Essential Social, Cultural and Legal Perspectives on Cormorant-fisheries Conflicts







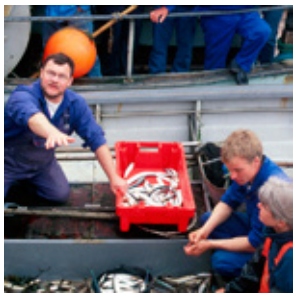
Photographs — INTERCAFE

cost
EUROPEAN COOPERATION
IN SCIENCE AND TECHNOLOGY

Essential Social, Cultural and Legal Perspectives on Cormorant-fisheries Conflicts









Photographs—INTERCAFE

Mariella Marzano and David N Carss (Editors)

ACKNOWLEDGMENTS

This publication has been produced by **INTERCAFE's** Work Group 3, the 'Linking Science with Policy and Best Practice' group, which comprised 19 researchers from 13 countries across Europe and beyond (for details of WG3 participants, please see Appendix).

The authors of this publication are given at the start of each chapter.

Helpful comments and corrections on various drafts were provided by the above and also by: Bruno Broughton, Sandra Bell, Miha Janc and Norman Dandy.

A number of people kindly provided photographs for inclusion and individual sources are acknowledged under each picture.

Numerous participants from **INTERCAFE's** other two Work Groups made contributions to the 'Linking Science with Policy and Best Practice' group meetings, and these meetings were also informed on occasions by discussions with invited experts and local stakeholders. Wherever appropriate, information from these sources has also been incorporated into this publication.

CONTENTS

PREFACE 6

1 INTRODUCTION AND BACKGROUND TO INTERCAFE'S SOCIAL, CULTURAL AND LEGAL PERSPECTIVES 9
1.1 Cormorant-fisheries conflicts 9
1.2 Introduction and background to Work Group Three 11
1.3 Managing expectations 12
1.4 Why include social, cultural and legal components? 12
1.5 How were the areas of study chosen? 14
1.6 Overview of WG3 work 14

PART ONE: PROCESSES

2 INTRODUCTION TO PROCESSES 20

3 FROM SCIENCE TO INTERDISCIPLINARY COLLABORATION: successfully co-managing human:wildlife conflicts 22
3.1 Human:wildlife conflicts in context 22
3.2 Case studies of HWC 25
3.3 Discussion and Conclusions 38

4 WILDLIFE MANAGEMENT PLANS: concepts and diversity 45
4.1 Introduction 45
4.2 Background 45
4.3 From conservation to management 47
4.4 Common objectives of management plans 49
4.5 The emphasis on scientific knowledge in management plans 53
4.6 Acknowledging different types of knowledge and expertise 54
4.7 MPs and legitimacy 55

5 THE INCORPORATION OF SCIENTIFIC CONTRIBUTIONS AND OTHER STAKEHOLDERS' VIEWS INTO MANAGEMENT PLANS: an analysis for 'conflict' species 58
5.1 Introduction 58
5.2 Introduction and methodological approach 59
5.3 Who is involved in developing Management Plans — a quantitative approach 61
5.4 Redundancy analysis: a general overview of the MP process 65
5.5 Qualitative approaches to exploring the inclusion of science: expertise, stake-holder involvement and conflict management in MPs 66
5.5.1 Background to three Finnish MPs 66
5.5.2 Background to three Swedish MPs 68
5.5.3 Comparing MPs 71
5.6 Stakeholder representation and public participation 71
5.6.1 The Finnish MPs 71
5.6.2 The Swedish MPs 73
5.6.3 Comparing MPs 74
5.7 Recommendations in MPs for Conflict Management and Research 75
5.7.1 The Finnish MPs 75
5.7.2 The Swedish MPs 77
5.7.3 Comparing MPs 78
5.8 Summary of findings 79
5.9 The way forward — a few words on flexibility and adaptability in MPs 81
5.10 Appendix 1. Questionnaire One 83
5.11 Appendix 2. Questionnaire Two 83

PART TWO: FRAMING THE ARGUMENTS: SCIENCE, LAW, POLICY, AND THE MEDIA

6 INTRODUCTION TO FRAMING THE ARGUMENTS 85

7 LEGAL INSTITUTIONS AND INSTRUMENTS IN EU LAW 87
7.1 What is law and what can we expect from it? 87
7.2 The legal landscape 89
7.2.1 Different levels of legal systems 89
7.2.2 The EU: its institutions and legal instruments 90
7.2.3 Access to the Court of Justice 92
7.3 The Wild Birds Directive 93
7.4 Concluding Summary 96

8 SOME THOUGHTS ON SCIENCE, LAW, AND POLICY 98
8.1 Introduction 98
8.2 Legitimacy 99
8.3 The role of science in law and policy 100
8.3.1 Science in policy-making 101
8.3.2 Science in standard-setting 102
8.4 Science, Law and Policy in the Cormorant-Fisheries Conflict 103
8.5 Conclusions 105

9 MEDIA REPRESENTATIONS OF CORMORANTS: a preliminary analysis 107
9.1 Introduction 107
9.2 Methods 109
9.2.1 General approach 109
9.2.2 Data analysis 110
9.2.3 Data limitations 110
9.3 Narrative analysis of media representations of Cormorants at the pan-European scale 111
9.3.1 Exploring the material 111
9.3.2 Meta-narratives and media accounts 112
9.3.3 Main rhetoric devices used by spokespersons 114
9.4 The 'reliability' of media articles 118
9.4.1 Reliability by year of publication 119
9.4.2 Reliability by media source 119
9.4.3 Reliability by main spokesperson 120
9.5 pan-European summary 121
9.6 Media representations of Cormorants in the Czech Republic 122
9.6.1 Narratives and rhetorics 123
9.6.2 Comparing the perspectives and opinions of fish farmers and the public 127
9.7 Summary and conclusions 130

10 ETHICAL PERSPECTIVES IN LAW AND PUBLIC DEBATE 136
10.1 Introduction 136
10.2 Background 136
10.3 Elements of ethical analysis 138
10.3.1 The main schools of thought 138
10.3.2 Prioritising Competing Interests 141
10.4 Applying Ethical Perspectives to the Cormorant-Fisheries Conflict 143
10.5 Conclusions 146

PART THREE: CASE STUDIES, SUGGESTED READING AND NEXT STEPS

11 INTRODUCTION TO CASES, CONTEXTS, AND FURTHER THOUGHTS 149

12 EXPLORING DIFFERENT CONTEXTS WITHIN EUROPEAN CORMORANT-FISHERIES CONFLICTS USING A 'CASE STUDY' APPROACH 151
12.1 Introduction 151
12.1.1 The Case Study concept 152
12.2 Methodological approach 153

13 POND FISH FARMING 157
13.1 Environmental and Social Contexts 157
13.2 Cormorants, Numbers and Associated Problems 163
13.3 Legal/Policy and Economic Contexts 167
13.4 Management Measures 172

14 COASTAL (OPEN SEA) FISHING WATERS (BALTIC) 178
14.1 Environmental and Social Contexts 178
14.2 Cormorants, Numbers and Associated Problems 181
14.3 Legal/Policy and Economic Contexts 182
14.4 Management Measures 184

15 DELTA AND LARGE LAGOON FISHERIES 187
15.1 Environmental and Social Contexts 188
15.2 Cormorants, Numbers and Associated Problems 192
15.3 Legal/Policy and Economic Contexts 194
15.4 Management Measures 195

16 RIVERS AND RECREATIONAL FISHERIES 198
16.1 Environmental and Social Contexts 199
16.2 Cormorants, Numbers and Associated Problems 201
16.3 Legal/Policy and Economic Contexts 204
16.4 Management Measures 206

17 CASE STUDIES: a synthesis 209
17.1 Environmental and Social Contexts 209
17.2 Cormorants, Numbers and Associated Problems 211
17.3 Legal/Policy and Economic Contexts 213
17.4 Management Measures 215
17.5 Contextual summary 217
17.5.1 Environmental and Social Contexts 217
17.5.2 Cormorants, Numbers and Associated Problems 217
17.5.3 Legal/Policy and Economic Contexts 218
17.5.4 Management Measures 218

18 FURTHER READING ON KEY 'CONTEXTUAL' THEMES 220
18.1 Introduction 220
18.2 Wetlands 220
18.3 Cormorants and Fish 230
18.4 Economics – Valuation and Compensation 234
18.5 Human:wildlife Conflicts 243
18.6 Conflict Management 249
18.7 Science-Policy-Society Relationships 255
18.8 Environmental Law, Ethics and Governance 258

19 INTERCAFE'S APPROACH TO CORMORANT-FISHERY CONFLICTS IN EUROPE AND THE MIDDLE EAST: building an effective multi-national conflict management process for complex human:wildlife interactions 265
19.1 Introduction 265
19.2 Conflict Management 266
19.3 Conflict Analysis 268
19.4 Designing a Conflict Management Process 272
19.5 Managing a Conflict Management Process 273
19.6 Capacity Building 275
19.7 Gaps and Next Steps 276

APPENDIX — WORK GROUP 3 MEMBERSHIP 279

PREFACE

This publication is supported by **COST**. It is one of the outputs of the **INTERCAFE COST** Action (635). **COST** (European Cooperation in Science and Technology) is the longest-running inter-governmental network for cooperation in research across Europe.

INTERCAFE — 'Conserving biodiversity: interdisciplinary initiative to reduce pan-European cormorant-fishery conflicts' — was awarded funding for four years (2004–2008). **COST** Actions are charged with directing European science and do not pay for researchers' time. Instead, funding was available for **INTERCAFE** to organise and run a series of international meetings, drawing together researchers from a number of disciplines (bird-related and broader ecology, fisheries science and management, sociology, social anthropology and international law) and other experts (very often connected with fisheries production, harvest and management, or to regional/national policy and decision-making). Under **INTERCAFE's** coordination, interested parties, from local stakeholders to international policy-makers, were thus offered a unique opportunity to address European cormorant-fisheries issues.

The main objective of **INTERCAFE** was to improve European scientific knowledge of cormorant-fisheries interactions in the context of the interdisciplinary management of human:wildlife conflicts at local to international levels across Europe. It also aimed at delivering a coordinated information exchange system and improved communication between stakeholders. To this end, **INTERCAFE** attempted to address:

i. the fundamental distrust between the main stakeholder groups which was compounded by the disparate and uncoordinated nature of available sources of information;
ii. the necessity of applying an integrated interdisciplinary research approach (biological, social, legal) to cormorant-fishery conflicts (as these are as much a matter of human interests as they are of biology or ecology), thus recognising the need for different perspectives in the development of collaborative strategies; and
iii. the lack of an integrated understanding of the interdisciplinary factors at the heart of cormorant-fisheries conflicts that precludes the provision of useful and practical information and advice to all interested/affected parties.

The **INTERCAFE** network comprised almost seventy researchers from all 27 EU Member States (except Luxemburg, Malta and Spain) and other countries in continental Europe (Georgia, Norway, Serbia) and the Middle East (Israel). In addition to these 28 countries, Ukraine and Croatia were also associated with the Action. **INTERCAFE** held a series of eight meetings, each themed around a topic particularly relevant to the host country:

1. Gdansk, Poland, April 2005 — *'Cormorant ecology, commercial fishing and stakeholder interaction'*
2. Saxony, Germany, September 2005 — *'Commercial carp aquaculture'*
3. Hula Valley, Israel, January 2006 — *'Cormorant-fishery conflict management in the Hula Valley, Israel'*
4. Bohinj, Slovenia, October 2006 — *'Angling and EU legislation'*
5. Hanko, Finland, April 2007 — *'What to do when the cormorant comes'*
6. Po Delta, Italy, September 2007 — *'Extensive aquaculture systems and relationships between stakeholder perspectives and different spatial and institutional levels'*
7. South Bohemia, Czech Republic, April 2008 — *'Management practices in a complex habitat mosaic and at local, regional and national levels'*
8. Paris, France, September 2008 — *'The management of cormorant-fisheries conflicts in France and the wider European context'*

At each meeting, **INTERCAFE** participants worked in one of three Work Groups, covering the broad aims of the Action:

- Work Group One — Ecological Databases and Analyses
- Work Group Two — Conflict Resolution and Management
- Work Group Three — Linking Science with Policy and Best Practice

Most meetings included a field visit to allow participants to see Cormorant-fishery conflicts at first-hand. In addition, wherever possible the **INTERCAFE** budget was also used to invite appropriate local, regional, national or international experts to these meetings. Through these discussions and interactions, **INTERCAFE** participants tried to understand the diverse Cormorant-fishery conflicts in Europe and beyond.

This publication is one of a series of **INTERCAFE** outputs aimed at providing readers with an overview of European Cormorant-fishery conflicts and associated issues, which is as comprehensive as possible given the budgetary and time constraints on all of INTERCAFE's participants.

The **INTERCAFE** publications are:

- Cormorants and the European Environment: exploring cormorant status and distribution on a continental scale. (ISBN 978-1-906698-07-2)
- The **INTERCAFE** Field Manual: research methods for cormorants, fishes, and the interactions between them. (ISBN 978-1-906698-08-9)
- The **INTERCAFE** European Cormorant Management Toolbox: methods for reducing cormorant problems at European fisheries. (ISBN 978-1-906698-09-6)
- Cormorant-fisheries conflicts at Carp ponds in Europe and Israel: an **INTERCAFE** overview. (ISBN 978-1-906698-10-2)
- Essential social, cultural and legal perspectives on cormorant-fisheries conflicts. (ISBN 978-1-906698-11-9)

Highlights from these publications are available in **INTERCAFE**: an Integrated synthesis (ISBN 978-1-906698-06-5) and also from http://www.intercafeproject.net

Drawing on **INTERCAFE's** ability to develop a network of researchers and the Action's privileged opportunity to see and hear about Cormorant-fishery issues across Europe and beyond, WG3 used each meeting to examine 'real world' situations with stakeholders and explore the links between biological and social scientific communities, local stakeholders and policy advisors in relation to human:wildlife conflicts and their management.

Membership of **INTERCAFE's** WG3 comprised researchers from a wide range of disciplines and interest groups, including both natural and social scientists, researchers and other stakeholders. Consequently, WG3 participants often worked outside their traditional roles and areas of research interest and/or expertise through collaboration with others. There was no pre-prescribed work plan for WG3; instead, the group used Case Studies and other **INTERCAFE** meetings to hear as many viewpoints on Cormorant-fisheries matters as possible. As this information was collated, WG3 recognised issues recurring consistently during meetings and began to explore these key themes in some depth. This work is presented here in three parts.

The chapters in Part One focus on the processes by which (i.e. 'how') different disciplinary (e.g. natural and social science) perspectives are integrated, particularly in relation to concerns over how best to manage 'problem wildlife' in general and Cormorants in particular. They also examine why wildlife management is sometimes thought to be necessary and what it aims to achieve. Importantly, exploring the practical integration of different knowledge and experiences helps broaden our understanding of the human dimensions of 'wildlife management', especially where this involves a mix of individuals and groups with perspectives and positions different to those of professional ecologists. The chapters in Part Two explore these differing perspectives and positions further by considering the role of socio-cultural issues in human:wildlife conflicts in terms of the diversity of positions taken or 'arguments' posed by various stakeholder groups. At one end of the spectrum, such positions are laid down as instruments in EU law and apply to all. At the other, the positions given or reported by the popular media are perhaps the most diverse and individual.

Despite the possible wide disparity here, an understanding of these two 'frames' (and their specific vocabularies) is important when considering Cormorant-fishery conflicts and associated issues. Here, WG3's work highlights the role of such socio-cultural issues in conflicts and their management within legal frameworks and shows that the positions taken very often differ between groups — be they local stakeholders, policy advisors, or ecologists — and are influenced by people's values, attitudes, experiences and beliefs. Lastly, Part Three summarises **INTERCAFE's** Case Studies and other opportunities that the research network had to discuss conflict issues with local people and other stakeholders. This reveals a recurring set of four specific (through not completely mutually exclusive) 'contextual themes' which are described and discussed. Further reading and detailed commentaries are given on a number of social, cultural and legal perspectives — consideration of these appears essential if Cormorant-fisheries conflicts are to be better understood and addressed. Finally, some reflections on the **INTERCAFE** 'conflict management' process itself are presented in a chapter that also looks to possible future next steps in relation to such a process involving Cormorant-fisheries issues.

The deeper explorations of WG3 reported here show clearly that Cormorant-fisheries conflicts are as much a matter of human interests as they are of biology. This suggests that continued, integrated, interdisciplinary scientific research (biological, social, economic) is needed if these different perspectives are to be applied effectively to the development of any sustainable form of collaborative management for Cormorant-fisheries conflicts across Europe.

1 INTRODUCTION AND BACKGROUND TO INTERCAFE'S SOCIAL, CULTURAL AND LEGAL PERSPECTIVES

David N Carss and Mariella Marzano

1.1 Cormorant-fisheries conflicts

Across Europe and beyond, 'Cormorant-fisheries conflicts' is a catch-all expression that covers a diverity of issues relating to interactions between Great Cormorants (*Phalacrocorax carbo*) and fisheries interests. Whilst these interactions have been covered in great detail elsewhere (e.g. Keller & Carss, 2003, Carss, 2003, Carss & Marzano, 2005, van Eerden *et al*. 2012), a short overview of the situation may be helpful here. Cormorants feed almost exclusively on fish which they catch in virtually all but the smallest fresh (running and still) waters, shallow coasts and brackish habitats. The birds also have a diverse diet, taking a very wide variety of species but usually preying on the most commonly occurring ones.

Bird numbers, distribution and movements

Cormorant numbers have increased dramatically in Europe in the last 20–30 years, most likely due to reductions in environmental pollution, human persecution, and a non-limiting food supply. This numerical increase has also led to a considerable expansion in the species' geographical range, with birds returning to their former haunts and also 'colonising' new territories. These birds are highly flexible in their breeding and feeding habitats and are also very mobile — both locally in terms of feeding-site choice and internationally in relation to their seasonal migration patterns. Birds generally tend to breed in more north-eastern regions and overwinter in more south-western ones.

Cormorants and man

Like almost all wild birds, Cormorants are protected (from killing or deliberate disturbance at some times of year, for example) under EU environmental law enacted through the national legislation of Member States. Given their flexibility in both foraging site and prey choice, Cormorants frequently come into conflict with human fisheries interests, be they recreational angling, commercial fishing or fish farming. The main issue is that many of these fisheries interests believe that the birds are consuming so many fish that they are reducing their catches, thus causing frustration and economic difficulties and hardship. In some cases Cormorants are unable to swallow the larger fish they catch but these fish are damaged by manipulation in the bird's beak and have reduced market value and increased risk of disease. Indirect effects are also thought to occur with the presence of foraging Cormorants affecting the behaviour of fish and making them less 'available' for people to catch or perhaps reducing their feeding and/or growth rates. Whilst many of the commonest fish species eaten by Cormorants are of little or no commercial or sporting value, some claim that a reduction in stocks of these fishes due to Cormorant predation reduces the food supplies available for fish that do have commercial value. Although the most frequently

reported problems with Cormorants are clearly related to fisheries, the guano (faeces) produced by birds at breeding and roosting sites is known to eventually kill trees — which, when alive, may have commercial or amenity value. Guano production can also alter the local floral community, which can have conservation consequences for some rare or very localised plant species. In some places the presence of relatively large aggregations of Cormorants, in colonies or roosts, and the associated noise and smell is considered by some to be an unwanted intrusion in their local land/waterscape.

Management

Several issues relating to Cormorant management are important, particularly in relation to fisheries. The first involves the damage they are claimed to cause. Despite some considerable efforts, there is very little unequivocal (natural) scientific evidence that Cormorants are directly responsible for reductions in fish populations, stocks, or catches in all but the simplest fishery systems. This is not necessarily because no damage occurs but is because demonstrating a 'Cormorant effect' scientifically is very difficult in almost all wetland situations (see chapter 10 of Carss *et al*. 2012).

There is little doubt that many fisheries are facing problems with declining catches which are often associated with changing fish communities and size-classes but there is also wide acknowledgement that these are the result of a considerable number of interacting factors (see chapter 13 of van Eerden *et al*. 2012) of which Cormorants are only one. Understanding the role and magnitude of these various factors is not a trivial task for biologists — nor is teasing out the relative 'importance' of Cormorants in this complex situation.

Naturally, many people with fisheries interests have long been frustrated by the inability of scientists to 'prove' that Cormorants are causing damage. Linked to this, it is possible to manage and even kill Cormorants within EU law (under special license) if they are causing 'serious damage'. However, given the difficulties in quantifying 'damage' — along scientific lines at least — this is another source of frustration and so there is debate about how any damage caused by the birds can best be quantified.

Even if the issue of how much damage Cormorants cause could be recorded or quantified and then addressed satisfactorily, there are still major issues to consider in terms of management. There are demonstrable examples where some form of site-specific management action has solved (or at least reduced) Cormorant problems at fisheries (e.g. see chapter 6 of Russell *et al*. 2012). On the other hand, there are also many situations where currently applied site-specific management actions do not work (e.g. at large-scale, 'extensive' fisheries). Whilst other site-specific 'tools' could be devised or serious trials might improve the efficiency of current techniques (and there is probably a lot more work that could be done in this area), many people intuitively think that problems at fisheries would be best reduced (and most quickly) if there were fewer Cormorants. However, even this point is keenly debated. The best professional judgement of many biologists data suggest that 'a substantial reduction in [Cormorant] population size does not necessarily lead to a substantial reduction in the number of Cormorants feeding on so-called problem areas' (van Dam & Asbirk, 1997: 89). Nor do these biologists think that ecomonic losses would decline proportionately with a decline in the number of birds feeding in a problem area. Furthermore, evidence suggests that given the current large numbers of European Cormorants (and their high mobility), any reduction in their numbers in one area may be quickly compensated for by an influx of birds from elsewhere in Europe.

Nevertheless, when thinking of reducing Cormorant numbers (although it is far from clear to what level), it is not obvious how this could be achieved: full-grown birds could be killed or reproductive output reduced at colonies (e.g. through oiling eggs) or a combination of these, or other, methods used. When considering shooting, perhaps the most crucial issue is the long-distance, seasonal, migration of birds between breeding and over-wintering areas. Very often Cormorants cause problems at fisheries in countries that they visit in the winter or on migration to/from their wintering areas but these birds actually breed in other countries. The issue thus arises of who should take responsibility for reducing their numbers.

In terms of reducing breeding productivity there will undoubtedly

be a time-lag between when eggs are destroyed and when a consequent effect is seen in terms of a reduction in the numbers of full-grown/breeding birds. There is also possibility that birds not affected by management actions will merely compensate for a reduction in the population size through factors such as improved survival and increased breeding productivity. In very practical terms, it is also not clear who would undertake (or pay for) such population reduction programmes, nor for how long they would have to be continued (although this is likely to be several years). Given all these uncertainties, there are also debates as to the relative merits of pan-European versus more local site-specific management, as well as how site-specific actions may be developed and/or integrated to be effective over increasingly wider geographical areas.

1.2 Introduction and background to Work Group Three

As described above, there are clearly many important issues to be considered in relation to Cormorant-fishery conflicts. Furthemore, the often diverse differences of opinion concerning these issues are inevitably at the heart of resulting conflicts. At its simplest, conflicts revolve around identifying and quantifying what the Cormorant problem really is. This includes the magnitude of any damage the birds are causing to fisheries and its relative importance in relation to all the other factors (environmental and anthropogenic) that are affecting them. It also encompasses what people feel when they consider that the birds are damaging their livelihoods and/or way of life. In addition, it is important to decide and implement what, if anything, should be done about the problem. This includes understanding the flexibility of the bird's habitat requirements, their breeding and foraging site-selection and their seasonal migration. The necessity (or not) of some type of management to address the problem also requires consideration. This includes the form (and the geographical- and time-scales over which) any actions should take, their ultimate aim, cost-effectiveness and sustainability, how they fit with environmental legislation, and who is ultimately responsible for doing something, paying for it and monitoring the subsequent effects.

Drawing on **INTERCAFE's** ability to develop a network of researchers and the Action's privileged opportunity to see and hear about Cormorant-fishery issues across Europe and beyond, WG3's 'Essential Social, Cultural and Legal Perspectives on Cormorant-fisheries Conflicts' offers an exploration of the different — but often tightly interwoven — contexts that are apparent when Cormorant-fishery problems are examined. Clearly, Cormorant-fishery problems also have a strong ecological context (see 1.1 and van Eerden *et al*., 2012) and so this was also integrated within WG3's activities. Thus, the work here further develops our understanding (e.g. van Dam & Asbirk, 1997; Carss & Marzano, 2005) that Cormorant-fishery problems are not merely ecological ones and that, like other situations (e.g. Knight, 2000), this apparent human:wildlife conflict is, in practice, also a human:human one. As this publication demonstrates, we are not considering a single conflict here but a multitude of diverse conflicts. However, these often share recurring issues and have common features despite differing in circumstance, geographical location, fishery type, human values and responses.

INTERCAFE was citicised by some for being a group of 'plain bird protectors' but this was not the case. The Action was an interdisciplinary endeavour with only 12% of participants having bird biology as their main area of expertise. The remaining participants were social scientists (12%), ecologists with policy-management links (16%), ecologists (24%), and fisheries scientists or managers involved in fish farming, angling, and commercial fisheries (36%).

Before **INTERCAFE** was established, the aim of WG3, in theory, was to work towards 'Linking Science with Policy and Best Practice'. However, in reality, WG3's activities could not be reduced to such simplicity. As Hargreaves *et al*. (2002:5) point out when discussing science and public (societal) affairs: 'what matters here, we would suggest, is not so much the science itself, but establishing clear connections between science, policy and the broader public interest'. Thus a quote offered by a journalist from the USA in relation to environmental conflicts (see Marzano and Carss, 2006: 23) that 'Nothing is clear but everything is interconnected' quite neatly encapsulates many aspects of the

Cormorant issue across Europe and beyond that **INTERCAFE's** WG3 was attempting to explore.

No research funding was available within **INTERCAFE** (as is the case for all **COST** Actions) which meant that WG3 was primarily involved in developing a series of 'thought pieces' based on the social, cultural and legal perspectives (linked, of course, to ecological ones) that appear essential to a better understanding of the constituent parts within Cormorant-fisheries conflicts (see also 1.5). The hope was that this better understanding would form some foundation for more effective mechanisms to both manage these conflicts and for addressing the very real problems that face people. In this respect, a more focussed social element to **INTERCAFE's** work developed, based on the need of individuals, institutions, regions, and countries to both tell their story and have it heard at **INTERCAFE** meetings.

In practice, two key elements developed through WG3's activities. First, The Group attempted to explore the complex nature of Cormorant-fisheries conflicts, investigating social, cultural, environmental, economic, and political contexts. We did this by meeting groups of individuals with different backgrounds, interests, experiences and concerns and by discussing and recording what they considered to be the key issues concerning Cormorants and fisheries. Second, the Group worked on how best to present its findings and thoughts in a way that would be useful to others — be they people directly affected by the issues or those involved less directly, for example as researchers or policy-makers.

1.3 Managing expectations

In several ways, the second task described above — the one of communication — is also linked closely to the issue of 'managing the expectations' of those awaiting **INTERCAFE's** outcomes in terms of what the Action could reasonably achieve.

INTERCAFE was devised as a means of sharing knowledge and providing useful and practical information to others, including researchers, natural resource managers and decision-makers. The Action was not a lobby group nor did it have any formal links with national or international policy-makers. Instead, the objectives of **INTERCAFE** were to explore and offer resolutions through (i) getting scientists together — bringing different knowledges, scientific studies and experiences in one place, (ii) including other groups of people to encourage knowledge-sharing, and (iii) developing dialogue between those who need to talk to each other. **INTERCAFE** did not have resources to do the necessary 'capacity building'[1] but, like REDCAFE's case study in Lea Valley (Carss, 2003: 131–159), it did — through its meetings — attempt to provide a forum for the relevant parties to build relationships.

We have made no attempt here to achieve consensus but instead have worked to highlight differing perspectives and to give a 'local voice' to these. Nevertheless, the work undoubtedly revealed several recurring themes that seem common to Cormorant-fisheries conflicts in Europe and beyond, and we believe this exploration and documentation to be a very useful exercise. We are also aware that this is but one way of looking at these issues. It is one governed by the expertise and research/personal interests of the 67 **INTERCAFE** participants and of those local experts (around 170 individuals) who took the time and effort to provide further input to our work.

1.4 Why include social, cultural and legal aspects?

INTERCAFE considers that social, cultural and legal perspectives are essential components of both the conflicts and of any attempts to resolve them. Indeed, the Action builds on a growing body of academic evidence (e.g. Lewicki *et al*., 2003: O'Leary & Bingham, 2003; Stoll-Kleemann & Welp, 2006) that a better understanding of social elements is often key to addressing human:wildlife conflicts.

The (apparent) dichotomy at the heart of **INTERCAFE's** exploration of perspectives within the issues of Cormorant-fishery interactions and conflicts is well illustrated by two books, both called 'Natural Enemies'. The first (Crawley 1992) is subtitled 'the population biology of predators, parasites and diseases' and is an overview of broad patterns found in the population biology of natural enemies. It explores the role of these organisms in the

[1] The UN Development Programme (UNDP) has defined 'capacity' as 'the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner.'

population dynamics and evolution of their prey. As the nucleus of all Cormorant-fisheries interactions is the biological fact that the birds feed almost exclusively on fish (Nelson, 2005), it is perhaps not surprising that 'previous attempts to resolve Cormorant-fisheries conflicts have relied largely on the work of biologists' (Carss *et al*. 2009: 100). From a biological perspective, Cormorant-fishery interactions revolve around such issues as foraging behaviour, the use, suitability, availability and preference of particular prey types (or species, or sizes), the refuges available to prey, compensation mechanisms within a prey population, the numerical rate of change within the predator population, the abundance of predators, and their movements. These issues, and more, are discussed in more detail in chapter 10 of Carss *et al*. (2012). To biologists and ecologists, Crawley's (1992) world of natural enemies represents the main foundation for their understanding of Cormorant-fishery interactions.

Cormorants and modern bony fishes had coexisted for some 40 million years before the advent on the genus *Homo*, which includes modern human beings, during which time the birds and fishes co-evolved. Predation acted as an important agent of natural selection, making future generations of fish more difficult to catch which, in turn and in parallel, is likely to have stimulated the evolution of more efficient predators: the predator-prey relationships between Cormorants and fishes being in what has been termed 'an evolutionary play' (Crawley, 1992, p.xii). It is only with the arrival of humans that some of these relationships have become 'conflicts' and are deemed to require human intervention and management. As the nucleus of all Cormorant-fisheries conflicts is neither fishes nor Cormorants but is actually humans and their interests, it is perhaps not surprising that the purely biological approach to resolving such conflicts has often been inadequate (see overview in Carss *et al*. 2009). The second book entitled 'Natural Enemies' (Knight, 2000), is subtitled 'people-wildlife conflicts in anthropological perspective' and is an examination of the human dimensions of people-wildlife conflicts from a social anthropological perspective, which encapsulates the social and political contexts of conflicts.

From a social science perspective Knight's (2000) world of natural enemies represents many of the key elements involved in people's understanding of Cormorant-fisheries conflicts and their causes. These elements include such issues as the concepts of pests and nature protection, the attribution of blame to (and demands for political redress from) the state, and of processes (e.g. wildlife ecology and management; law, legislation and governance; media dissemination; economies) that may well span local, national and international levels (Knight, 2000), issues of governance and legislation and of Cormorants being a 'symbolic vehicle' for conflicts between different people, and between them and the state (Carss *et al*. 2009, p.110). To social scientists, Knight's (2000) world of natural enemies represents many of the key elements involved in people's understanding of Cormorant-fisheries conflicts, their causes and any possible solutions.

Given this and the fact that, in human:wildlife conflicts, 'there is one common thread: the thoughts and actions of humans ultimately determine the course and resolution of the conflict' (Manfredo and Dayer, 2004: 317), the social aspects of conflicts have to be addressed at a variety of scales, ranging from the individual ('micro') level to the cultural ('macro') level. To **INTERCAFE**, with a focus on Cormorant-fisheries conflicts, the micro level would include such things as an individual's response to the conflict in terms of values — of how he/she views Cormorants in relation to aquatic systems, how much damage they think the birds cause, how in control of the situation they feel they are, and how likely they are to accept novel management actions. Similarly, the macro level encompasses the unique patterns of thought that distinguish social groups (e.g. fisheries associations, angling clubs, conservation NGOs, natural and social scientists, policy-makers and managers at local to international scales) and wider societies.

Given that human:wildlife conflicts are often human:human, and that focussing management on wildlife often provides only a 'temporary fix … whereas changing human behaviours can provide long-term solutions' (Baruch-Mordo *et al*., 2009: 219), it was clearly important for **INTERCAFE** to explore human perspectives and values including group identities, positions and power relations. Moreover, if only a 'pestilence' approach was taken

(i.e. just dealing with Cormorants as predators considered to be damaging to fisheries), this would exclude many of the key issues that concern people in relation to the ecology and management of European wetlands (see Carss *et al.*, 2009). This approach could thus ignore the real problems that many fisheries are facing, such as large-scale anthropogenic habitat and hydrological modification with concomitant changes in water levels, water quality, aquatic vegetation, and the abundance and structure of fish communities.

INTERCAFE also acknowledges the importance of economic perspectives to Cormorant-fisheries conflicts. At its most basic, an economic perspective could be used to assess the damage suffered by fisheries (be they recreational or commercial) as a result of Cormorant predation and/or presence. Similarly, any attempts to reduce or mitigate against such damage will have an associated financial cost. At its simplest, comparison between the costs of damage and that of preventing it would at least allow some informed debate over the cost-effectiveness of potential management actions. Unfortunately, **INTERCAFE** found it very difficult to access much publically-available economic information relating to Cormorant issues. This is a situation also encountered by van Dam & Asbirk (1997: 123–129) in terms of assessing rigorously the cost-effectiveness of potential management actions, particularly at larger — regional, national, international — scales. This suggests that detailed explorations of economic perspectives of Cormorant-fisheries conflicts in quantitative terms are still required. Nevertheless, ecomonic perspectives were addressed to some extent, in a qualitative manner, wherever possible during WG3's work.

1.5 How were the areas of study chosen?

INTERCAFE's WG3 comprised people from a wide range of disciplines and interest groups, including both natural and social scientists, researchers and other stakeholders. In practice, this meant that people were often working outside their traditional roles and areas of research interest and/or expertise: with 'natural' scientists working with 'social science' methods in collaboration with social scientists and *vice versa*.

Whilst WG3's work was grounded by academic research principals and founded on specific concepts of general academic interest (see 1.6 for overview), it's aim was not to produce a series of independent, stand-alone, academic studies. Instead WG3 aimed to promote links between the biological and social scientific communities, local stakeholders and policy advisors in order to appreciate the role of socio-cultural issues in such conflicts, their management within legal frameworks, and efforts towards their resolution.

1.6 Overview of WG3 work

Part One: Processes

Here the emphasis is on exploring how different perspectives are expressed and integrated in relation to managing 'problem wildlife' including Cormorants. Part One moves through some of the processes behind addressing human:wildlife conflicts, beginning with relatively simple cases and moving on to more complex ones.

Chapter 3 examines literature concerned with specific human-wildlife conflict cases where clear scientific understanding and application tends to be all that is needed to address the problem. Nevertheless, such cases often require some sociological scrutiny to understand the underlying problems and to develop co-management for implementing and monitoring any resulting management actions. Chapter 4 explores situations that are generally longer-term and/or occur over larger geographical areas than those considered in the previous chapter. In such cases, management plans (MPs) are generally seen as a good approach to addressing conflicts because action is often required over considerable temporal and spatial scales — with an appropriate increase in social input. Moreover, the chapter shows that MPs are driven by a wide range of incentives, including the management of invasive species or those of commercial importance or of conservation concern. Other MPs, including those for Cormorants, arise from the desire to manage non-threatened species that occur in numbers deemed undesirable by some.

In these chapters, the concept of 'governance' allows WG3 to highlight both expertise and the roles of different types of knowledge that are incorporated during the development of MPs. Governance has many definitions

(Engelen *et al*., 2008) but here it refers to multi-level management institutions (such as national and regional environmental agencies) that interact during the planning and decision-making processes involved in the development of MPs in the domains of the state, private sector and civic society. Consideration of the concept thus broadens the scope of WG3's exploration into management interactions and decision-making over environmental issues and is highly appropriate to issues at the pan-European level as suggested by the notion of the EU as 'a complex and very dynamic polity' (Fairbrass & Jordan, 2001: 499) where descision-making powers are shared between different vertical tiers of authority — from the supranational to the subnational.

These aspects are covered in more depth in chapter 5 which examines MPs in relation to how decision-making is coordinated across the different sectors involved in the issue. This chapter is an exploration of how science and other stakeholders' views have been incorporated into a number of MPs dealing with so-called conflict species. Here, MPs are considered as instruments for stakeholder participation and conflict mitigation. They are examined to determine whether, and how, science was incorporated into the process of devising them, and to what level and extent were stakeholder representation and public participation also included in the process. Whilst all three chapters here follow the paradigm that biological science alone does not provide complete understanding of, nor solutions to, human:wildlife conflicts, chapter 5 in particular emphasises the importance of understanding the social issues involved in conflicts if management aims are to be agreed and achieved (see also Marshall *et al*., 2007).

As Madden (2004:250) points out, 'half of the challenge of addressing the conflict is in understanding the human dimension with its social, cultural, political, economic and legal complexities'. Thus the three chapters in Part One explore several of these social, political, and economic issues in terms of their implicit or overt incorporation into MPs. Other issues such as the cultural and legal complexities are covered in Parts Two and Three.

Part Two: Framing the Arguments

Here, some aspects of how people 'see' human:wildlife conflicts (HWC) are explored, focussing on issues pertinent to European Cormorant-fisheries conflicts and using the over-arching concept of 'frames and framing' (e.g. Muter *et al*., 2009: 267–68 and see below). This approach is useful because framing encapsulates the 'psychological lenses or assumptions that affect how [individuals] see and interpret the world around them' (Gardner, 2003) and because frames are known to influence beliefs about how wildlife-related issues should be addressed and resolved (Siemer *et al*., 2007). How people acquire information relevant to particular conflicts is also examined, as are the degrees to which perceptions differ between groups, and how local variation in these elements may be obscured in regional or national level debate (cf. Marshall *et al*., 2007). Overall, these issues are conveyed in our use of the word 'arguments' — which is taken to denote the positions that people take as a consequence of their values, attitudes and beliefs.

In terms of addressing the Cormorant problem, there is often an inextricable link between management and legislation. **INTERCAFE's** work encompasses both regional/national legislation but also leads ultimately to international legislation at the EU level. Chapter 7 is thus a brief review of legal institutions and instruments in EU law and focusses on the Wild Birds Directive — the ultimate legal recourse that people have access to in terms of managing Cormorants in the EU. Chapter 8 then considers the relationships between science, law, and policy (analogous to discussions of management plans in Part One) that lie at the heart of environmental issues such as the Cormorant-fisheries conflicts (Tarlock, 2002). In many ways, these two chapters are explorations of relevant issues at the 'macro level' — that is, the cultural level — (see discussion in 1.4 above and Manfredo and Dayer, 2004). On this level, Madden (2004: 250–51) suggests that one important lesson from HWC is that they are often fuelled when (a) people feel that they lack control over addressing a problem, and (b) where perceptions of potential risk are high. In examining legal perspectives, the first two chapters therefore address one of the most frequently cited reasons why people often feel they do not have control within Cormorant-fisheries conflicts: they are ultimately constrained by, and/or do not fully understand, the universal reasoning and application of EU laws.

In terms of how people percieve the risks within Cormorant-fisheries

conflicts, the REDCAFE Concerted Action showed that other media than the scientific literature were most commonly used sources of information on these matters amongst stakeholders (Carss, 2003: section 3.3.7). At the 'micro' or individual level, the role of the non-academic media is likely to be very important through informing and reinforcing the values of individuals and their behaviour in relation to Cormorants. Chapter 9 examines general media representations of Cormorants available to people across a number of European countries and, more specifically, within the Czech Republic. Here, in one region of high conflict, such media representations are also compared with the knowledge and views of fishermen, local residents and visitors concerning Cormorants and their management alternatives.

The portrayal of the environment by the mass media is known to help the audience interpret various environmental issues and shape opinions about these issues (Jensen, 2003), and there is no doubt that the media greatly influence public risk perception. This is because most of the information the public has about risks comes by way of the mass media (Wiedemann and Schuetz, 2000: 42). Here, what are termed 'risk frames' can be used to apply the concepts of 'victims'and 'perpetrators' to human:wildlife conflicts. As chapter 9 shows, Cormorants — the perpetrators — are perceived, or portrayed, by many as being a very serious source of risk. In North America, Muter *et al*. (2009) used this approach to examine media coverage of Double-crested Cormorants (*P. auritus*) in the American Great Lakes in terms of both risk perceptions and management responses.

Perceptions of (and responses to) environmental conflicts are clearly very diverse and chapter 10 builds on an understanding that environmental issues and problems are described in different vocabularies and explained in various ways by different groups of people because they are complex and multi-dimensional (cf. Jamieson, 2008: 24–25). This chapter covers both macro (cultural) and micro (individual) levels in its exploration of ethical perspectives in law and public debate. Here the word 'ethical' is used because, as Jamieson suggests, environmental problems present themselves as having important ethical dimensions and so challenge our ethical and value systems. Thus, through a focus on law and public debate, chapter 10 considers what people deem to be right and wrong and good and bad. These are important issues because, as **INTERCAFE** has shown, these notions are often at the heart of European Cormorant conflicts and dictate what people consider to be the right — or best — way of approaching issues, defining and articulating problems, and resolving disputes.

Part Three: Case Studies, Suggested Reading and Next Steps

Here we summarise **INTERCAFE's** Case Studies and other opportunities that the research network had to hear and learn about Cormorant conflict issues through meeting local people and other stakeholders. Part Three also presents detailed commentaries and suggests further reading on a number of themes which recurred throughout the work of the Action before, summing-up and looking to the future, offering some reflections on the **INTERCAFE** 'conflict management' process itself.

INTERCAFE was able to explore Cormorant-fishery conflicts in its Case Studies and other meetings with stakeholder groups, and Chapters 12–17 offer one attempt to draw out the interconnections, similarities and differences between various elements of these diverse conflict situations. Chapter 12 introduces **INTERCAFE's** 'Case Study approach' and describes how the analysis follows a 'habitat/fishery-specific' categorisation (see van Eerden *et al*., 2012). The next chapters contain discussions and descriptions of (i) pond fish farming (chapter 13), (ii) coasts and open seas (chapter 14), (iii) deltas and large lagoons (chapter 15), and (iv) rivers and recreational fisheries (chapter 16). Within each of these, a number of contextual perspectives emerge that are described under a series of four headings: (1) environmental and social, (2) Cormorant numbers and associated problems, (3) legal/policy and economic contexts, and (4) management measures. Here, the importance of social issues embedded in HWC (e.g. Marshall *et al*., 2007) is clearly shown and understood. Furthermore, by developing a series of contextual perspectives, the complex and multi-dimensional nature of these social issues (e.g. Jamieson, 2008) and their relationship to ecological ones can be synthesised and summarised (chapter 17). In relation to Cormorant-fishery conflicts, such a distillation shows how various individuals

and institutions see information as being relevant and consider potential management options to be appropriate (e.g. Gardner, 2003).

During **INTERCAFE's** meetings a number of recurring themes emerged and chapter 18 offers suggested reading (with commentaries) on these, considering them to be highly relevant to European Cormorant-fishery interactions in their broadest sense. Here there is discussion of some of the significant literature on the relationships humans have with wetlands, the interactions between Cormorants and fish, and fisheries economics. This is followed by suggested reading on both human:wildlife conflicts and conflict management, and then by writings on the relationships between science, policy and society and on environmental law, ethics and governance. Reflecting **INTERCAFE's** interdisciplinary approach, these perpectives are also frequently integrated with biological and ecological ones throughout the chapter.

Chapter 19 ends this publication by examining **INTERCAFE's** approach to Cormorant-fisheries conflicts in Europe and Israel. As a form of self-reflection on the work of this network of researchers, there is a critical assessment of **INTERCAFE's** progress towards building an effective, multi-national, conflict management process for complex human:wildlife interactions. This examination encompasses how researchers within the network worked together on an interdiscipliary endeavour, building on calls for increased interdisciplinary approaches to addressing environmental issues (e.g. Mascia *et al*., 2003) and training researchers to do this (e.g. Zarin *et al*., 2003). Such self-reflection can be seen as part of a wider academic exploration of how interdisciplinarity works in practice (e.g. Campbell, 2005; Marzano *et al*., 2006) and also in terms of **INTERCAFE's** relationship with the wider world (and vice versa) where the need for such an examination is, in some ways at least, akin to those discussed by Gillespie (2007:681) in terms of social relations. Importantly, this chapter also identifies gaps in current understandings and begins to identify the next steps in the on-going endeavour to address Cormorant-fisheries conflicts.

INTERCAFE's WG3 has used strategies to incorporate the views of a wide range of stakeholders to consider European Cormorant-fisheries conflicts, while acknowledging the need to balance wildlife conservation and the safeguard of human interests (e.g. Treves *et al.*, 2006; Stringer *et al*., 2006). In doing so, there is an examination of the apparent mismatch between 'broad holistic questions typically posed in policy formation and narrow reductionist questions that are susceptible to scientific method' (Pullin *et al*., 2009). In acknowledgement of the growing importance of science-policy interfaces (van den Hove, 2007), perhaps the most important task has been an attempt to integrate ecological and human dimensions into a form that may be useful for adaptive management (e.g. Enck *et al*., 2006). Only by understanding the real concerns of many stakeholders, quantifying the economic aspects of Cormorant problems and their possible solutions, and by integrating these essential social, cultural and legal perpsectives with the essential biological ones, will some form of sustainable management solution to Cormorant-fisheries conflicts in Europe and beyond emerge.

References

Baruch-Mordo, S, Breck, S W, Wilson, K R, and Broderick, J. 2009. A tool box half full: how social science can help solve human-wildlife conflict. Human Dimensions of Wildlife, 14: 219–223.

Campbell, L M. 2005. Overcoming obstacles to interdisciplinary research. Conservation Biology, 19: 574–577.

Carss, D N (editor). 2003. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Pan-European Overview. Report to EU, pp.169. Also available at: http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, pp.265. Also available at: http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Bell, S, and Marzano, M. 2009. Competing and coexisting with cormorants; ambiguity and change in European wetlands. In: Heckler, S. (editor) Landscape, Process and Power: re-evaluating traditional environmental knowledge. Berghahn Books, Oxford, pp.99–121.

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J. 2012. The **INTERCAFE** Field Manual — research methods for Cormorants, fishes, and the interactions between them. COST Action 635 Final Report II. ISBN 978-1-906698-09-9

Crawley, M J. 1992. Natural Enemies: the population biology of predators, parasites and diseases. Blackwell Scientific Publications, Oxford.

Enck, J W, Decker, D J, Riley, S J, Organ, J F, Carpenter, L H, and Siemer, W F. 2006. Integrating ecological and human dimensions in adaptive management of wildlife-related impacts. Wildlife Society Bulletin, 34: 697–705.

Engelen, E, Keulartz, J, and Leistra, G. 2008. European nature conservation policy making. From substantive to procedural sources of legitimacy. In: Keulartz, J, and Leistra, G (editors) pp.3–21, Legitimacy in European nature conservation policy. Case studies in multilevel governance. The International Library of Environmental, Agricultural and Food Ethics, Vol. 14, Springer.

Fairbrass, J, and Jordan, A. 2001. Protecting biodiversity in the European Union: national barriers and European opportunities? Journal of European Public Policy, 8: 499–518.

Gardner, R. 2003. Process Frames. Beyond Intractability. Conflict Information Consortium, University of Colorado, Boulder. Available at: http://www.beyondintractability.org/essay/process-frames

Gillespie, A. 2007. The social basis of self-reflection. In: Valsiner, J, and Rosa, A (editors). The Cambridge Handbook of Sociocultural Psychology. Cambridge University Press, pp.678–691.

Hargreaves, I, Lewis, J, and Speers, T. 2002. Towards a better map: Science, the public and the media. Economic and Social Research Council Report, ISBN 0-86226-291-7, Swindon, Wilts, UK.

Jamieson, D. 2008. Ethics and the Environment: an introduction. Cambridge University Press, Cambridge.

Jensen, H R. 2003. Staging political consumption: a discourse analysis of the Brent Spar conflict as recast by Danish mass media. Journal of Retailing and Consumer Services 10: 71–80.

Keller, T M, and Carss, D N. 2003. Cormorants: Ecology and Management at the start of the 21st Century. Vogelwelt 124.

Knight, J. 2000. Natural Enemies: people-wildlife conflicts in anthropological perspective. Routledge, London & New York.

Lewicki, R, Gray, B, and Elliot, M. 2003. Making Sense of Intractable Environmental Conflicts: frames and cases. Island Press, Washington, USA.

Madden, F. 2004. Creating coexistence between humans and wildlife: global perspectives on local efforts to address human-wildlife conflict. Human Dimensions of Wildlife, 9: 247–257.

Manfredo, M J, and Dayer, A A. 2004. Concepts of exploring the social aspects of human-wildlife conflict in a global context. Human Dimensions of Wildlife, 9: 317–328.

Marshall, K, White, R, and Fischer, A. 2007. Conflicts between humans over wildlife management: on the diversity of stakeholder attitudes and implications for conflict management. Biodiversity Conservation, 16: 3129–3146.

Marzano, M, Carss, D N, and Bell, B. 2006. Working to make interdisciplinarity work: investing in communication and interpersonal relationships. Journal of Agricultural Economics, 57, 2: 185–198.

Marzano, M, and Carss, D N. (editors). 2006. Cormorant-fishery conflict management in the Hula Valley, Israel. **INTERCAFE** Case Study Report, Hula Valley, Israel, January 2006: 23.

Mascia, M B, Brosius, J P, Dobson, T A, Forbers, B C, Horowitz, L, McKean, M A, and Turner, N J. 2003. Conservation and social sciences. Conservation Biology, 17: 649–650.

Muter, B A, Gore, M L, and Riley, S J. 2009. From victim to perpetrator: evolution of risk frames related to human-cormorant conflict in the great Lakes. Human Dimensions of Wildlife, 14: 366–379.

Nelson, J B. 2005. Pelicans, Cormorants, and their Relatives: the Pelecaniformes. Oxford University Press, Oxford.

O'Leary, R, and Bingham, L B. (editors). 2003. The Promise and Performance of Environmental Conflict Resolution. RFF Press, Washington.

Pullin, A S, Knight, T M, and Watkinson, A R. 2009. Linking reductionist science and holistic policy using systematic reviews: unpacking environmental policy questions to construct an evidence-based framework. Journal of Applied Ecology, 46: 970–975.

Russell, I, Broughton, B, Keller, T, and Carss, D N. 2012. The **INTERCAFE** Cormorant Management toolbox: methods for reducing Cormorant problems at European fisheries. COST Action 635 Final Report III. ISBN 978-1-906698-09-6.

Siemer, W F, Decker, D J, and Shanahan, J. 2007. Media frames for black bear management stories during issue emergence in New York. Human Dimensions of Wildlife, 12: 98–100.

Stoll-Kleemann, S, and Welp, M. 2006. Stakeholder dialogues in Natural resources Management: theory and practice. Springer-Verlag, Berlin Heidelberg.

Stringer, L C, Dougill, A J, Fraser, E, Hubacek, K, Prell, C, and Reed, M S. 2006. Unpacking 'participation' in the adaptive management of social-ecological systems: a critical review. Ecology and Society, 11: 39. Available at: http://www.ecologyandsociety.org/vol11/iss2/art39/

Tarlock, A D. 2002. Who owns science? Penn State Environmental Law Review, 10: 135.

Treves, A, Wallace, R B, Naughton-Treves, L, and Morales, A. 2006. Co-managing human-wildlife conflicts: a review. Human Dimensions of Wildlife, 11: 1–14.

van Dam, C, and Asbirk, S. (editors). 1997. Proceedings of the workshop towards an international conservation and management plan for the Great Cormorant (*Phalacrocorax carbo*), 3 and 4 October 1996, Lelystad, the Netherlands. IKC natuurbeheer, Wageningen, Netherlands.

van den Hove, S. 2007. A rationale for science-policy interfaces. Futures, 39: 807–826.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906689-07-2.

Wiedemann, P M, and Schuetz, H. 2000. Developing dialogue-based communication programs (Studies in Risk Communication 79). Juelich: Research Center Juelich.

Zarin, D J, Kainer, K A, Putz, F E, Schmink, M, and Jacobsen, S K. 2003. Integrated graduate education and research in Neotropical working forests. Journal of Forestry, 101: 31–37.

2 INTRODUCTION TO PROCESSES

Part One — Processes

David N Carss and Mariella Marzano

There is an extensive literature on human:wildlife conflicts (hereafter, HWC), indeed the subject has become a science in itself.[2] This part of **INTERCAFE's** exploration of social, cultural and legal perspectives on Cormorant-fisheries conflicts focuses on some of the processes involved in addressing HWC in general and those involving Cormorants in particular. Of special interest here (see also chapter 1) is the interdisciplinary integration of different knowledges relating to European Cormorant-fisheries interests that have been explored by **INTERCAFE** participants. At its simplest, this is an integration of, or at least a mutual awareness and understanding of, the biological knowledge (van Eerden *et al*. 2012) and the social, cultural and legal knowledge explored in this publication.

The chapters in Part One focus on how different disciplinary perspectives are integrated, particularly in relation to concerns over how best to manage 'problem wildlife' in general and Cormorants specifically. These chapters also examine why wildlife management is sometimes thought to be necessary and what it aims to achieve. There are two important reasons for examining the integration of different knowledges and experiences. First, it is anticipated that exploring interdisciplinary approaches in practice will help broaden our understanding of the human dimensions of wildlife management, especially where this involves a mix of individuals and groups with perspectives different to that of the 'wildlife professional' (cf. Burach-Mordo *et al*., 2009). Second, appreciating how differing areas of knowledge relating to the social, legal and biological dimensions of HWC can be brought together will help in attempts to make wildlife management actions culturally compatible with the local situations in which they are applied (cf. Knight, 2000, p.5).

Fuller (1994, p.14) argues that the need for solid (natural) science to inform action on environmental issues, including the practical management of wildlife within the context of conservation biology, has 'never been so great'. However, she also eloquently makes the links between species, their habitats, and the humans that interact with those habitats, as part of a necessarily broad approach to long-term conservation. These are clearly complex issues and difficult ones to address in practice. This is usually because the ecological and socio-economic aspects being affected are linked to particular, and often conflicting, human interests (cf. Renn, 2006). Three chapters explore these differing aspects in relation to human:wildlife management in situations of increasing complexity.

Chapter 3 selects a number of specific published cases, encapsulating a variety of local to continental scales, that show the need for undisputed scientific evidence in HWC management but also the importance of ownership of this evidence and any subsequent mitigation/intervention techniques derived from it, by all those affected by HWC. All the successful cases show the benefits of moving towards some form of co-management dependent on robust scientific evidence but emphasising strongly the need for all stakeholders to participate and share involvement in decision-making.

Chapter 4 highlights the importance of management plans (MPs) as a tool for dealing with

[2] For example, in relation to wildlife damage, the definitions, philosophies and considerations of human relationships with natural resources are explored in depth by Covoner (2002).

wildlife and human interests and explores different types of management plans as well as the rationale behind them. This chapter emphasises the difficulty in incorporating an ecosystem approach to wildlife management and the emergence of other knowledge sources, alongside the published scientific literature, that also need to be accommodated within the development and implementation of MPs.

Finally, **chapter 5** considers regional and/or national management plans for particular conflict species, exploring in some detail how scientific perspectives and those of other stakeholder groups can be incorporated. Importantly, much of this chapter is derived from questionnaire responses with those wildlife managers responsible for the production of each management plan.

By examining these real world situations, Part One explores the links between biological and social scientific communities, local stakeholders and policy advisors in relation to human:wildlife conflicts and their management.

References

Baruch-Mordo, S, Breck, SW, Wilson, K R, and Broderick, J. 2009. A tool box half full: how social science can help solve human-wildlife conflict. Human Dimensions of Wildlife, 14: 219–223.

Conover, M. 2002. Resolving human:wildlife conflicts; the science of wildlife damage management. Lewis Publishers, Washington D C.

Fuller, K S. 1994. The role of science in defining conservation priorities for nongovernmental organisations. In: Meffe, G K, and Carroll, R. Principles of Conservation Biology. Sinauer Associates, Inc., Massachusetts (pp.14–15).

Knight, J. 2000. Natural Enemies: people-wildlife conflicts in anthropological perspective. Routledge, London & New York.

Renn, O. 2006. Participatory processes for natural resource management. In: Stoll-Kleemann, S, and Welp, M. (eds) Stakeholder Dialogues in Natural resources Management: theory and prectice. Springer-Verlag, Berlin (pp.4–15).

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST 635 Final Report I, ISBN 978-1-906698-07-2.

3 FROM SCIENCE TO INTERDISCIPLINARY COLLABORATION: successfully co-managing human:wildlife conflicts — a review of ten articles

Susana França and Simon C Nemtzov

3.1 Human:wildlife conflicts in context

This chapter provides a review of ten examples of human:wildlife conflicts that have been fully or partly resolved and identifies key lessons or management strategies that can be applied to Cormorant-fisheries conflicts across Europe.

For millenia, humans have defended themselves and their property from wildlife, leading to what is commonly referred to as human:wildlife conflict — HWC (Conover, 2002). But how do we define HWCs and where and when do they usually occur? According to Treves *et al*. (2006), HWCs can be defined as situations in which wildlife threaten human safety, livelihoods or recreation. Taking a wider view, and including the impact of HWC not just on people but on wildlife itself, the IUCN (World Park Congress, 2003) defined HWC as occurring when wildlife requirements overlap with those of human populations, creating costs to both residents and wild animals. Similarly, the World Wildlife Fund (2005:6) see HWC as impacting both humans and wildlife by defining it as *'any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment'*.

According to Knight (2000:3) HWC *'are relations of rivalry or antagonism between human beings and wild animals which typically arise from territorial proximity and involve reliance on the same resources or a threat to human wellbeing'*. HWC are fast becoming a critical threat to the survival of many globally endangered species (Woodroffe *et al*., 2005a) and can also have far-reaching environmental impacts (Woodroffe *et al*., 2005b). In many cases, species most exposed to HWC are also shown to be prone to extinction as, commonly, the human response has been to kill the suspected wildlife and transform wild habitats to prevent further losses to their resources (Distefano, 2004). However, with rising concern for species and biodiversity conservation, historical lethal methods of controlling wildlife are now often seen as socially unacceptable and, in many areas, may be illegal (Treves *et al*. 2006). For instance, across Europe all but a few species of wild birds are given conservation protection under the Wild Birds Directive (see chapter 7).

Under some circumstances, human-induced mortality as part of a HWC management programme can affect not only the population viability of some of the most endangered species, but it also has broader environmental impacts on ecosystem equilibrium and biodiversity preservation. An interesting example of such complexity, admittedly not as

part of any HWC management but human-induced mortality nevertheless, is given by Estes *et al*. (1993) in their exploration of the local extinction, and later reintroduction, of Sea Otters (*Enhydra lutis*) on the Pacific rim of North America. Here, human hunting on a commercial scale from the 18th century caused the extinction of many Sea Otter populations, and left many others critically endangered (*ibid* p.309). Many of these populations were the subject of reintroductions, from the late-1960s onwards, undertaken in an attempt to obtain a balance between two issues and values. The first was conservation and the second — and an important one in the context of this discussion — was that Sea Otter reintroductions were considered necessary to maintain the species 'function in nature' (*ibid* p.308). In terms of ecosystem equilibrium and biodiversity preservation, Sea Otters were found to limit herbivores (sea urchins) through predation. However, when released from this predation, sea urchin populations increased dramatically and the primary producers in the ecosystem — large algal (seaweed) beds of kelp — were seriously overgrazed by them, having a knock-on effect on commercial shellfish fisheries (*ibid* p.315–16). Thus the human-induced mortality of Sea Otters (through commercial hunting), directly affected ecosystem equilibrium and biodiversity loss in terms of top predators (the otters), herbivores (sea urchins) and primary producers (kelp beds) leading, ultimately, to the complete deforestation of rocky reef habitats and the associated loss of commercially valuable shellfish species that relied on this habitat.

Wildlife management through Sea Otter reintroductions, and ecological research to better understand this ecosystem complexity, involved applied ecologists, conservation biologists and natural resource managers. Estes *et al*. (1993, p.317) suggest that a prudent approach to wildlife management in general is *'to develop goals and expectations on the basis of [*scientific*] knowledge about the particular species and [*eco*]systems of concern.'* Later we explore this idea further and also turn our attention to non-science based forms of knowledge that could be incorporated into the successful management of HWC.

HWC can also occur with wildlife species that have very healthy populations, or are locally abundant. Indeed, some would argue that these species have become so successful that they are now overabundant 'pests'. Examples could include Grey Squirrels (*Sciurus carolinensis*), the European Rabbit (*Oryctolagus cuniculus*), beavers (*Castor* spp.), some species of seal (*Phocidae*), geese (*Anserinae*) and the Great Cormorant (*Phalacrocorax carbo*). Selected references highlighting problems around these species are: Grey Squirrel (Bryce *et al*. 2002), Rabbit (Williams *et al*. 2007), beavers (Rosell *et al*. 2005), seals (Matthiopolous *et al*. 2004), geese/waterfowl (van Roomen & Madsen 1992), Great Cormorant (Carss *et al*. 2009). Many of these species are discussed in chapter 4 in relation to devising management plans for conflict species.

As well as affecting shared resources, HWC can also undermine human welfare for example in the case of disease-carrying species, or threaten health and safety as in the case of large carnivore species for instance, and also has economic and social costs (Carss, 2003; Thirgood *et al*. 2005; Woodroffe *et al*. 2005b). Such broad environmental, economic and social impacts suggest that wildlife managers, scientists and local communities need to recognise and understand the problems and adopt management measures that are in the interests of both human and environmental well-being. HWC are now seen as a major challenge for conservation, as reflected in the burgeoning literature and meetings on the topic, such as the Annual Meeting of the Society for Conservation Biology in Brazil in 2005, which was entirely focused on HWC and the Aberdeen Centre for Environmental Sustainability (ACES) conference 'Conservation Conflicts — Strategies for Coping with a Changing World' (2011). Moreover, in response to the recommendations of the World Park Congress (2003), a new international collaborative project has been established — the Human Wildlife Conflict Collaboration HWCC (www.humanwildlifeconflict.org).

Conflicts are particularly common on reserve borders, where species that rely on extensive territories come into contact with human settlements, and in areas where a wide range of species co-exist with high-density human populations (World Wildlife Fund, 2005). According to Distefano (2004: 2–4), a set of global trends has contributed to the escalation of HWC worldwide, including (i) human population growth, (ii) land use transformation, (iii)

species habitat loss, (iv) habitat degradation and fragmentation, (v) growing interest in ecotourism and increasing access to nature reserves, (vi) increasing wildlife populations as a result of conservation programs, and (vii) climatic factors and stochastic (i.e. random and/or unpredictable) events.

Considering all these factors, it is clear that HWC will not be eliminated completely in the near future although conflicts will often continue to warrant some form of urgent management. Furthermore, there is no single management option or solution that can successfully deal with all HWC problems and so a combination of mitigation and management actions is often needed (see for example World Wildlife Fund, 2005, Carss & Marzano, 2005). In the past, management strategies have frequently been designed from a biological point of view. However, conflicts are often embedded in related ecological, social, cultural and economic realities, and so interdisciplinary collaboration is usually far more useful (Distefano, 2004, Carss & Marzano, 2005, Treves *et al*. 2006).

Mitigation strategies, such as financial compensation systems, insurance programmes, and incentive programmes generally attempt to reduce the impact of HWC and lessen the consequences of conflicts. Preventative strategies (e.g. artificial and natural barriers to wildlife movements) aim to prevent the conflict occurring in the first place, some of them are efficient in the short-term, others show results only in the long-term or are more effective within defined geographic regions or for specific taxonomic groups.

Cormorant-fishery conflicts in particular

Many of the issues involved in HWC are embedded in Cormorant-fisheries conflicts across Europe, affecting a variety of stakeholder[3] groups living and working in a diverse range of aquatic habitats (Carss, 2003). Although Great Cormorant populations cannot be considered endangered in the 21st century, part of the conflict does incorporate the belief held by some fisheries stakeholders that these birds are endangering scarce fish species (e.g. Grayling *Thymallus thymallus* in Alpine rivers). Concerns have also been expressed that without some form of pan-European co-ordination of lethal control, Cormorant numbers may be adversely affected through uncontrolled culling (van Dam & Asbirk 1997:9). Nevertheless, as highlighted in REDCAFE (Carss, 2003, Carss & Marzano, 2005 and references therein) and by Carss *et al*. (2009), Cormorant population expansion must be considered in the context of unprecedented landscape and social changes across Europe during the late 20th century.

The multi-dimensional and dynamic nature of Cormorant-fisheries conflicts, where diverse stakeholders often hold different values, beliefs and preferences, highlights the need for flexible management measures. Moreover, Knight (2000) suggests that many apparent human:wildlife conflicts actually have more to do with tensions, divisions and antagonisms between humans. Thus, successful conflict management depends on conflicting parties opening communication channels and developing networks of trust for effective participation, dialogue and collaboration (Carss, 2003:7).

Whilst the **INTERCAFE** Action was not a forum for management decision-making, one of the key lessons that has emerged from the REDCAFE and **INTERCAFE** research networks is the importance of groups and individuals working together to resolve or manage Cormorant-fisheries conflicts. This process — co-management — refers to collaboration between affected communities, governmental agencies or non-governmental organizations and researchers, leading to effective partnerships between all parties (e.g. Carss, 2003). It implies that all are willing to put aside personal preferences to a large extent (Treves *et al*., 2006), and that the tasks and responsibilities of decision-making and management processes are shared between the representatives of government, and other stakeholder groups. Although ultimately rewarding, co-management takes time and in cases where conflicts are present, may be well described as *'harmonisation of the incompatible'* (Carss, 2003:29). Nevertheless, it is useful to explore methods available for co-management and how these help to resolve conflict. According to Treves *et al*. (2006) there are three fundamental steps to this: (i) baseline applied research, (ii) participatory planning, and (iii) intervention and monitoring.

[3] In the context of this review the term 'stakeholder' is taken to mean (a) people who are affected (either positively or negatively) by a particular problem or activity or (b) people who can influence (either positively or negatively) the outcome or end result of a particular process. For further details see Ramírez (1999).

Although this chapter focuses on HWC cases where baseline applied research has been the foundation of conflict resolution, it also describes and discusses the importance of building on this through greater involvement of all those affected by HWC, not just the scientific community. This review examines case studies of HWC where processes of conflict management can provide useful lessons in understanding and dealing with Cormorant-fisheries conflicts across Europe and where the starting point is the often complex issue of the provision of undisputable scientific information.

3.2 Case studies of HWC

Ten articles published in the scientific literature or as national governmental reports were selected to explore the importance of stakeholder participation and co-management in the successful resolution of HWC, and to highlight common problems that exist across different spatial scales. These articles were chosen to demonstrate improvements in the management of HWC through, first, the provision of sound scientific evidence and, second, the involvement of a variety of stakeholders in a process of co-management.

Although HWC occur worldwide, they often appear to be more evident and more widely-reported from the tropics and so-called developing countries where livestock holdings and low-technology agriculture are an important part of rural people's livelihoods and incomes. Also, these are often the regions where the more publicly-attractive or newsworthy wildlife (e.g. 'man-eating' tigers, 'rogue' bull elephants, mountain gorillas) are found. In these regions, competition between local communities and wildlife over natural resources can be particularly intense, and relatively low levels of actual damage can severely impact human welfare (see for example, Knight, 2000). However, the cases here have been chosen mostly from Western countries, where high population densities and extreme habitat modification — two important contributing factors in many HWC cases — are both found (Distefano, 2004). These cases were also chosen because they have high relevance for **INTERCAFE's** examination of Cormorant-fisheries conflicts in Europe and Israel. In particular, they were chosen for the the way that they highlight (a) the different ecological, social, economic and political processes at play and (b) the possible ways to address these processes in managing human:wildlife conflicts.

In this chapter each of the ten cases (published articles) have been summarised by reproducing the published Abstract, with only minor editing in a few instances. The major lessons are then discussed in the overall context of the **INTERCAFE** Action. The most important steps taken towards conflict resolution/management are also reviewed for each case and their relevance to European Cormorant-fisheries conflicts assessed.

The ten cases are ordered as follows:

- Cases 3.2.1 — 3.2.3 deal with Cormorants in USA and Europe, at regional, national, and continental scales.
- Cases 3.2.4 — 3.2.6 deal with other waterbirds, at local and national scales.
- Cases 3.2.7 and 3.2.8 deal with mammals at regional scales.
- Cases 3.2.9 and 3.2.10 provide general reviews of HWC across continental or global scales and the potential tools for resolving them.

3.2.1 Relocation of Pygmy Cormorants *Phalacrocorax pygmeus* using scare tactics to reduce conflict with fish farmers in the Bet She'an Valley, Israel (Nemtzov, 2005).

Abstract: The Pygmy Cormorant *Phalacrocorax pygmeus*, common in Israel in the 19th century, mainly occurred as a wintering migrant but also a breeding species. However, in the 20th century there was a decline primarily due to loss of wetland habitats and intense persecution by fish farmers. From 1960 to 1973 there were no observations of the species in Israel at all. In the early 1990's they began nesting again in the Bet She'an Valley, a major fish-growing area. Increasing conflict arose between Pygmy Cormorants (using fish ponds as feeding areas) and fish farmers, and in the Bet She'an Valley this reached its peak in April 1999 with the intentional destruction of a nesting colony by disgruntled farmers. Following this event, a concerted conservation project was begun to try to safeguard the future of the Pygmy Cormorants while at the same time endeavouring to resolve the conflict with fish farmers. Both sides worked together to conserve the species by translocating the nesting sites out of the Bet She'an Valley.



Pygmy Cormorant *Phalacrocorax pygmeus*. Photo courtesy of Stefano Volponi.

What we can learn

Cooperation between the Israeli government's wildlife conservation agency and the fish farmers in this region began only after the fish-farmers took the law into their own hands (in 1999) and destroyed a Pygmy Cormorant nesting colony near the fish ponds. It is unfortunate that cooperation began only once the conflict reached a crisis situation, and perhaps it should have started earlier with participatory planning. Collaboration was subsequently established with all stakeholders involved in order to develop a Pygmy Cormorant management plan with the main goal being to conserve this species and reduce the conflict. Unlike the USA situation (section 3.2.3 below) where Double-crested Cormorants were thought by some to be an overabundant species and where lethal control was an option considered acceptable by many stakeholders, people in Israel were dealing with a relatively rare and locally endangered species where lethal control was far less appropriate.

This case shows the importance of starting to establish communication and cooperation among stakeholders in resolving HWC as soon as possible, especially when dealing with an endangered or scarce species. In this particular case, in a collaborative partnership, biologists, fish farmers and NGOs developed a co-operative management scheme, leading to an acceptable and successful, long-lasting solution. The solution consisted of encouraging 'self-translocation' of the birds by harassing them in the fish-growing area outside the breeding season. In this way the birds moved and established their breeding colonies in safer areas without anyone physically handling them. The process did not appear to harm the cormorants and may have led to greater numbers in the long-term, as Pygmy Cormorants have started to feed at less sensitive, alternative foraging sites.



The Bet She'an Valley, Israel.
Photo courtesy of Shutterstock.

The key to the success of this scheme relied on cooperation between all stakeholders with the establishment of trust and an agreement on common goals in trying to reduce the conflict. This case illustrates that the concept of devising co-ordinated strategies and finding flexible and adaptive solutions for managing Great Cormorants across Europe is certainly important and should be given serious consideration.

3.2.2 Protecting your fishery from Cormorants. (The Fisheries and Angling Conservation Trust Joint Wildlife Management Group, 2006)

Abstract: Growing concerns about the impact of avian predators on



fish stocks led to a major UK Government-funded research programme, which began in the mid 1990s, aimed at providing new information on bird/fish conflicts. The Moran Committee was set up in 1997 to provide a co-ordinated platform of organisations to address angling and fisheries issues. More recently, the work of the Moran Committee was taken on as part of a new organisation, the Fisheries and Angling Conservation Trust (FACT), which seeks to provide a unified voice on issues affecting angling and the aquatic environment. FACT forged links with other nature conservation groups in order to identify common ground on the bird predation issue and to ensure that a reasonable balance is struck between the need to conserve both fish and birds. The FACT Joint Wildlife Management Group recognised the need to inform anglers about predation issues and produced this booklet as a practical guide which was widely distributed to those concerned with the management of our fisheries.

The aim of this advisory booklet is to complement the information provided already and to give fishery managers comprehensive practical advice on the options for protecting their stocks. Wherever possible, this has been reinforced by reference to specific case studies, where various management techniques have been tried and tested, together with diagrams or pictures to illustrate particular deterrents, and contact addresses/websites for further information. Although this booklet concentrates on protecting a fishery from Cormorants, many of the management techniques described will be applicable to other fish-eating birds, such as sawbill ducks (*Mergus* spp.).

The guidance also provides a simple, step-by-step guide on how to apply for a licence to kill birds at a site if other means fail. These licences allow specified numbers of birds to be shot either as an aid to scaring or to reduce the numbers of Cormorants at a site.

What we can learn

The UK's Great Cormorant wintering population has grown



Great Cormorant *Phalacrocorax carbo*. Photo courtesy of Shutterstock.

considerably over the last 20 years to perhaps 25,000 birds. Furthermore, Cormorants have become more widespread and increasingly over-winter at inland sites, leading to HWC, mainly with anglers and inland fisheries (Newson *et al.*, 2005). This booklet was originally produced in 2002 by the Moran Committee which was set up in 1997 to provide a co-ordinated platform of organisations to address angling and fisheries issues and establish a useful forum for dialogue with government agencies and nature conservation organisations. In 2005 the group changed its name to the Wildlife Management Group and became part of FACT: The Fisheries and Angling Conservation Trust, which issued a revised version of the booklet in 2006. The main goal of their work was *'to identify common ground on the bird predation issue and to ensure that a reasonable balance is struck between the need to conserve both fish and birds.'* (FACT 2006:3).

This booklet is the result of a collaborative effort, and shared ownership means that no national group can view the information in it as biased or one-sided. These efforts have helped to establish the common ground which has greatly reduced this HWC, and the human:human conflict, in the UK in recent years. It has done this primarily by providing *'invaluable information on methods of reducing the impact of Cormorants and sound advice on how to apply for a licence to shoot them as an aid to scaring'* (UK Environment Agency website). For example, in 2004 this collaborative endeavour laid the groundwork for changes to the government's licensing requirements for lethal control of Cormorants.

This is an example of effective co-management of the Cormorant-fisheries conflict at the national level, showing especially how the dissemination of accurate information and updated data can be important in reducing HWC.

3.2.3 Resolving Double-crested Cormorant *Phalacrocorax auritus* conflicts in the United States: past, present and future (Hanisch & Schmidt, 2006)

Abstract: The Double-crested Cormorant *Phalacrocorax auritus* has been protected in the United States of America by the Migratory Bird Treaty Act since 1972, as a result of a bilateral treaty with Mexico. Since that time, the U.S. Fish and Wildlife Service (USFWS) has had authority for cormorant management and conservation. From the late 1970s to the present, Double-crested Cormorants experienced dramatic population growth. Management policies and practices to address resource conflicts associated with cormorants have evolved over the last 30+ years, culminating most recently in new regulations that were adopted following the development of an Environmental Impact Statement and considerable public involvement. The new regulations expand the authority of certain agencies to address conflicts between cormorants and aquacultural, recreational, and ecological resources. The past and present of Double-crested Cormorant management and possible directions for the future are discussed.



Double-crested Cormorant *Phalacrocorax auritus*.
Photo courtesy of Shutterstock.

What we can learn

The story of Double-crested Cormorant management in the USA is less one of sound scientific study leading to a management plan, although it encompassed studies *'providing strong evidence that cormorant predation had negative impacts on recruitment of certain fisheries'* (pp.826–7). Rather, it is more the story of a HWC and the difficulties the federal government faced in trying to take into account the wants and needs of many interest groups. This publication describes the development of the federal government's EIS (Environmental Impact Statement), the precursor to any changes in legislation and final rule for its Public Depredation Order, accomplished after a 100-day consultation period and twelve public meetings around



the nation before the draft EIS was published.

Following publication of a series of management alternatives in the EIS, there was another 100-day public consultation and ten more public meetings nationally. In addition, the USFWS received about 1,000 letters or emails on the draft EIS. Later, when a draft of the new regulations was published, there was a further 60-days of public consultation during which time the USFWS received over 9,700 letters, faxes and emails on the proposed rule. About 85% of these comments were against the rule and were part of a mass campaign undertaken by some interest groups.

In the end, the management plan was not a single country-wide plan, but rather a method to allow some of the states with Double-crested Cormorant problems to deal with them using lethal control methods. Each of these states then had to develop and implement its own management plan. It is likely that these plans were acceptable to some stakeholders but not to others, as earlier comments received by the USFWS during the public consultation highlighted different opinions running from 'cormorants are being scapegoated and should be left alone' to 'cormorants are a scourge and their populations should be greatly reduced'.

Methods for developing this specific management plan did not seem to include any forum for bringing stakeholders together to work out acceptable solutions — such as that for the Lesser Snow Geese (see 3.2.5) — but rather the federal government issued draft proposals and invited people to comment at public meetings or send in their written remarks by mail. This form of one-way input may be the only reasonable way for the government to listen to the many stakeholders across such a large country but it seems that people were left with the impression that their wants and needs were not adequately taken into account.

If this case is compared with the Scottish geese situation (see 3.2.4), it is evident that in both instances the government set the overall parameters and allowed local-level action. However, as well as the issue of geographical scale, the projects are quite different in that the Scottish project included much stakeholder involvement in planning and especially in implementing the local management plan, whereas in the USA, even the regional (state-level) plans were developed and carried out by public officials.

The possibility of adopting such a wide-scale strategy to develop any management plan for the Great Cormorant at a European level would seem to be fraught with difficulty. Of particular note would be the ambition to conserve wildlife in the context of the diverse interests of all Europeans. Hearing, understanding, recognising and incorporating these diverse interests across all EU Member States and stakeholder groups would be a major challenge. Furthermore, as the US case shows, the influence of lobbyists should not be considered either trivial or ineffectual within this participatory/consultative process. Perhaps of even greater concern than the need to incorporate the views of stakeholders is recognition of the considerable flexibility available to EU Member States to adapt their management plans to their own environmental and other concerns within the framework of EU environmental directives (see Part Two: Framing the Arguments: science, law, policy, the media, and values). Nevertheless, each Member State has different national legislation and interpretation. Coupled with the fact that within the European continent there are also non-EU countries over which the EU has no jurisdiction, these factors could make it even more difficult to apply a blanket plan like the one adopted in the USA.

3.2.4 From conflict to coexistence: a case study of geese and agriculture in Scotland (Cope *et al.*, 2005, and Cope *et al.* 2006)

Abstract: Nine distinct populations of geese are found in Scotland, most

of which are increasing in number due to increased legislative protection from shooting. They are concentrated in time and space, and increasingly feed on agricultural land, reducing yields in grass and cereal crops. Whilst geese are economically valuable for their recreational amenity, the farmers who suffered yield losses have not shared in these benefits in the past. This caused a conflict of interest between geese and farmers, which has threatened to destabilise the balance between the needs to conserve Scotland's fauna and the needs of farmers to run economic businesses. While culling, scaring, the provision of alternative feeding areas or compensatory payments were unlikely to solve this conflict in isolation, a co-ordinated stakeholder-driven approach to solve this conflict was initiated in the 1990s. This approach used payments to encourage farmers adversely affected by the presence of geese to redistribute them into areas designated as undisturbed feeding refuges. Payments were directed towards farmers for positively managing the land for the benefit of geese, ensuring that Scotland met its international conservation obligations.

What we can learn

The geese-agriculture conflict is unusual in that the wildlife populations involved are given a high degree of conservation importance and the areas of conflict are localised. Other countries in Europe that suffer from geese-agriculture conflict showed that the most successful resolution of the conflict appears to be closely linked to the provision of a co-ordinated approach. In Scotland, a set of local management schemes have been developed, which involve integrating strategies combining culling, scaring, alternative feeding, and compensation payments (either damaged-based or area-based). The programs are successful because government ministers establish the general parameters, and the local groups work out the details of each plan according to their local needs.

The authors mention that the biggest potential challenge is the long-term financial viability of the schemes, due to expensive compensation payments. They hope to offset these costs by increasing local income through wildfowl hunting and ecotourism.

Similarities with the Cormorant-fisheries conflict are clear, as both the Scottish geese species and the Great Cormorant have increased dramatically in number under protective legislation and are now considered problematic by some people. Furthermore, the literature shows that in both cases, it is evident that on their own, culling, scaring, compensation or the provision of reserves do not provide an adequate solution. Both conflicts are likely to escalate as both species' populations increase. Another common aspect is that problems are highly variable with respect to damage levels, so solutions must be site-specific.

The main lesson to be drawn from this case (as in the Pygmy Cormorant case, 3.2.1) is the importance of a coordinated strategy in developing the management schemes, where all stakeholders had a very strong input at all levels, leading to widespread acceptance and successful implementation. Furthermore, Scottish goose management plans are constantly being reviewed and updated as stakeholders' attitudes and goose populations change. This top-down and bottom-up management strategy should be widely applicable to other cases of wildlife conflict, particularly to the European Cormorant-fisheries one.



Greylag Geese *Anser anser* in Scottish agricultural land.
Photo courtesy of Shutterstock.

3.2.5 Case study of conflict resolution in the management of overabundant light geese in North America (Batt *et al.*, 2006)



Snow Geese *Chen caerulescens*. Photo courtesy of Shutterstock.

Abstract: During the 1990s, North American waterfowl managers detected extraordinary increases in populations of Lesser Snow Geese *Chen caerulescens caerulescens*, Greater Snow Geese *C. c. atlanticus* and Ross's Geese *C. rossii*. This led to more intensive study of available information by several teams of scientists who concluded, initially, that mid-continent Lesser Snow Geese were causing irreversible damage to their Arctic breeding habitats. They recommended that goose numbers be reduced (through proactive management programs) to levels that could be sustained for the long-term. Other reports concluded that Greater Snow Geese would soon be at similar levels and that Ross's Geese were also more abundant than ever previously recorded. Waterfowl population managers took actions to achieve the recommended objectives through the management interventions that have now been in place for several years. Several critical elements of how managers have responded to these conflicts with the mid-continent Lesser Snow Goose are reviewed. These were: assure a strong science-base existed to support management recommendations; consult fully with all stakeholders associated with the issue; develop clear resolve by management agencies to address the issue; communicate effectively with all stakeholders about the nature of the problem and the proposed management actions; implement management programs; and monitor the response of the targeted resource and adapt to information obtained from monitoring with additional or improved management practices.

What we can learn

This is not a typical case of HWC in terms of wildlife-agriculture conflict, but rather an example of the reconciliation of different stakeholder positions concerning the management of geese. The 'conflict' started when scientists concluded, after extensive studies, that the Lesser Snow Geese population was growing at such a rate that the birds threatened to permanently destroy large tracts of their fragile Arctic breeding habitats, areas also used by a multitude of other resident and migratory species. The upshot of this concern was the formation of the Arctic Goose Habitat Working Group (AGHWG) by the Arctic Goose Joint Venture (AGJV), which engaged scientists, population managers and non-government conservation associations. The product of the group's work showed that the destruction of these species' habitat was expanding rapidly and the best conservation solution would be to reduce goose numbers through proactive management programs to levels that could be sustained for the long-term. These programs would allow legalising hunting practices, extending hunting seasons, and very high harvest limits for individual hunters.

Initially, there were objections to the hunting of this species by a variety of stakeholders: scientists, waterfowl managers, hunters, indigenous Canadians, public officials and other interest groups, such as conservation NGOs and anti-hunting groups. In order to minimise this conflict, working groups and a Joint Management

Board reviewed the scientific findings and the management programs proposed, and their recommendations went to a Stakeholder Committee, which led to development of the actual management program. There was full stakeholder involvement at all stages, but the initial basis for successful establishment of the management programme was irrefutable scientific data.

The organisers of the management programme realised early on that there would be objections from various parties to any management of these geese. They assuaged most objections by ensuring two major modes of action: accurate, peer-reviewed scientific data, and open public communication (with full transparency and the involvement of all stakeholders and public officials).

This case tends towards being a human-human conflict (see Knight, 2000), and there are lessons that could be learned for the European Cormorant-fisheries situation. These relate to several critical and very important elements of how managers might react to the conflict, including (1) assuring that a strong science data base exists to support management recommendations, (2) consulting fully and early on with all the stakeholders and communicating effectively about the nature of the problem and the proposed management actions, (3) implementing management programs according to the plan, (4) monitoring the response of the targeted resource, and (5) adapting to information obtained from monitoring with additional or improved management practices.

3.2.6 Using Decision Modeling with Stakeholders to Reduce Human–Wildlife Conflict: a Raptor–Grouse Case Study (Redpath *et al*., 2004, and Thirgood & Redpath, 2005)

Abstract: The successful resolution of human:wildlife conflicts requires the participation of local communities and other stakeholder groups in formulating management decisions. In the uplands of the United Kingdom, a controversial conservation issue concerns the relationship between the conservation of a legally protected bird of prey, the Hen Harrier (*Circus cyaneus*) and the management of a gamebird, the Red Grouse (*Lagopus lagopus scoticus*). Multicriteria analysis were used to evaluate the perspectives of two groups of stakeholders, grouse managers and raptor ('bird of prey') conservationists, and the acceptability to them of different management solutions to this conflict. Both groups quantified the relative importance of evaluation criteria and used these as a basis for comparing different upland and Hen Harrier management options. In relation to upland management, grouse managers placed more importance on economic criteria than did raptor conservationists, who valued natural-environment criteria more highly. Intensively managed grouse moors, involving the control of harrier numbers, were ranked most highly by grouse managers and managed nature reserves by raptor conservationists, but both groups also ranked legally managed grouse moors highly. When evaluating Hen Harrier management options, grouse managers considered time-scale and cost the most important criteria, whereas raptor conservationists considered the effects on harrier populations to be most important. Harrier quota schemes were the management solution most favored by grouse managers, whereas raptor conservationists preferred allowing harriers to attain natural densities. Notably, however, one technique that has already been partly tested in the field — the use of diversionary feeding — was scored highly by both groups and thus holds promise for some form of compromise. This exercise highlighted the value of these objective techniques for developing dialogue and trust between stakeholder groups, and it highlighted the need to conduct further research to test the effectiveness of different management options. There was broad agreement that the workshop moved the prior positions of individual stakeholders and was a valuable tool in helping to resolve human:wildlife conflicts.

What we can learn

This case deals with one of the most contentious conservation issues in the UK and concerns the conflict between the conservation of legally protected birds of prey, in particular the Hen Harrier, and the commercial hunting of Red Grouse. Red Grouse live on moorland and the aim of grouse management is to sustainably maximise the number of grouse available for shooting. Birds of prey are perceived to reduce grouse harvests, and they are sometimes killed illegally as a consequence. The aim of the authors was to engage the

stakeholders in a constructive dialogue. This case evaluates a method called 'decision modelling' as a way to quantify the perceptions of polarised stakeholders. A multi-criteria analysis was done to examine attitudes toward various management options and to evaluate which measures were most acceptable.

This case shows the importance of communication by bringing the opposing stakeholders together and allowing them to better understand the other side's perceptions and viewpoints and facilitating the search for acceptable solutions. This case also shows the benefit of attempting to quantify the perceptions of polarised stakeholders by making the perceptions tangible, at least to some degree. By assigning perceptions a numerical value, they can be balanced against each other in order to help decision-making.



Red Grouse *Lagopus lagopus scoticus* a high-income game bird of Scottish uplands. Photo courtesy of Shutterstock.

In the particular case of the European Cormorant-fisheries conflict such multi-criteria analysis would however be extremely difficult to apply at a continental or even a national level. This case deals with a specific and spatially well-defined problem, as opposed to the European Cormorant issue, which has many aspects and seems a less well-defined problem. This method seems to be quite useful when the conflict is at a small-scale and/or the stakeholders involved are few. Nevertheless, the main lesson that could be learned — one of facilitating communication between stakeholder groups and enabling all sides to achieve a better understanding of the perceptions of each other — is extremely important and could certainly be applied when trying to resolve Cormorant-fishery conflicts at a smaller geographical scale.

3.2.7 Coyotes and Humans: Can We Coexist? (Fox, 2006)

Abstract: Coyotes (*Canis latrans*) have expanded their range throughout much of North America, aided by the extirpation of wolves, alteration and transformation of habitat, and urban sprawl. Humanised landscapes have worked to the Coyote's advantage by offering an abundance of food, water, and shelter. Unfortunately, intentional and unintentional feeding of Coyotes has also resulted in increased encounters and conflicts. How communities address such conflicts generates impassioned debate. Many state wildlife agencies and local municipalities lack the resources to effectively implement proactive strategies before encounters escalate to conflicts. Moreover, lack of agency coordination, combined with a largely uneducated populace, hinders effective conflict resolution. Consequently, responses to Coyote conflicts are usually reactive and fail to address the root causes of most conflicts, i.e., a constant food source. Failure to address these root causes often leads to a vicious cycle of trapping and killing. Moreover, inconsistent and exaggerated reports of Coyote attacks can lead to heightened public fears, which may limit the opportunity for establishing long-lasting proactive coexistence strategies. This paper provides an overview of Coyote ecology in urbanised landscapes and considers several case studies of communities that have developed effective Coyote coexistence programs.

What we can learn

This case shows how HWC can be managed through a combination of scientific knowledge, and public outreach and education. Similar to the European Cormorant situation, this conflict has been fuelled by a combination of factors such as a public uninformed about Coyote ecology (e.g. their numbers, their reaction to the provision of easily-obtained food, and their level of threat to people) and lack of agency coordination. These factors have thus contributed to making it seemingly impossible to reach a resolution to the conflict. As a consequence, responses to both conflicts were reactive and failed to address their root causes, which included virtually unlimited food resources for Coyotes and certain perceptions and attitudes among people, including fear of the animals. Here as in many other HWC cases, both these factors are major contributors to fuelling conflicts.



Coyote *Canis latrans*. Photo courtesy of Shutterstock.



Deer killed by Coyote *Canis latrans*. Photo courtesy of Shutterstock.

Coyote-human conflicts are common in North America and Coyotes are generally viewed as uncontrollable pests. By identifying the major source of the problem for Coyote numbers in urban areas — in this case, the easy availability of food — the author was able to offer people ways to reduce the conflict and not to over-exaggerate it by viewing the Coyotes as more dangerous than in reality they are. By educating the public with radio-tracking studies of Coyote behaviour in urban areas, people could see for themselves the real data, and this alleviated much suspicion and fear of the species.

This case shows the importance of obtaining sound scientific knowledge and communicating it to stakeholders, and using public education to reduce HWC. It also serves as a useful example to take into account when addressing European Cormorant-fisheries conflicts. The Coyote conflict was largely resolved through public education that showed the true extent of the problem as defined by sound scientific knowledge. This contrasts with the many perceptions and beliefs that occur across Europe about the extent of Cormorant damage to fisheries. However, given the inherent difficulties of measuring fish stocks and populations, it may always be difficult and imprecise to quantify Cormorant impact from a purely biological perspective (for detailed discussion, see chapter 9 of Carss *et al*. 2012). Nevertheless, this case does show the value of both obtaining a scientific understanding of relevant aspects of a species' ecology and being able to communicate this knowledge clearly to others and these are certainly important factors when considering HWC resolution.

3.2.8 Jaguars and livestock: living with the world's third largest cat (Rabinowitz, 2005)

Abstract: Wherever the Jaguar (*Panthera onca*) lives in close proximity to people, it has generally been persecuted as a threat to humans and their livestock or pets. The perception of the Jaguar by the ranching community as a predator of livestock is a major reason for the continued killing of Jaguars throughout Mexico, Central and South America. In some areas in Venezuela and Brazil, the only Jaguar habitat outside of protected areas is on large expanses of cattle land or other private holdings. A Jaguar Conservation Program was established by the Wildlife Conservation Society in 1999 to focus on working with ranchers to reduce the HWC between cattle and Jaguars.

The programme is only at the very beginning of reducing Jaguar-livestock conflict but has established the necessary dialogue and information exchange with ranchers for creating a model of engagement for the ranching community, thereby improving Jaguar conservation.

What we can learn

The Jaguar-livestock conflict in Central and South America is one

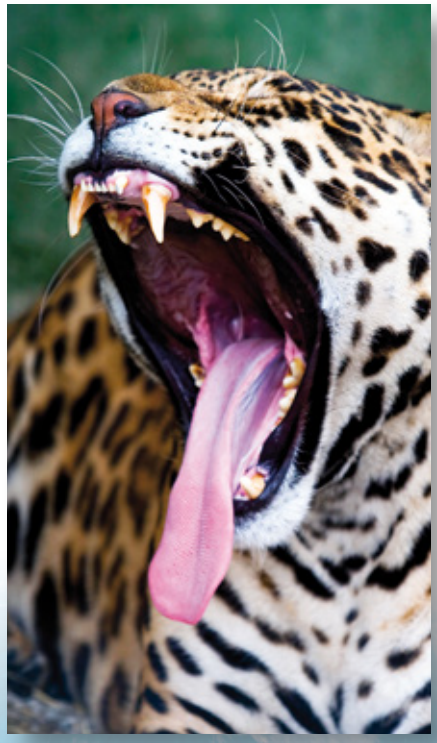
of the major factors endangering Jaguar populations. This paper explains how mitigation of this HWC has begun with a new project that brings together such diverse stakeholders as local ranchers, cowboys and cattle managers, tourism professionals, environmental NGOs, Jaguar scientists, and government officials.

The programme began by organising workshops where for the first time ranchers were asked to express their knowledge of the problem to Jaguar biologists, as well as to provide possible solutions to mitigate the conflict. By actually listening to the ranchers, and empowering them to offer solutions, the program was able to dispel a lot of anger and distrust once the ranchers realised that they truly 'owned' the workshops. The cattle ranchers thus became more positive and outspoken and expressed constructive and useful recommendations, especially when they realised that funds were available to help them to alleviate the conflict. By fully integrating the ranchers into the decision-making process, lasting changes in ranching practices became possible that should lead to reduced livestock depredation and better Jaguar conservation.

One big problem in managing many HWC cases is that local people affected by wildlife do not have an open line of communication with government or independent biologists for a mutual exchange of knowledge to occur. This type of open communication has set the ground for resolution of the Jaguar-livestock conflict in Central and South America, and projects like **INTERCAFE** have attempted to do the same for the Cormorant-fisheries conflict in Europe.

3.2.9 Towards sustainable land use: identifying and managing the conflicts between human activities and biodiversity conservation in Europe (Young *et al.*, 2005)

Abstract: Conflicts between biodiversity conservation and human activities are becoming increasingly apparent in all European landscapes. The intensification of agricultural and forestry practices, land abandonment and other land uses such as recreation and hunting are all potential threats to biodiversity that can lead to conflicts between stakeholder livelihoods and biodiversity conservation. To address the global decline in biodiversity there is, therefore, a need to identify the drivers responsible for conflicts between human activities and the conservation of European biodiversity, and to promote the management of these conflicts. Here, the drivers of biodiversity conflicts are analysed in a European context for five habitat types: agricultural landscapes, forests, grasslands, uplands and freshwater habitats. A multidisciplinary approach to conflict management is described, with active stakeholder involvement at every stage of conflict identification and management as well as a range of other approaches including stakeholder dialogue and education, consumer education, improvement of political and legislative frameworks, financial incentives, and planning infrastructure.



Jaguar *Panthera onca*.
Photo courtesy of Shutterstock.

What we can learn

This publication is a review of the main conclusions from a multidisciplinary project to identify and analyse conflicts occurring between human activities and biodiversity conservation at the continental scale in Europe within five broad habitat types.

The authors state: *'People will not usually object to conserving biodiversity, providing it does not clash with personal or institutional goals'* (page 1,652) so one needs then to jointly identify and address these goals in order to mitigate the conflict. The authors explain that for successful conflict resolution one needs to first identify all the stakeholders, which is not a trivial task as their number has increased



Intensive agriculture: often considered a threat to biodiversity. Photo courtesy of Shutterstock.

in modern times, with local participants, NGOs and the media now more actively involved.

Once the definition of the conflict has been established by the stakeholders, communication between them has to be actively promoted, which might not be an easy task. It is often difficult to establish this open dialogue among the various stakeholders in order to define the conflict and it may take some time to begin to explore ways to resolve it.

As is evident from other cases in this chapter, this review paper stresses the importance of establishing a sound body of scientific data for successful conflict management. But more importantly, the final conclusion suggests that: *'Inclusive stakeholder approaches are the most likely to lead to sustainable management of conflict providing there is early involvement of all key stakeholders, effective communication between parties, awareness raising and supported processes for their continued involvement, including feedback, monitoring and review.'* (page 1,656).

This review focuses on conflicts between human activities and biodiversity conservation, but the main lessons learned can also be adapted to other HWC, including the European Cormorant-fisheries conflict. Keeping in mind that all conflicts have to be dealt with in a unique manner (according to the species, habitats, people and cultures involved), the authors show that a fundamental aspect is to raise awareness of, and provide objective information on, the habitats or species concerned, their requirements and the measures required to conserve them as an integral part of the cultural landscape. Scientific research can always play a significant role in conflict management. However, better communication between



Monoculture forestry, often involving non-native species: another potential threat to biodiversity. Photo courtesy of Shutterstock.

scientists, managers and local stakeholders should form the basis of cooperation between all the groups involved in the conflict. The scientific and local communities have to learn to understand, accept and benefit from each other's knowledge and cultural backgrounds.

Each conflict will be different in terms of scale, cultural contexts and intensity. This review also highlights the need for an interdisciplinary approach, integrating social and natural elements in conflict resolution. Indeed 'an interdisciplinary approach involving the collaboration of biological and social scientific expertise, economic and political interest and practical local experience' was one of the most important aspects of the **INTERCAFE** Action.

3.2.10 Human:wildlife conflicts worldwide: collection of case studies, analysis of management strategies and good practice (Distefano, 2004)

Abstract: Human:wildlife conflict is fast becoming a serious threat to the survival of many endangered species in the world. The case studies from countries all over the world demonstrate the severity of the conflict and suggest that greater in-depth analysis of the conflict is needed in order to avoid overlooking the problem and undermining the conservation of threatened and potentially endangered species. This report provides an insight into the HWC issue, based on a selection of relevant case studies and gathers together the key lessons learned. The case studies illustrate that HWC is a growing global problem.

The second part of the report reviews a collection of management practices currently used under diverse demographic, economic and social circumstances; it highlights the costs, benefits and constraints of each option and identifies which techniques could be best implemented under similar conditions. The review reveals that the problem is multifaceted: some management practices are ineffective, others are financially unsustainable or too technologically complex and costly for underprivileged rural communities to adopt.

The study recommends two different approaches to resolving HWC: short-term mitigation tools that need to be combined with longer-term preventive strategies, along with techniques that are effective with diverse species.

The report provides practical recommendations to better design future HWC interventions and improve already existing techniques.

What we can learn

By reviewing a wide variety of HWC case studies from around the world, this report shows the importance of directly involving the people who are affected when creating and implementing programs to conserve wildlife and to reduce the conflicts. Although this may seem like a trivial requirement, there are many instances where it is not done — where government directs wildlife management projects without the participation of the stakeholders affected by the conflict.

Another conclusion focuses on the importance of developing the implementation of a combination of two different approaches: short-term mitigation tools along with longer-term preventive strategies, so as to reduce current problems while fostering the rapid development and use of innovative approaches to address future issues and eradicate the problem.

In addition, the paper stresses that, as noted in other cases, conflict resolution should be based on sound scientific knowledge, but the text also highlights that science should be combined with local knowledge and collaboration. This reference to local knowledge is useful because it can provide a better understanding of what works and what does not in relation to conflict resolution at different regional and community levels.

One of the main lessons from this review is that the best scenario would include integrated community development and wildlife conservation promoted by managers and supported by local populations. Community-based conservation should give local people the right to limited and sustainable use of natural resources while promoting tolerance towards wildlife.

Although the current European Cormorant-fisheries conflict does not deal with an endangered species, this case demonstrates the importance of the local communities' involvement when striving for conflict resolution.

3.3 Discussion and Conclusions

The ten case studies discussed above were not chosen at random but were selected *a priori* as examples of cases of varying degrees and types of successful management of HWC as reported in the readily available literature. Besides the Cormorant-fisheries conflict, the case studies cover a wider range of conflicts with other species, habitats and even with biodiversity conservation. A review of these cases points to the importance of two major components in dealing with HWC. The first is the creation and dissemination of a sound biological and sociological basis concerning the nature of the conflict. The second is to assure full stakeholder participation in the planning and, where possible, the management of the intervention. Finally, at the end of this chapter, several pertinent lessons are proposed that have been distilled from this exploration of successful cases of HWC mitigation.

Baseline applied research on human:wildlife conflicts

Collecting baseline information by studying the timing and locations of conflicts, as well as the behaviour of the parties involved (wildlife and humans), is a vital first step in managing HWC (Treves *et al*. 2006). In the absence of good baseline data, the scale and nature of HWC can become a matter of personal opinion or institutional perspective. HWC are often emotionally laden and, as a result, reports and opinions can be biased, creating a false impression of the size and/or scale of the problem. Or perhaps, more practically, it shows that one important element of the conflict consists of these divergent viewpoints and understandings.

Although this chapter has highlighted the importance of obtaining biological data, it is apparent that many projects to manage HWC are directed or designed by ecologists with little, or no, social science input. Much effort is then spent by the ecologists to find the best way to prevent the conflict from their perception of the problem, which can often differ greatly from the needs of the different stakeholders. This review has shown that engagement with local people is a key component of any strategy to resolve HWC (see also Woodroffe *et al*., 2005b) because political, economic and socio-cultural constraints can sometimes provide insight into — or even preclude — certain interventions or monitoring plans that may seem biologically logical. Indeed, a major goal of the **INTERCAFE** Action was to promote links between the biological and social science communities, local stakeholders, legal experts and policy advisors in order to better understand the role of socio-cultural issues in conflicts and their management (see chapter 1).

All stakeholders in a HWC situation need to provide as much information as possible about the conflict and its direct and indirect consequences, because each of them has an important role to play. However, the sources of this kind of information may be different for different stakeholders, including commercial fishermen, recreational anglers, farmers, community-based organisations, businesses, policy-makers, non-governmental organisations, wildlife departments and scientific researchers. Research findings may also be useful to instigate dialogue about interventions, especially when the research has been invited and co-designed by local stakeholders. Care should be taken for researchers to remain impartial, as they must often relinquish control over the outcome of negotiations between the stakeholders. However, this is not always easy or possible, as scientists may hold particular viewpoints or are assigned a particular identity and standpoint by other stakeholders.[4]

When gathering baseline information, all the groups involved should try and gather key data that will be useful for managing the problem (World Wildlife Fund, 2005). This WWF paper provided a general overview (WWF, 2005: 12–14) of what may be considered to be useful information in this context. Furthermore, the authors stated that it *'is important that the data are collected consistently and can be analysed over a reasonable length of time'*. The WWF also identify the basic facts that it considers need to be gathered and these can be summarised as follows:

- who suffered the damage, what was damaged
- where and when the incident occurred

[4] Interestingly, **INTERCAFE** regularly noted that scientists working on Cormorant-fisheries issues were branded 'bird protectionists' or 'conservationists' by those with explicit and public fisheries interest (e.g. see Angling International, February 2009, p.52).

- the wildlife species involved
- the extent or estimated cost of the damage

This last point may rely on value judgement and can be subject to bias as methods to study and measure damage and losses are diverse and may vary in effectiveness (for more on the complexities associated with quantifying the impact of Cormorants on fisheries, see chapter 9 of Carss *et al*. 2012). WWF (2005: p.12) suggest that an independent damage cost-analysis is usually more appropriate because the extent of the damage may require a value judgement and so accurate and consistent information that is collected in a repeatable, standardised manner is required. Information should be provided by those directly affected by the conflict. However, if such independent information gathering is not available, or there is considerable dispute as to the scale and/or estimated cost of the damage caused, then it is especially important to collect representative opinions in order to build a thorough understanding of the problems and to build trust among all stakeholders (Halvoresen, 2003).

A major issue highlighted here is that stakeholder participation at all stages is of utmost importance for a successful HWC resolution programme. Encouraging the creation of partnerships and diverse stakeholders' collaboration will make almost any strategy more successful, and it will foster mutual assistance and strengthen the possibility of resolving the HWC. Participatory methods and tools thus seem essential to the design and implementation of viable HWC co-management projects. This point is particularly true in relation to understanding socio-economic issues and practices, to explaining and measuring the perceptions of those involved, and to involving all relevant actors in the conflict management process perhaps by means of participatory planning. A good example of this is an overview of existing knowledge of social science in relation to biodiversity issues which assesses its relevance for policymaking and policy implementation (Gilbert *et al*. 2006). This guide was produced by an EU-funded project investigating Social Science and Biodiversity (SoBio) which aimed to stimulate social research relevant to the management of biodiversity and ecosystems, and especially to the development of successful policies in this field.

Participatory planning

In practice, building such an understanding of key issues embedded in any HWC and hence, ultimately, building trust amongst those involved is not a trivial matter. Several crucial issues are involved here, particularly the involvement of local stakeholders who can bring both their experiences and perceptions into the management process and plans for HWC co-management. One particular method of including local people in such management is through so-called participatory planning and there is a whole body of literature on the subject (e.g. Innes & Booher, 2004; Llambí *et al*. 2005). Participatory planning may improve local stakeholders' perceptions of HWC projects, working partners and practical outcomes (Halvoresen, 2003, Treves *et al*. 2006). The success of wildlife conservation and HWC reduction depends largely on the ability of managers/ decision-makers to recognise, embrace and incorporate diverse stakeholder values, attitudes and beliefs (Messmer, 2000). In the context of Cormorant-fisheries conflicts participation means the involvement of local people as partners (rather than as passive spectators) in the process of collecting knowledge and experiences and, in some cases, baseline information. Participatory planning can often generate ideas that one party alone might not have envisaged. In order to be successful, it hinges critically on managing expectations and communicating roles and responsibilities clearly. Participatory planning for the management of HWC also requires defining joint objectives and identifying obstacles, followed by strategic design of interventions and monitoring systems. Joint objectives should include both the protection of human welfare/ interests and reducing threats to wildlife (see Treves *et al*. 2006).

REDCAFE**'s** case study in the Lea Valley, UK (Carss, 2003) allowed the researchers to meet and discuss issues with local fisheries groups and other key stakeholders in the participatory development of a Fisheries Action Plan. **INTERCAFE** has continued to encourage the exchange of knowledge about Cormorant-fisheries interactions at a pan-European level and the development of an holistic overview of the conflicts. However, there are still lessons that can be learned from other

conflict management efforts and participatory planning. For example, people have a right to express their views and have input into decision-making, but the decision-making power is often in the hands of government agencies which can reduce the overall effectiveness of HWC management (P. Salmi, pers. comm.). The objectives of participatory planning then are to develop consensus on which interventions to implement; to recruit relevant individuals or groups to put these in place; to divide up the necessary tasks among interested parties; and to set a timeline for action and monitoring (Treves *et al*. 2006: 389–391).

Intervention and monitoring

Interventions in HWC can be thought of as any activity designed to reduce the severity or frequency of encounters between people and wild animals, or as any activity that increases tolerance of people for those conflicts. These may include, for example, barriers, guards, compensation programmes, incentive schemes, environmental education and lethal measures (e.g. Treves & Karanth, 2003). In relation to European Cormorant-fisheries conflicts, a diverse range of local, regional and pan-European interventions are in theory available and these are discussed with reference to specific case studies in a 'Toolbox' of mitigation measures and actions that have been evaluated for effectiveness in specific fisheries and habitats by Russell *et al*. 2012.

Monitoring is considered essential to judge the effectiveness of interventions (Curtin, 2002) and, according to Treves *et al*. (2006: p.391), strategic monitoring of HWC management should include three measures of performance:

1. Were interventions implemented as planned?
2. Was the threat abated? (Did the level of HWC diminish?)
3. Did the intervention achieve the project goals? (Were conservation targets maintained or restored? Were human welfare targets attained?)

The success of any management action needs to be evaluated according to predetermined targets. This can be done by simply comparing a 'before and after' scenario (although this may be extremely difficult for many European Cormorant-fishery conflicts, see chapter 9 of Carss *et al*. 2012). At a minimum, monitoring should be able to distinguish between natural fluctuations and the effects of the interventions (Curtin, 2002). Of course, all interventions in relation to European Cormorant-fisheries conflicts need to comply with local, regional or national laws, all of which are ultimately governed by the EUs Wild Birds Directive (see chapter 7). Often the results of monitoring will show a need for changes in the goals and/or the interventions. Similarly, after each modification or application of the intervention, further monitoring is then also necessary.

Pertinent lessons

The most pertinent lessons from the case studies examined here, primarily related to stakeholder engagement, can be listed as follows:

1. Developing a management plan with one-way input of comments to the responsible authority (often government) may be the only reasonable way to hear from stakeholders across a large area. Nevertheless, by doing so, many opinions might not be properly heard and dialogue with and between stakeholders may be difficult to establish.
2. Effective co-management of conflict requires dissemination of accurate data and updated information as a way of monitoring it.
3. Establishing communication and cooperation between stakeholders early in the conflict resolution process is very important. Ideally, trust and the agreement of roles, responsibilities and common goals for trying to reduce the conflict should be the basis of this cooperation. In addition to a strong and valid scientific data base, people's opinions, wants, identities and social needs must also be considered.
4. It is important to build a coordinated strategy where all stakeholders have a strong input at all levels in the development of management schemes. This should lead to a more widespread acceptance of management options.
5. It is important to facilitate communication among stakeholders groups in order to enable all sides to achieve a better understanding of different perspectives. It can be very useful to appoint an independent facilitator to help with this. In order to bring all the stakeholders together and fully integrate them, one must demonstrate that their opinions are important and that they can participate actively in the whole

process of developing a solution to the conflict. This will help in the discussion of the conflict and in the acceptance of future measures to resolve or reduce it.

6. Successful HWC resolution depends on obtaining sound scientific knowledge but also on developing effective communication strategies and forums for knowledge exchange with stakeholders and, in some cases, the wider public. By doing so, the arguments of all sides of the conflict can be explored and future solutions may be easier for all to accept and understand.
7. There is a strong need for an interdisciplinary approach within HWC resolution, integrating social and natural elements by identifying all the stakeholders involved and actively promoting communication amongst them. It may be difficult to establish, but strong efforts should be made to achieve dialogue. Despite being time-consuming, this is a vital step towards conflict management.
8. In trying to manage HWC the best scenario would imply the integration of knowledge and expertise from the affected communities and high quality and relevant scientific data. Involving the people who are affected by the conflict when creating and implementing programs to reduce them is essential for successful HWC resolution.

Conclusions

This chapter has focussed on selected case studies and shown the importance of indisputable, sound biological data as a basis upon which to plan and implement co-management and resolution of HWC. The term 'indisputable' is highly relevant, particularly in a HWC such as the European Cormorant-fisheries one. As shall be discussed later (see chapters 10, 12, 14), despite biological data that may be undisputed within the scientific community, the key to resolving many long-term HWCs is for all parties to share common ground and, amongst other things, an understanding of some of the central biological cause and effect relationships that are either operating to create the HWC in the first place and/or could be used in mitigation actions for HWC resolution. As well as these lessons, there are several other issues which need to be addressed for effective HWC mitigation interventions and management. For example, conservation education for local stakeholders, more effective knowledge sharing, better definitions and prediction of conflict 'hot-spots', reliable data collection and evaluation of the impact, better sharing of information, and promotion of dialogue and cooperation among different stakeholders (Distefano, 2004).

This chapter has discussed a number of important issues to be considered in developing an effective HWC resolution or management programme. It is apparent that many cases are successful or more effective if all, or most, of these issues are addressed and taken into account, and where stakeholder participation is accorded primary importance. However, when attempting to devise HWC resolution programmes there are no hard-and-fast rules on how best to integrate the perspectives of scientists and other stakeholders. Similarly, there are no definitive rules as to what constitutes a HWC nor on why management plans are considered necessary, although this is explored in chapters 4 and 5.

References

Batt, B D J, Schmidt, P R, and Wendt, S. 2006. Case study of conflict resolution in the management of overabundant light geese in North America. In: Boere, G, Galbraith, C A, and Stroud, D A (editors), pp.795–800. Waterbirds Around the World: a global overview of the conservation, management and research of the world's waterbird flyways, The Stationery Office, Scotland, UK. http://jncc.defra.gov.uk/PDF/pub07_waterbirds_part6.1.3.pdf

Bryce, J, Johnson, P J, and MacDonald, D W. 2002. Can niche use in red and grey squirrels offer clues for their apparent coexistence? Journal of Applied Ecology 39: 875–887.

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169 pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors) 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265 pp. http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Bell, S, and Marzano, M. 2009. Competing and coexisting with Cormorants: ambiguity and change in European wetlands. In: Heckler, S (editor), pp.99–121. Landscape, Process and Power: re-evaluating traditional environmental knowledge. Studies in Environmental Anthropology and Ethnobiology, Volume 10, Berghahn Books, Oxford, UK.

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J. 2012. The **INTERCAFE** Field Manual — research methods for Cormorants, fishes, and the interactions between them. COST 635 Final Report II. ISBN 978-1-906698-08-9.

Conover, M. 2002. Resolving Human:wildlife Conflicts: the Science of Wildlife Damage Management. Lewis Publications, Boca Raton.

Cope, D R, Vickery, J A, and Rowcliffe, J M. 2005. From conflict to coexistence: a case study of geese and agriculture in Scotland. In: Woodroffe, R, Thirgood, S M, and Rabinowitz, A. (editors), pp.176–191, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

Cope, D R, Vickery, J A, and Rowcliffe, J M. 2006. From conflict to coexistence: a case study of geese and agriculture in Scotland. In: Boere, G C, Galbraith, C A, and Stroud, D A. (editors), pp.791–794, Waterbirds Around the World: a global overview of the conservation, management and research of the world's waterbird flyways, The Stationery Office, Edinburgh, UK. http://www.jncc.gov.uk/PDF/pub07_waterbirds_part6.1.2.pdf

Curtin, C G. 2002. Integration of science and community-based conservation in the Mexico — U.S. borderland. Conservation Biology 16(4): 880–886.

Distefano, E. 2004. Human: wildlife conflicts worldwide: collection of case studies, analysis of management strategies and good practice. The Food and Agricultural Organization of the United Nations, Rome. http://www.ecoagriculture.org/greatest_hits_details.php?id=850

Environment Agency (UK) webpage entitled 'Cormorants'. http://www.environment-agency.gov.uk/business/sectors/32665.aspx

Estes, J A, Rathbun, G B, and van Blaricom, G R. 1993. Paradigms for managing carnivores: the case of the sea otter. In: Dunstone, N, and Gorman, M L. (editors) pp.307–320, Symposia of the Zoological Society of London No. 65, Oxford Science Publications, Oxford.

The Fisheries and Angling Conservation Trust Joint Wildlife Management Group (2006) Protecting your fishery from Cormorants, version 2. http://www.salmon-trout.org/pdf/Fishery_management_guide_March_06.pdf

Fox, C H. 2006. Coyotes and Humans: can we coexist? In: Timm, R M, and O'Brien, J M. (editors), pp.287–293, Proceedings of the 22nd Vertebrate Pest Conference, University of California, Davis.

Halvoresen, K E. 2003. Assessing the effects of public participation. Public Administration Review 63(5): 535–543.

Hanisch, S L, and Schmidt, P R. 2006. Resolving Double-crested Cormorant *Phalacrocorax auritus* conflicts in the United States: past, present, and future. In: Boere, G C, Galbraith, C A, and Stroud, D A. (editors), pp.826–828, Waterbirds around the World: a global overview of the conservation, management and research of the world's waterbird flyways, The Stationery Office, Edinburgh, UK. http://www.jncc.gov.uk/PDF/pub07_waterbirds_part6.1.10.pdf

Innes, J E, and Booher, D E. 2004. Reframing public participation: strategies for the 21st Century. Planning Theory & Practice 5(4): 419–436.

Gilbert, K, Hulst, N, and Rientjes, S. 2006. Social Science and Biodiversity: why is it important? A guide for policymakers. ECNC-European Centre for Nature Conservation, ISBN: 978-90-76762-18-0. Also available at: http://www.ecnc.org/publications/technicalreports/social-science-and-biodiversity

Knight, J. 2000. Introduction. In: Knight, J. (editor), pp.1–35, Natural Enemies: people–wildlife conflicts in anthropological perspective. London: Routledge.

Llambí, L D, Smith, J K, Pereira, N, Pereira, A C, Valero, F, Monasterio, M, and Dávila, M V. 2005. Participatory planning for biodiversity conservation in the high tropical Andes: are farmers interested? Mountain Research and Development 25(3): 200–205.

Matthiopoulos, J, McConnell, B, Duck, C, and Fedak, M. 2004. Using satellite telemetry and arial counts to estimate space use by grey seals around the British Isles. Journal of Applied Ecology 41: 476–491.

Messmer, T A. 2000. The emergence of human–wildlife conflict management: turning challenges into opportunities. International Biodeterioration & Biodegradation 45: 97–102.

Nemtzov, S C. 2005. Relocation of pygmy Cormorants *Phalacrocorax pygmeus* using scare tactics to reduce conflict with fish farmers in the Bet She'an Valley, Israel. Conservation Evidence 2: 3–5. http://www.conservationevidence.com/individual-study/2134

Newson, S E, Hughes, B, Russell, I C, Ekins, G R, and Sellers, R M. 2005. Sub-specific differentiation and distribution of Great Cormorants *Phalacrocorax carbo* in Europe. Ardea 92: 3–9.

Rabinowitz, A. 2005. Jaguars and livestock: living with the world's third largest cat. In: Woodroffe, R, Thirgood, S M, and Rabinowitz, A. (editors), pp.278–285, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

Ramírez, R. 1999. Stakeholder analysis and conflict management. In: Buckles, D. (editor), pp.101–127, Cultivating Peace. International Development Research Centre, World Bank Inst., Washington DC, USA.

Redpath, S M, Arroyo, B E, Leckie, F M, Bacon, P, Bayfield, N, Gutierrez, R J, and Thirgood, S J. 2004. Using decision modeling with stakeholders to reduce human–wildlife conflict: a raptor–grouse case study. Conservation Biology 18: 350–359. http://onlinelibrary.wiley.com/doi/10.1111/j.1523-1739.2004.00421.x/pdf 8251.pdf

Rosell, F, Bozsér, O, Collen, P, and Parker, H. 2005. Ecological impact of beavers *Castor fiber* and *Castor canadensis* and their ability to modify ecosystems. Mammal Review 35 (3&4): 248–276.

Russell, I, Broughton, B, Keller, T, and Carss, D N. 2012. The **INTERCAFE** Cormorant Management Toolbox — methods of reducing Cormorant problems at European fisheries. COST 635 Final Report III. ISBN 978-1-906698-09-6.

Thirgood, S R, and Redpath, S. M. 2005. Hen harriers and red grouse: the ecology of a conflict. In: Woodroffe, R, Thirgood, S R, and Rabinowitz, A. (editors), pp.192–208, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

Thirgood, S R, Woodroffe, R, and Rabinowitz, A. 2005. The impact of human–wildlife conflict on human lives and livelihoods. In: Woodroffe, R, Thirgood, S R, and Rabinowitz, A. (editors), pp.13–26, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

Treves, A, and Karanth, K. 2003. Human carnivore conflict and perspectives on carnivore management worldwide. Conservation Biology 17: 1491–1499.

Treves, A, Wallace, R B, Naughton-Treves, L, and Morales, A. 2006. Co-managing human:wildlife conflicts: a review. Human Dimensions of Wildlife, 11: 383–396. http://faculty.nelson.wisc.edu/treves/pubs/Treves_etal_2006_comgmt.pdf

van Dam, C, and Asbirk, S. (editors). 1997. Cormorants and human interests. Proceedings of the Workshop towards an International Conservation and management Plan for the Great Cormorant (*Phalacrocorax carbo*), 3 and 4 October, Lelystad, the Netherlands. IKC natuurbeheer, Wageningen, Netherlands.

van Roomen, M, and Madsen, J. (editors). 1992. Waterfowl and Agriculture: review and future perspective of the crop damage conflict in Europe. IWRB Special Publication No. 21, Slimbridge, Gloucester.

Williams, C K, Davey, C C, Moore, R L, Hinds, L A, Silvers, L E, Kerr, P J, French, N, Hood, G M, Pech, R P. 7 Krebs, C J. 2007. Population responses to sterility imposed on female European rabbits. Journal of Applied Ecology 44:291–301.

Woodroffe, R, Thirgood, S J, and Rabinowitz, A. 2005a. The impact of human–wildlife conflict on natural systems. In: Woodroffe, R, Thirgood, S J, and Rabinowitz, A. (editors), pp.1–12, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

Woodroffe, R, Thirgood, S J, and Rabinowitz, A. 2005b. The future of coexistence: resolving human–wildlife conflicts in a changing world. In: Woodroffe, R, Thirgood, S R, and Rabinowitz, A. (editors), pp.388–405, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

World Park Congress. 2003. Recommendations of the Vth IUCN World Parks Congress, Durban, South Africa. http://www.iucn.org/themes/wcpa/wpc2003/pdfs/outputs/wpc/recommendations.pdf

World Wildlife Fund. 2005. Human Wildlife Conflicts Manual. Wildlife Management Series. http://awsassets.panda.org/downloads/human_wildlife_conflict.pdf

Young J, Watt, A D, Nowicki, P, Alard, D, Clitherow, J, Henle, K, Johnson, R, Laczko, E, McCracken, D, Matouch, S, Niemela, J, and Richards, C. 2005. Towards sustainable land use: identifying and managing the conflicts between human activities and biodiversity conservation in Europe. Biodiversity and Conservation 14: 1641–1661. http://www.solvitweb.ch/BiodivandConserv.pdf

4 WILDLIFE MANAGEMENT PLANS: concepts and diversity

Erik Petersson, Pekka Salmi and Rosemarie Parz-Gollner

4.1 Introduction

As discussed in the chapter 3, both traditional scientific evidence and the shared involvement of other stakeholders are considered essential to successful wildlife management. These actions are often documented and justified within a 'management plan'. In this way, management plans can be seen as a powerful theoretical and practical tool in human:wildlife conflict (HWC) management. In practice there is a wide array of management plans and reasons for having them, and these are the subjects of this chapter.

4.2 Background

Here management plans (hereafter, MPs) are defined as plans providing guidance on the overall management of an area or species administered by a federal or state agency. A MP usually includes objectives, goals, standards and guidelines, management actions, biological background information and monitoring plans. If such a plan is to be produced for a certain species, information about that species is crucial — knowledge that generally is gathered by biologists. But that is not the full story; the biological requirements for a flourishing species may interfere with human activities and desires. For some species this collision with human interests can cause conflicts, not only between humans and wildlife but also between humans themselves (see Knight, 2000). Very often conflicts involve a species or a habitat of high conservation importance. For example, Woodroffe *et al* (2005) focus specifically on conflicts involving people and threatened wildlife, such as crop raiding, livestock depredation, predation on managed wildlife and the killing of people. However, as the cases described and discussed in chapter 3 demonstrate, there is no common definition of what constitutes a 'conflict species', and so here a slightly broader definition is employed. More broadly, all HWCs by definition involve at least one (non-human) species implicated in some form of 'controversy' — often over the use of resources. One example of such a controversial species in Europe is of course the Great Cormorant (*Phalacrocorax carbo*).

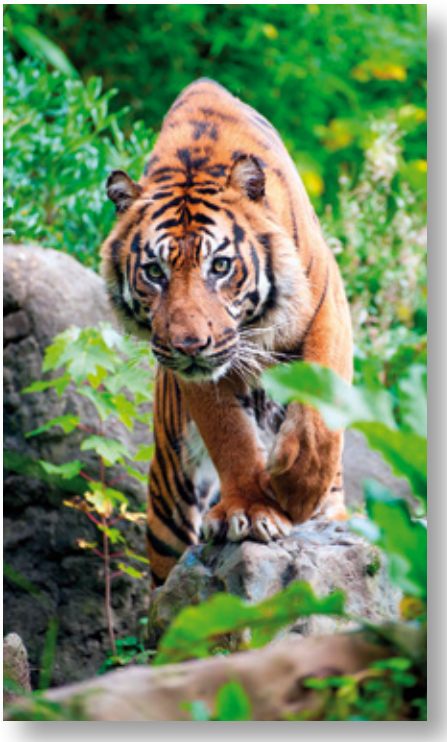
Conflicts with wildlife often appear following some form of environmental, societal or individual changes affecting people's livelihood, knowledge, perceptions or beliefs. Although people may accommodate new conditions and even reconsider aspects of their everyday practices, change can also create tensions when individuals or groups have different views on how these changes might affect and influence environmental and wildlife[5] management (Jones *et al*. 2005).

The incentives for producing MPs in Europe often emerge in relation to: (1) changes in the environment as a common living space or habitat for plants, animals and humans, (2) the ability of humans to modify the environment and natural resources on multiple levels, (3) reduction of space or other resources due to increasing human demands, (4) human perception and awareness of the environment, (5) ownership and legislation; and (6) ethical considerations such as the management of free-living wildlife for human consumption, the destruction of free-living wildlife for disease control or environmental reasons, or the appropriate management of introduced ('alien') and/or pest species.

[5] The term 'wildlife' usually refers to non-domesticated members of the animal kingdom, but a broader definition includes also plants and other organisms (e.g. fungus, bacteria).

Usually, management in the context of nature or the environment is understood as a way of dealing with wildlife populations within a given area — being managed either for ecological (usually conservation) or economic (usually harvesting) reasons. Within Europe, these dual objectives of an MP are reflected by the fact that Member States develop their plans differently, depending on the purpose. For instance, in Sweden plans for conserving species are called 'åtgärdsprogram', which might be translated as *action plan* (*or programme*). Plans for species not under threat, but with a commercial value, are called 'förvaltningplan' (*administration/ management plan*). In the Czech language there is a difference between 'program péče' (*programme of care* — devoted to preservation of landscape and environment generally including landscape, protected village areas, cultural landscape, bird areas, diversity of protected areas, protection of soil against erosion etc.), and 'záchranný program' (*preservation programme* — covering endangered species such as Lynx *Lynx lynx*, Pearl Mussel *Margaritifera margaritifera*, and Capercaillie *Tetrao urogallus*.

Interestingly, the European Union does not explicitly require that Member States should have MPs for specific species. However the Bern Convention (Convention on the Conservation of Wildlife and Natural Habitats)[6] states: *'The parties [*countries*] undertake to:*





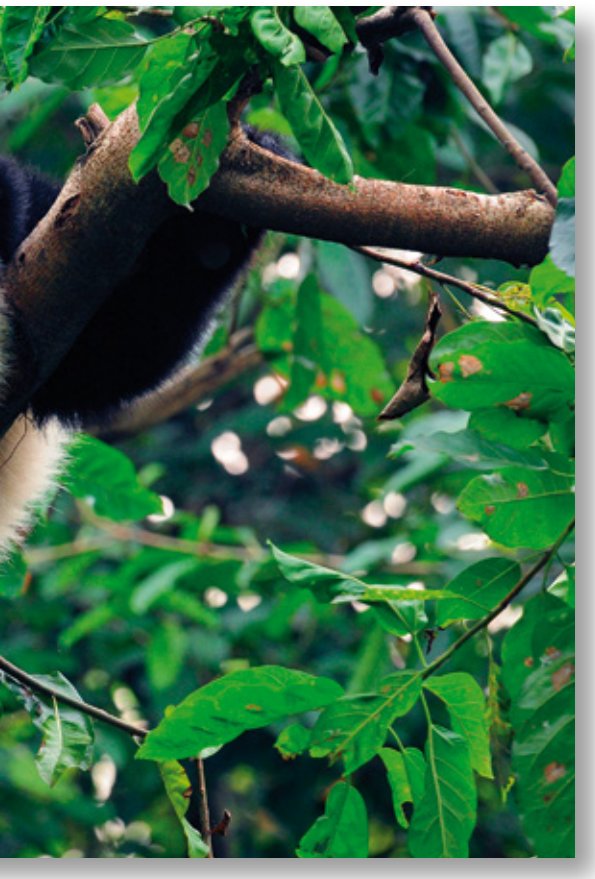
Tiger *Panthera tigris* (left), White Rhinoceros *Ceratotherium simum* (right) and Giant Panda (*Ailuropoda melanoleuca*) (centre).
Photos courtesy of Shutterstock.

promote national policies for the conservation of wild flora, wild fauna and natural habitats…'. Thus, one way to meet these obligations is to produce MPs (for further information on the Bern Convention and other EU legislation relevant to Cormorant issues, see chapter 7 on European legal institutions and instruments).

Here, and particularly in the next chapter, we focus on conflict species such as carnivores, seals and fish-eating birds, primarily because these species have a high potential to polarise different interest groups such as farmers, commercial fishermen, anglers, conservation groups and others. However, it should be noted that MPs can sometimes be used as a quick fix to temporarily mitigate conflicts, whereas long-term conflict management requires that governments incorporate exisiting expertise in the search for more sustainable solutions that balance biological, economic and socio-political objectives of natural resource management (Hilborn, 2007). One of the commonest biological objectives of natural resource management, often found in legislation and international agreements, is to maximise production or harvest of food crops, fisheries, or forest products.

Over the last few decades there has been additional emphasis on the protection of non-target species and ecosystems and ecosystem-based management towards long-term, sustainable approaches. This moves away from the purely biological realm and includes: (1) economic objectives, (2) social objectives that often involve the

[6] Council Decision 82/72/EEC of 3 December 1981 concerning the conclusion of the Convention on the Conservation of European Wildlife and Natural Habitats.





maintenance of employment and livelihoods, production/efficient utilisation of food resources, and the continuation of traditional communities, and (3) political objectives which primarily involve the avoidance, management or resolution of competing interests and goals. These diverse objectives are sometimes compatible but are often in opposition, leading to conflicts over the management of natural resources.

4.3 From conservation to management

One issue affecting conservation goals, such as the listing of threatened species and MPs in general, is the fact that people think and feel about different species in different ways. Humans are neither objective nor free from prejudices against species they do not like. Most people tend to associate endangered species with the charismatic, so-called 'flagship', species such as the Tiger (*Panthera tigris*), White Rhinoceros (*Ceratotherium simum*), and Giant Panda (*Ailuropoda melanoleuca*). However, many other, less well-known species are also endangered, and some scientists argue that people tend to focus their attention on 'cute' species and not enough on the 'ugly ducklings' that are considered less charismatic. As a consequence, many conservation management groups have tended to target popular species with which people can identify, or to which they can form an attachment, in order to persuade them to donate funds in support of conservation activities.

One argument is that by conserving these species and, importantly, their habitats, other species are protected in those habitats too. A related, but broader, perspective is the discussion of 'keystone species' and the presumption that by focussing on the conservation of certain species, then entire ecosystems will ultimately benefit (Mills *et al.* 1993).

In relation to their management, species can also be classified according to their abundance and the degree to which they are considered to be an actual or perceived problem. So-called pest species are often classed as (1) animals or plants that have been introduced by humans to a new location, outside their natural range, or (2) indigenous species that have dramatically increased in numbers, sometimes through human-induced environmental changes, to the detriment of other species[7]. Species may be deemed as pests because they are destructive to native biodiversity, harvested resources and farmed species, and potentially to humans because of a reduction in recreational amenity. They may also pose the most important long-term threat to aquatic and other environments (e.g. Cappo *et al.* 1995). Indeed the concept of animal pests is a widespread and important phenomenon in many wildlife

[7] e.g. Australian Government website (2009) at http://www.nrm.gov.au/publications/factsheets/me-indicators/estuarine/pest-species.html

management issues (see Knight, 2000 on 'pestilence discourse').

Some species are considered to potentially compete with humans for resources. For instance they may be direct competitors, as is the case with some species of deer causing damage to timber crops, or bird species that destroy fruiting crops. In other cases these species may be symptomatic of wider environmental problems that are either caused entirely by other factors or by a particular species in conjunction with a range of other factors (Carss *et al*. 2009). For example, declining fish stocks are generally the result of factors such as over-fishing, pollution, and habitat destruction or modification. However, considerable focus is often placed on the impact of Cormorant predation on fish catches even though this might not be the main cause of the problems facing fisheries[8]. Scientifically, while there may be an association between declining fish numbers, or catches for instance, and increasing Cormorant presence in an area, this is not the same as a cause and effect relationship where Cormorants are solely affecting fish numbers or catch size (see chapter 9 of Carss *et al*. 2012 for detailed exploration of this issue). Philosophically, the role of the Cormorant in such cases of fish stock degradation effectively becomes a 'slingshot argument' (Barwise & Perry 1981), where people argue or conclude that there is only one fact, or true proposition, or state of affairs in such circumstances — that Cormorants are directly to blame for fish decline and, conversely, that fewer Cormorants would mean more fish.

There are two additional points to be emphasised. First, many conflict species are also charismatic ones being appreciated by many but detested by others, as is the case with the wolf. Second, is the question of how wildlife should be managed. Species can be managed for a diverse range of reasons, including their scarcity or conservation value, their high public profile and apparent key role in the maintainance of ecosystems, their translocation to the 'wrong' places, their real or perceived abundance, and their real or perceived competition with humans for shared resources. An ecosystem approach is generally considered a more efficient and holistic way of integrating social, environmental and economic factors into management decision-making and practice. Unfortunately, in most cases, ecosystems and their associated social systems appear too complex to address in a MP within a specific, and usually limited, time-scale. In this and the next chapter, most of the MPs that are discussed focus only on one or a few species.

Another important issue that arises when considering the management of species is the characteristic of many of them to move freely between the arbitrary boundaries humans have made between regions or between countries. In contrast to this free trans-boundary movement, most MPs are often only regional or national in their coverage although one exception concerns migratory bird species. If a species has an unfavourable conservation status at a national level there is actually a legal requirement for an international MP (de Klemm 1994) and some large mammals (e.g. Elk or Moose *Alces alces*, Brown Bear *Ursus arctos*, Wolf *Canis lupus* and Lynx) also frequently move between different countries. There are thus several examples of international co-operation in order to conserve species with large home ranges, or which cover large geographical areas in their annual cycle. These include the Bearded Vulture (or Lammergeier *Gypaëtus barbatus*) project in central Europe[9] and the efforts of the large carnivore group KORA[10] who mostly deal with Lynx in Switzerland.

Such international, transboundary conservation efforts are becoming more common. For instance, the

[8] From an ecological point of view, the issue concerning Cormorant impacts on fish populations can be summarised in a much simplified form, as follows (see also chapter 9 of Carss *et al*. 2012 for full exploration of this topic). The fish species living in a lake, river or an ocean are affected differently by human activities (such as eutrophication, river channelling, river fragmentation, introduction of non-native fish species, development of artificial water bodies, overfishing, and so on). Some fish species benefit from some of these activities, while other fish species generally suffer from such changes. For example, if commercial fishing is directed towards large predatory fish species, the smaller and mid-sized species might benefit. In turn, Cormorants might well benefit from many anthropogenic changes, because such changes tend to restructure fish species- and size-compositons to those most preferred (i.e easiest to catch) by the birds. Thus, Cormorants need not be the original — nor the main — 'problem' affecting fisheries but their presence can nevertheless greatly aggravate the situation (see for example Carss 2003, p.160).

[9] Bearded Vulture reintroduction to the Alps website at http://www.wild.uzh.ch/bg/index_e.htm

[10] KORA, Koordinierten Forschungsprojekten zur Erhaltung und zum Management der Raubtiere in der Schweiz, website at http://www.kora.ch

CMS — the Convention on the Conservation of Migratory Species of Wild Animals (or the Bonn Convention) — was signed in 1979 and entered into force in 1983. It aims to conserve terrestrial, marine and avian migratory species throughout their range and currently includes European bats, cetaceans in several regions, seals in the Wadden Sea, African-Eurasian waterbirds, albatrosses and petrels (Procellariiformes), and gorillas (*Gorilla* spp.) and their habitats. The Bonn convention is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme, and it deals with wildlife and habitat conservation on a global scale. Membership has grown to include over 100 Parties from Africa, Central and South America, Asia, Europe and Oceania. Similarly, the IUCN-linked European Green Belt Initiative[11] has a vision to create the backbone of an ecological network that runs from the Barents Sea to the Black Sea. This has the aim of preserving some of the most important habitats for biodiversity and bio-geographical regions in Europe along the border of the former so-called 'Iron Curtain'.

Importantly, the vast majority of international agreements relating to migratory species, including birds, are a result of the conservation status of that species or protection issues associated with it. Much less common are international agreements for migratory species that do not to require high levels of conservation or special protection and that are considered to be a problem to human interests.

In many cases, MPs are seen as necessary instruments for managing overlapping or controversial interests that have to share or compete for the same resources. MPs deal with topics on a mixture of temporal and spatial scales. For example, they may be restricted to a particular period in a species' annual cycle or to a particular time when its activities are considered destructive. Furthermore, MPs are also often developed and have to be implemented to accommodate (1) the difference between short- and long-term views, production cycles, and species' life-spans or (2) the number of people directly involved, or the amount of attention those issues surrounding the species receives, which is often independent of total animal numbers or the area involved (Schwach *et al.* 2007).

4.4 Common objectives of management plans

In general, the development and writing of MPs across Europe and elsewhere can usually be seen as being reactive or 'case-driven'. In many cases, special attention is given to species that, from a human perspective, are considered to require action in order to achieve some management goal. In general, MPs may help in finding a better balance between the interests, knowledge and values involved in the management of a species or habitat and go some way to reducing HWCs. Four of the most common objectives of MPs are described below to give a flavour of their diversity and some of their associated HWCs. These examples focus predominantly on wildlife management in terms of actions taken directly on individuals of particular species but it is important to remember that MPs can also be applied to particular habitats.



Mountain gorilla *Gorilla beringei beringei*: a highly-protected species. Photo courtesy of Shutterstock.

[11] Website at http://www.europeangreenbelt.org

Managing threatened species

From a strict conservation point of view it is generally argued that the Earth's natural heritage must be maintained if future human generations are to thrive spiritually, culturally and economically. The interplay between some of these values and interests in relation to policy-formation are further explored in chapter 10. As Jones *et al*. (2005) point out, a current task is to conserve the Earth's living heritage, our global biodiversity, and to demonstrate that human societies are able to live harmoniously with nature. For conservation purposes, most countries compile their own 'Red Lists' similar to the IUCN Red List, and each should ideally incorporate knowledge concerning the conservation status of a species residing in other countries/areas, into their own MPs. For many species this is no problem but for others where numbers are low, it might cause conflicts if the species is regarded by some as a threat or a problem. Examples of such problem species include some carnivores whose growing numbers may increase the chances of attacks on livestock, or some primates where the preservation of some of the rarer species requires the protection of certain habitats which can cause conflicts over land use and access to resources by humans.



Brown Bear *Ursus arctos*: a species highly-prized by hunters. Photo courtesy of Shutterstock.



Atlantic Cod *Gadus morhua*: an over-fished species throughout much of its range. Photo courtesy of Shutterstock.

Managing commercial species

Putting aside the vast number of plants that are of commercial interest, a great variety of animal species are of interest for both commercial harvesting and for sport. Some species (e.g. Brown Bear in Scandinavia or Atlantic Cod *Gadus morhua* in the Baltic Sea) might be hunted or harvested to such an extent that management restrictions on capturing or killing them are necessary through the imposition of hunting seasons or catch quotas. Such species are usually desired in large numbers and so conflicts concerning their existence or population size do not generally occur as those that exploit them usually agree that a healthy population of these species is desirable.

Nevertheless, conflicts might arise if wildlife numbers and/or the geographical spread or behaviour of a species begins to interfere with human interests in the



Himalayan Balsam *Impatiens glandulifera* an alien plant in much of the UK and USA. Photo courtesy of Shutterstock.

same area. For example, in some situations livestock, or a very dense population of ungulates, might cause harm to habitats as well as strongly interferring with forestry or farming undertaken in the same restricted area. There might also be disagreements between different stakeholders on how to manage specific species. For example, environmentalists, tourists, trekkers and anglers might have different opinions about certain wildlife species than those held by hunters. Often, hunters or fishermen have traditionally harvested and/or managed certain wild resources for considerable periods of time, and changing circumstance (e.g. increased tourism or environmental restrictions) might give rise to new conflicts.

Managing invasive species

Invasive species are plants, animals, or other organisms that tend to produce reproductivly viable offspring in very large numbers and have the potential to spread dramatically and expand their range relatively rapidly over a large area[12]. Invasive species are often introduced, intentionally or by accident, to a place beyond their traditional, natural range and cause harm in this new location. Here, such 'alien' species often have no natural enemies to limit their reproduction and so usually spread rampantly.

Conservation biologists and policy-makers recognise invasive 'alien' species as one of the leading threats to biodiversity with the capacity to create enormous costs for agriculture, forestry, fisheries, and other human enterprises, some even impacting on human health. Much effort and money has gone into managing invasive species. In the USA the cost of controlling invasive species and the damage they inflict upon property and natural resources has been estimated at $137 billion annually[13]. One invasive plant, Leafy Spurge (*Euphorbia esula*), has been shown to decrease ranch-land values by up to 83% in Oregon[14]. Invasive species and their associated threats are generally recognised as such by all and so their management does not usually cause conflict between different interest groups (e.g. Council of Europe, 2001).

[12] See e.g. website of European Commission project DAISIE, Delivering Alien Invasive Species Inventories for Europe at http://www.europe-aliens.org

[13] See e.g. GISP, Global Invasive Species Programme, website at http://www.issg.org/gisp_publications_reports.htm

[14] See Invasive Species in Oregon website at http://oregoninvasivespeciescouncil.org





Ruffe *Gymnocephalus cernuus* (top) and Perch *Perca fluviatilis* (above).
Photos courtesy of Shutterstock.

Managing non-threatened species occurring in 'undesirable' numbers

While many species are negatively influenced by human activities, others are influenced positively for the same reasons. This depends greatly on the species' morphological and behavioural ability to adapt to, and take advantage of, man-made or modified landscapes and habitats. For example, in many cases agricultural land reclamation will change the landscape from forest to open fields, which will disadvantage species adapted to a life among trees but favour species adapted to a life in open areas. It might also be that some species benefit from a decrease in the numbers of other species. One example is the apparent competition between two fish species, the Perch *Perca fluviatilis* and the Ruffe *Gymnocephalus cernuus*. Ruffe may be the less popular species amongst anglers, but high fishing pressure on Perch often favours the Ruffe (Dieterich *et al*. 2004) which then tends to dominate the fish community.

The Great Cormorant has increased in numbers since the middle of the last century and its presence and feeding requirements are thought by many to affect human activities such as fishing, hunting, and some forms of land use. Conflicts occur in relation to such things as excessive Cormorant predation on commercial fish, possible effects on vegetation and forestry through guano production, and people's inability to scare birds because of the risk of disturbing other protected species. In most countries, the Cormorant is not regarded as a suitable game species and, while some interest groups would like to reduce/eradicate them, others argue that humans have to respect the alien in nature not only in its autonomous otherness but even in its stimulus, provocation and opposition (c.f. Rolston 1988). Most consider that current Cormorant numbers are the result of protection measures, changing environmental conditions and habitat modification (see chapter 17 for a synthesis of these issues within **INTERCAFE's** Case Studies). For an ecological overview of Cormorants thriving in human-dominated wetlands, see van Eerden *et al*. (1995). Conflicts occur not only because of the species' numerical abundance and geographic expansion, but also because of the diversity of problems that Cormorants are accused of causing.

4.5 The emphasis on scientific knowledge in management plans

It is often argued that management agencies must develop science-based plans to manage the ecological basis of a particular (problematic) situation, and to ensure adequate monitoring and enforcement of regulations. Natural science knowledge is considered an essential prerequisite of wildlife MPs. Indeed, wildlife management itself is deemed a science by some (e.g. Conover, 2002: 2). Among the world's dominant technocratic elites, science is considered a nesessary source of 'knowledge', the catalyst for 'research capacity', and a means of providing 'predictive ability' (Poff *et al*. 2003: 300). Similarly, in a list (of six) 'knowledge quality criteria' in relation to environmental decision-making (see below), Maxim and van der Sluijs (2007: 1) begin with *'reliability of the information — it must be based on all available scientific knowledge.'*

However, it is clear that science alone is not enough to resolve many human:wildlife conflicts surrounding environmental issues (see also chapter 3). This is because the *'scientific problems which are addressed can no longer be chosen on the basis of abstract scientific curiosity or industrial imperatives. Instead, scientists now tackle problems introduced through policy issues where typically facts are uncertain, values in dispute, stakes high and decisions urgent'* (Funtowicz & Ravetz 1991, see also Tacconi, 2000: 23–41). In relation to European Cormorant-fisheries conflicts and their potential resolution, these issues and those of the scientific community working together with others (see below) are discussed in some detail by Carss (2003: pp.73–77, pp.161–63). In many contexts, but particularly in fisheries management, the idea of integrating the issues mentioned above has been encapsulated in the context of co-management where fishermen and managers cooperate in drafting management policy (e.g. Rettig *et al*. 1989). This concept is taken further by Jentoft (2004) who states that (fisheries) management systems usually work through 'institutions' and, in a complex exploration of the concept, describes institutions as being seperable into three 'pillars' in the practice of fisheries management, as follows:

1. the regulative pillar (rules of conduct),
2. the normative pillar (legitimacy and moral dimensions), and
3. the cognitive pillar (how knowledge is assembled and who's knowledge takes precedence).

When analysing MPs, it is often the case that the cognitive pillar, especially scientific knowledge, has greatest emphasis, although the normative and regulative dimensions are also important for the acceptability and efficiency of management actions. When managing wildlife-related conflicts, the normative pillar is often undermined. It may be that focusing on legitimacy and acceptability of the management processes is often considered less useful — or more ambiguous and difficult — than, for instance, increasing the body of scientific knowledge and rules of conduct.

In many instances, ambiguities and difficulties stem from the inherent uncertainty of science, the management of uncertainty, understanding of the plurality of problem perspectives and the incorporation of non-scientists into environmental management and decision-making (see Maxim & van der Sluijs (2007) — so called 'post-normal science' (Funtowicz & Ravetz 1991). According to Maxim & van der Sluijs (2007), from a social science perspective it is important to note that the social construction of uncertainty plays a major role in environmental decision-making. In short, whilst the word uncertainty has a specific scientific connotation in relation to such things as accuracy (how close measurements are to reality), precision (the amount of variation recorded), probability (the quantification of chance) and the potential of generalising findings from specific studies, the term 'uncertainty of science' is used differently. When discussing this social construction of uncertainty, Maxim and van der Sluijs (2007: 2) use the word 'uncertainty' to *'gain insight into the role of contextual factors in the quality of scientific evidence. Uncertainty here… refers to the situation that the body of evidence from scientific research is* [perceived to be] *inconclusive with regard to the magnitude and nature of adverse effects, the causal mechanisms, and the probability of a risk.'*

Although methods for assessing the quality of scientific knowledge under conditions of uncertainty are lacking, Maxim & van der Sluijs (2007:12–15) propose six 'knowledge quality' criteria that can assist in evaluating information

communicated in a highly charged public process:

1. reliability of the information — it must be based on all available scientific knowledge;
2. robustness of the information — in relation to the availability (or not) of standard methodologies and also partly in relation to failures of communication between the scientific community and regulatory (decision-making) bodies;
3. use of the information produced by local actors providing 'real life' experiences (i.e. knowledge form non-scientists);
4. relevance of the argument(s) to the issue(s) under debate;
5. logical coherence of the discourse; and
6. legitimacy of the information source.

This last point is a key issue and here this specifically refers to *'the responsibility, impartiality, and independence'* of researchers and cites the *'procedural errors, incorrect reasoning, and a lack of understanding of … biology'* amongst some of them (ibid: p.14). It also refers to *'questions about the choice of experts working in expert committees that represent a certain institution with regard to their freedom, independence, and competence.'*

These criteria are intended to strengthen the role of science in situations of *'controversy and uncertainty'* (ibid, p.2) but, it is *'increasingly problematic to talk about 'science' (in general) and see its role as speaking 'truth (the objective facts) to 'power' (decision-makers)'* (see Wildavsky, 1979) because more and more actors are producing knowledge relevant to environmental decision-making.

MPs often have multiple, and not necessarily mutually exclusive, goals such as the conservation of natural resources, their sustainable use, their restoration, and the maintainance of socio-economic interests. As such, they try to include science, but also stakeholder and public participation, adaptive management and socio-economic considerations. However, wildlife managers or those tasked with developing MPs might find it difficult to fully integrate current scientific findings with all the other perspectives.

4.6 Acknowledging different types of knowledge and expertise

Studies concerning knowledge in environmental management and fisheries management in particular have highlighted the important role of scientific knowledge as well as its counterpart, local knowledge. Local ecological knowledge (LEK) or traditional ecological knowledge (TEK) dominate in the research literature focussed on local knowledge (Berkes, 1998). However, local knowledge should not be considered only in ecological terms. It has been commonly maintained that local (or 'traditional') knowledge incorporates a holistic understanding of the ecological, technological and social dimensions in connection with the life-worlds and experiences of the local people (Eythórsson 1998; Carss *et al.* 2009). Thus, local knowledge (or other stakeholders' views) may be an important aspect for inclusion in MPs.

Wilson (2003) has studied the 'two cultures' theory, which contrasts fishers' knowledge with research-based knowledge. Fishers and scientists do not see the world as differently as the two cultures theory suggests, but the reasons for problems lie in institutional factors. Wilson's case studies highlight that the local ecological knowledge of fishers can be regarded as anecdotal data and thus of less worth than that of scientific evidence. Carolan (2006), among others, prefers to shift attention away from discussions of science to that of expertise. This is connected with opening decision-making structures not only to those experts with scientific training, but also to experts with local practical knowledge. As Saaristo (2000) suggests, expertise cannot any longer be understand only in terms of professions or scientific education. The expert, then, is not necessarily an occupation or a profession, but a social position obtained in a specific occasion — for instance, in a group tasked with planning and decision-making. The advantage of this approach is that it may widen the availability of relevant knowledge and enhance decision-making.

In line with the above, Zwart (2008) holds that from a governance perspective, where the scope is wider than in top-down science-based management, no single form of knowledge can be regarded as overriding or objective. He continues that all knowledge claims emerge from a particular perspective, they all have their strengths and

weaknesses and they all have to be given due consideration in the deliberation process. Similarly, as the previous chapter demonstrated, what is required in management plans is perhaps more dialogue between scientists and others. Local knowledge is important — in terms of deciding that a management plan is needed, in devising it, and also in its implementation and subsequent monitoring. Scientific knowledge is important too, in understanding 'cause and effect' in the natural environment and also to place local issues within the context of the bigger picture of ecological processes. The Cormorant-fishery conflict is a good case in point, as too are other wildlife management issues, and chapter 5 examines whether, and how, different types of scientific and local knowledge claims have been considered in MPs.

4.7 MPs and legitimacy

An MP is the result of a process of considerable complexity, often not apparent to those who read or use it, or even to those involved in its drafting. To begin to understand the processes of collaboratively developing a management plan, questions should be asked regarding the legitimacy of persons, groups and/or institutions involved in the process as well as when and how these different actors are engaged in the process.

According to Engelen *et al.* (2008), legitimacy refers to the question of why outcomes of binding collective decision-making should be accepted by those whose interests may be harmed by the decisions taken. In democratic political systems, consent cannot be based on coercion nor can it be derived from convention or religion. Democracy is a procedural solution to the inability of finding broadly acceptable sources of substantial legitimacy (Zwart, 2008). On the other hand, scientific expertise is a contemporary substantial source of legitimacy. The procedural modes of legitimacy have gained in importance and include guaranteeing a level of fairness and collaboration in the decision procedure itself. This is in line with two rationalisations for public participation: (1) a democratic right of citizens to be involved in the processes, and (2) the effectiveness of policy delivery, namely how participation can assist in producing better policy outcomes (Rydin & Pennington, 2000). For instance, a broader knowledge-base provided by stakeholder participation can lead to robust and widely accepted outcomes. Moreover, decisions that are considered legitimate, and thus acceptable, are usually most amenable to implementation (Rauschmayer and Bahrens, 2008).

References

Barwise, J, and Perry, J. 1981. Semantic innocence and uncompromising situations, Midwest Studies in the Philosophy of Language, VI.

Berkes, F. 1998. Sacred Ecology: traditional ecological knowledge and resource management. Philadelphia, Taylor & Francis.

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale — REDCAFE, volume 1: pan-European Overview. Report to EU, contract no. Q5CA-2000-31387, pp169. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J. 2012. The **INTERCAFE** Field Manual — research methods for Cormorants, fishes, and the interactions between them. COST 635 Final Report II. ISBN 978-1-906698-08-9.

Carss, D N, Bell, S, and Marzano, M. 2009. 'Competing and Coexisting with Cormorants: Ambiguity and Change in European Wetlands'. In: Heckler, S (editor) Landscape, Process and Power: A New Environmental Knowledge Synthesis. New York: Berghahn.

Carolan, M. 2006. Science, expertise, and the democratisation of the decision-making process. Society and Natural Resources 19(7): 661–668.

Cappo, M, Alongi, D M, Williams, D, and Duke, N. 1995. A Review and Synthesis of Australian Fisheries Habitat Research: major threats, issues and gaps in knowledge of coastal and marine fisheries habitats, Fisheries Research and Development Corporation, Canberra.

Conover, M R. 2002. Resolving human-wildlife conflicts: the science of wildlife damage management. Lewis Publishers, Boca Raton, Florida, USA.

Council of Europe. 2001. Guidelines for Eradication of Terrestrial Vertebrates: a European contribution to the invasive alien species issue. T-PVS (2000) 65 rev2.

Dieterich, A, Baumgarten, D, and Eckmann, R. 2004. Competition for food between Eurasian perch (*Perca fluviatilis* L.) and ruffe (*Gymnocephalus cernus* L.) over different substrate types. Ecology of Freshwater Fish 13(4): 236–244.

de Klemm, C. 1994. The Problem of Migratory Species in International Law. In: Helge Ole Bergesen and Georg Parmann (eds.) Green Globe Yearbook of International Co - operation on Environment and Development 1994. Oxford: Oxford University Press. pp.67–77.

Engelen, E, Keulartz, J, and Leistra, G. 2008. European nature conservation policy making. From substantive to procedural sources of legitimacy. In: Keulartz, J, and Leistra, G (editors) pp.3–21, Legitimacy in European nature conservation policy. Case studies in multilevel governance. The International Library of Environmental, Agricultural and Food Ethics, vol 14, Springer.

Eythórsson, E. 1998. Voices of the weak — Relational aspects of local ecological knowledge in the fisheries. In: S. Jentoft (editor) pp.185–204, Commons in a Cold Climate. Coastal Fisheries and Reindeer Pastoralism in North Norway: The Co-management Approach. UNESCO & The Parthenon Publishing Group.

Funtowicz, S O, and Ravetz, J R. 1991. A new scientific methodology for global environmental issues. In: Costanza, R. (editor), pp.137–152, Ecological Economics: the science and management of sustainability. Columbia University Press.

Hilborn, R. 2007. Managing fisheries is managing people: what has been learned? Fish and Fisheries 8(4): 285–296.

Jentoft, S. 2004. Institutions in fisheries: what are they, what they do, and how they change. Marine Policy 28: 137–149.

Jones, W D, Jones, J C, Munn, I A, and Grado, S C. 2005. Wildlife Enterprises on Mississippi Private Lands. Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies 58: 344–355.

Knight. 2000. Natural Enemies: People-Wildlife Conflicts an Anthropological Perspective. Routledge, London and New York.

Maxim, L, and van der Sluijs, J P. 2007. Uncertainty: cause and effect of stakeholders' debates? Analysis of a case study: the risk for honeybees of the insecticide Gaucho®. Science of the Total Environment 376: 1–17.

Mills, L S, Soule, M E, and Doak, D F. 1993. The keystone-species concept in ecology and conservation. Bioscience 43(4): 219–224.

Poff, N L, Allan, J D, Palmer, M A, Hart, D D, Richter, B D, Arthington, A H, Rogers, K H, Meyers, J L, and Stanford J A. 2003. River flows and water wars: emerging science for environmental decision making. Frontiers in Ecology and the Environment 1(6): 298–306.

Rauschmayer, F, and Behrens, V. 2008. Legitimacy of species management. The Cormorant in the EU. In: Keulartz, J, and Leistra, G (editors) pp.55–74, Legitimacy in European nature conservation policy. Case studies in multilevel governance. Springer. The international library of environmental, agricultural and food ethics, vol 14.

Rettig, B, Berkes, F, and Pinkerton, E. 1989. The future of fisheries co-management: a multi-disciplinary assessment. In: Pinkerton, E. (editor), pp.273–289, Co-operative Management of Local Fisheries: new directions for improved management and community development. University of British Columbia Press, Vancouver.

Rolston, H. 1988. Environmental ethics — duties to and values in the natural world. Temple University Press, Philadelphia, USA.

Rydin, T, and Pennington, M. 2000. Public participation and local environmental planning: the collective action problem and the potential of social capital. Local Environment 5: 153–169.

Saaristo, K. 2000. Avoin asiantuntijuus. Ympäristökysymys ja monimuotoinen ekspertiisi. [Open expertise] Nykykulttuurin tutkimuskeskuksen julkaisuja 66. Jyväskylän yliopisto. [Publications of the Research Centre for Contemporary Culture, no. 66, University of Jyväskylä] [In Finnish].

Schwach, V, Bailly, D, Christensen, A-S, Delaney, A E, Degnbol, P, van Densen, W L T, Holm, P, McLay, H A, Nielsen, K N, Pastoors, M A, Reeves, S A, and Wilson, D. C. 2007. Policy and knowledge in fisheries management: a policy brief. ICES Journal of Marine Science, 64: 798–803.

Tacconi, L. 2000. Biodiversity and Ecological Economics: participation, values and resource management. Earthscan, London.

van Eerden, M R, Koffijberg, K, and Platteeuw, M. 1995. Riding on the crest of the wave: possibilities and limitations for a thriving population of migratory Cormorants *Phalacrocorax carbo* in man-dominated wetlands. Ardea 83: 1–9.

Wildavsky, A B. 1979. Speaking Truth to Power, the Art and Craft of Policy Analysis, Little Brown, Boston, Massachusetts.

Wilson, D C. 2003. Examining the two cultures theory of fisheries knowledge: The case of bluefish management. Society and Natural Resources 16(6): 491–508.

Woodroffe, R, Thirgood, S J, and Rabinowitz, A. 2005. The future of coexistence: resolving human–wildlife conflicts in a changing world. In: Woodroffe, R, Thirgood, S R, and Rabinowitz, A (editors), pp.388–405, People and Wildlife: Conflict or Coexistence? Cambridge University Press, Cambridge, UK.

Zwart, H. 2008. Animal governance: the Cormorant case. In: Keulartz, J, and Leistra, G (editors), pp.75–79. Legitimacy in European nature conservation policy. Case studies in multilevel governance. The international library of environmental, agricultural and food ethics, vol 14, Springer.

5 THE INCORPORATION OF SCIENTIFIC CONTRIBUTIONS AND OTHER STAKEHOLDERS' VIEWS INTO MANAGEMENT PLANS: an analysis for 'conflict' species

Erik Petersson, Pekka Salmi and Rosemarie Parz-Gollner

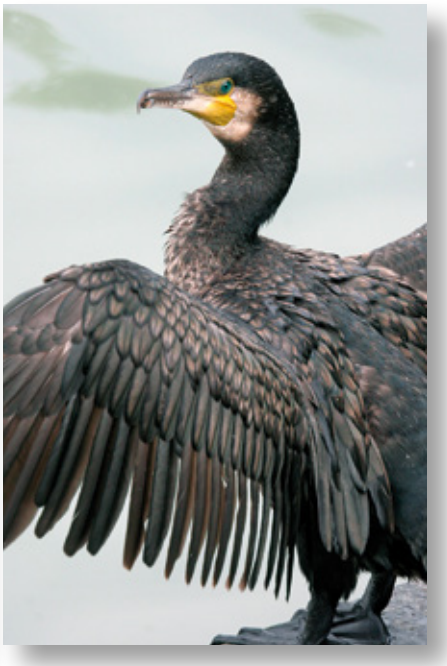
5.1 Introduction

This chapter investigates the ways in which science[15] and other views and interests have been incorporated into a selection of different types of species' MPs. Scientific views are often predominant in relation to natural resource management issues, which can cause conflicts when other groups and individuals believe that their knowledge and experiences have been excluded from decision-making processes. The concept of governance is used here to broaden the scope of the exploration into management interactions and decision-making over environmental issues. Governance has many definitions (Engelen *et al*. 2008), but the concept discussed here refers to multi-level management institutions (such as national and regional environmental agencies) that interact during the planning and decision-making processes involved in the development of MPs in the domains of the state, private sector and civic society. Governance approaches make it possible to highlight both expertise and the roles of different types of knowledge that are included during the development of MPs.

In this chapter the focus is on MPs as institutional instruments for wildlife, environmental and natural resource governance. Specifically, detailed examination is made of conflict species such as the Wolf *Canis lupus*, Great Cormorant *Phalacrocorax carbo*, and Grey Seal *Halichoerus grypus*, primarily because these species have a high potential to polarise different interest groups such as farmers, commercial fishermen, anglers, conservation groups and others. One of the commonest biological objectives of natural resource management, often found in legislation and international agreements, is to maximise production or harvest of food crops, fisheries, or forest products, for example. However, over the last few decades there has been additional emphasis on the protection of non-target species and whole ecosystems and on ecosystem-based management which works towards more sustainable outcomes. This moves away from the purely biological realm and includes such other things as: (1) economic objectives (that usually consider economic efficiency); (2) social objectives that often include the maintenance of employment and livelihoods,

[15] What is 'science'? The word comes from the Latin *scientia*, meaning 'knowledge'; and is generally interpreted as the effort to discover, and increase human understanding of, how the physical world works. Ideally, this is done through controlled methods: science uses observable physical evidence of natural phenomena to collect data, and it analyses this information to explain why and how things work. Some researchers stress that the term 'science' is not limited to the natural sciences, but includes investigations aimed at acquiring accurate knowledge of factual matters relating to any aspect of the world by using rational empirical methods analogous to those employed in natural science (Sokal, 2008).







Wolf *Canis lupus* (top left), Great Cormorant *Phalacrocorax carbo* (top right), Grey Seal *Halichoerus grypus* (above). Photos courtesy of Shutterstock.

production/efficient utilisation of food resources, and the continuation of traditional communities; and (3) political objectives which primarily involve the avoidance, management or resolution of competing interests and goals.

Sometimes, these diverse objectives are compatible but they are often in opposition, leading to conflicts surrounding the management of natural resources. Furthermore, both human and ecological systems are dynamic and so the concept of what is actually being managed may also be changing. Moreover, some issues are clearly trans-boundary in nature and have to be addressed at an international scale (see also 5.9).

The current analyses are based on two sets of data. First, two questionnaire surveys were sent out to wildlife managers in Europe and Israel. Then an in-depth analysis of six MPs from Sweden and Finland was conducted as a second source of primary material.

5.2 Introduction and methodological approach

MPs for conflict species can be studied as instruments for stakeholder participation and conflict mitigation. Here, two short questionnaires (see Appendices in 5.10 and 5.11) were devised to explore the processes involved in developing MPs and to gain a better understanding of which individual/groups become involved, how their knowledge and needs were incorporated into the plans and the types of measures suggested. The intention was also to discover what kind of conflict management strategy had been used, or tried, in the process of producing a management plan for a conflict species.

Questionnaire One

The first questionnaire was distributed to **INTERCAFE** participants in late 2006/early 2007 and they either completed it themselves or forwarded it to relevant researchers/administrators who had been involved the development of MPs. The 20 returns covering 23 MPs from across Europe were evaluated, analysed and quantified. It was clear that stakeholders (or at least the most affected ones such as those having an economic interest) might be integrated in the process and are continuously active and involved through the development of the MP. Similarly, stakeholders may be regularly invited to discuss the MP. Most common is that stakeholders

are either consulted before the writing starts (or at the beginning of the process through a hearing, for example), or they are asked to comment on a draft of the MP. Less common is a public meeting where all interested individuals and organisations are invited to discuss the issues. However, in some cases stakeholders may not be consulted about the MP at all.

In addition to these broad findings, the data were analysed in such a way that an overview could be generated through a redundancy analysis (ter Braak & Šmilauer 1998, Šidák 1967, Jongman *et al*. 1995). Essentially, this distils all the information into simple, interpretative diagrams that show the strongest relationships between answers recorded on the original questionnaires. In the resulting diagram (see Figure 5.1), each arrow points in the direction of the steepest increase of values for the corresponding factor. Arrows thus show the relative importance of this factor: the longer the arrow, the more important its corresponding factor in explaining variation within the overall dataset. The angles between arrows can be used to indicate correlations (or covariance) — that is, the degree of relatedness — between factors. The shallower the angles between arrows, the more closely the factors they represent are related.

Questionnaire Two

Between January and April 2008 a second round of questions was sent out by email to the people that completed the first questionnaire. This was aimed at deepening knowledge about collaboration, stakeholder participation and decision-making during the MP development/drafting processes. In

Table 5.1 Management plans (MPs) included in Questionnaire Two analysis in relation to country. Note: scientific species names are given in footnote no.16.

Species (group)	Denmark	Finland	Germany	Israel	Sweden
Cormorant	✗		✗	✗	✗
Wolf		✗	✗	✗	✗
Seal	✗	✗			✗
Pelican				✗	
Crayfish					✗





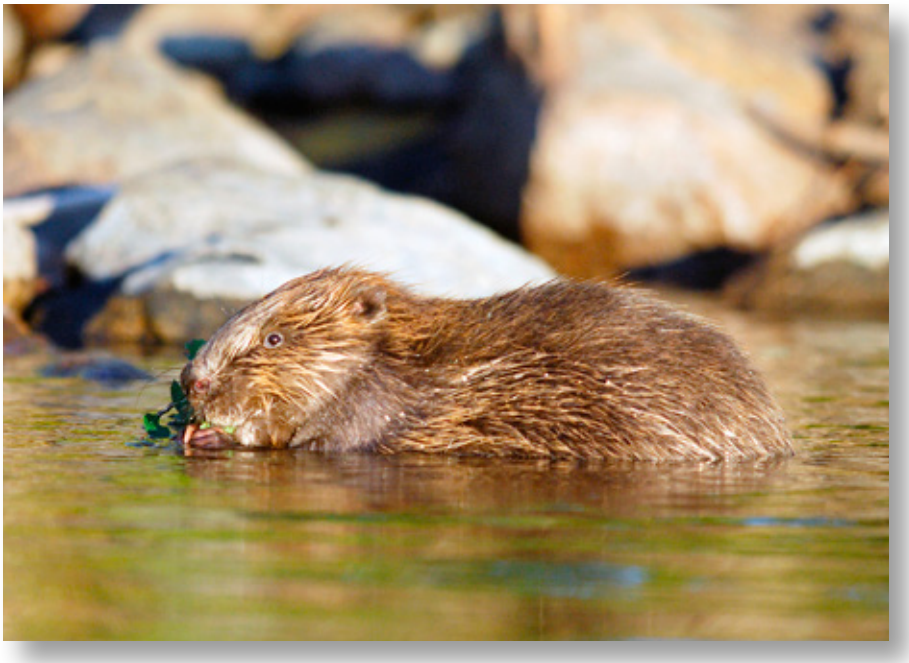
White Pelican *Pelecanus onocrotalus* (top) and European Crayfish *Astacus astacus* (above). Photos courtesy of Shutterstock.

addition, respondents were asked about the range of recommendations made in the MPs. A total of 20 questionnaires were sent out and 13 completed ones relating to MPs for individual species were received (Table 5.1). Answers and responses were examined, alongside a more detailed content analysis of six MPs.

MP content analysis

A more in-depth analysis of MPs was undertaken for Cormorants, Wolves and seals in Sweden and Finland. The MPs for Cormorants in Sweden and Finland were only available in the native language. However, MPs for the Wolf and seals were available in both Swedish and English whilst the Finnish plans were also written in English. In some cases a separate, more detailed report, related to specific MPs was also analysed. For example, interest group views were presented in a report about the Wolf discourse in Finland by Bisi & Kurki (2005). Similarly, a separate report about views concerning the Baltic seals was published in Finland by Storm *et al*. (2007) in connection with the preparation of the MP there.

The contents of MPs were analysed by deductive content analysis (see Elo & Kyngäs, 2008 and Tuomi & Sarajärvi, 2004 for a detailed summary). This is primarily a qualitative method of analysing written, verbal or visual communications in a systematic and objective manner to describe and quantify phenomena through concepts or categories. Primarily, the issues written in the plans were explored but consideration was also given to those subjects which were not articulated, such as collaborative institutional arrangements.



Beaver *Castor fiber*. Photo courtesy of Shutterstock.



Grey Seal *Halichoerus grypus*. Photo courtesy of Shutterstock.

5.3 Who is involved in developing Management Plans — a quantitative approach

The results of the questionnaires and the analyses of the six MPs revealed information about the writing process and how MPs can differ within and between countries. Firstly, a univariate quantitative approach revealed a variety of approaches for initiating the process, financing, stakeholder participation, etc. A further analysis of the MPs identified collaboration and decision-making processes.

Within each category the six management plans are compared while the results from the second questionnaire survey are used to

Table 5.2 Species, countries and management plans included in this study. Notes: *one single MP includes both Ringed Seal and Grey Seal, **one single MP includes Brown Bear, Lynx and Wolf.

	Species											
Country	Beaver	Brown Bear	Great Cormorant	Grey Seal	Hedgehog	Lynx	Noble Crayfish	Otter	Pygmy Cormorant	Ringed Seal	White Pelican	Wolf
Austria	✗	✗	✗									
Czech Republic	✗	✗**	✗			✗**		✗				✗**
Denmark			✗	✗*						✗*		
Finland			✗	✗*						✗*		✗
Germany (Bavaria)		✗**	✗			✗**						✗**
Israel									✗		✗	✗
Scotland					✗							
Slovenia		✗	✗									✗
Sweden			✗	✗			✗					✗

provide wider comparisons and to reveal intra-and international differences. Overall, 12 species were included in the MPs from nine countries during completion of Questionnaire One which was answered by 20 managers and covered 23 MPs (Table 5.2).[16] Sometimes, the number of cases was more than the number of MPs given in the text due to joint initiatives from two or more institutions/organisations or due to the fact that more than one way of involving stakeholders was used.

Overall, according to respondents, the decision to develop a MP was primarily made by a governmental institution and in most cases (59% of 27 cases) an environmental/conservation ministry. The initiative often originated at the national level but it could also come from the provincial level (the first level under the national level), which happened in 4 out of 23 cases (17%). Seldom (in around 10% of cases) was the decision to develop a MP taken by an NGO.

Respondents reported that, in their experience, scientific knowledge could be incorporated into MPs in six different ways. The most common (about 40% of 23 MPs) was that a researcher or a group of them familiar with the species in question wrote a review and added some new knowledge to the process. In just less than one-third of cases, a university departement was given the responsibility of writing the scientific (biological) background to the plans, and in around 20% of cases an NGO was tasked with reviewing available data. In rarer cases (less than 10% for each), existing information was reviewed by researchers or managers or MPs were based on preliminary monitoring data.



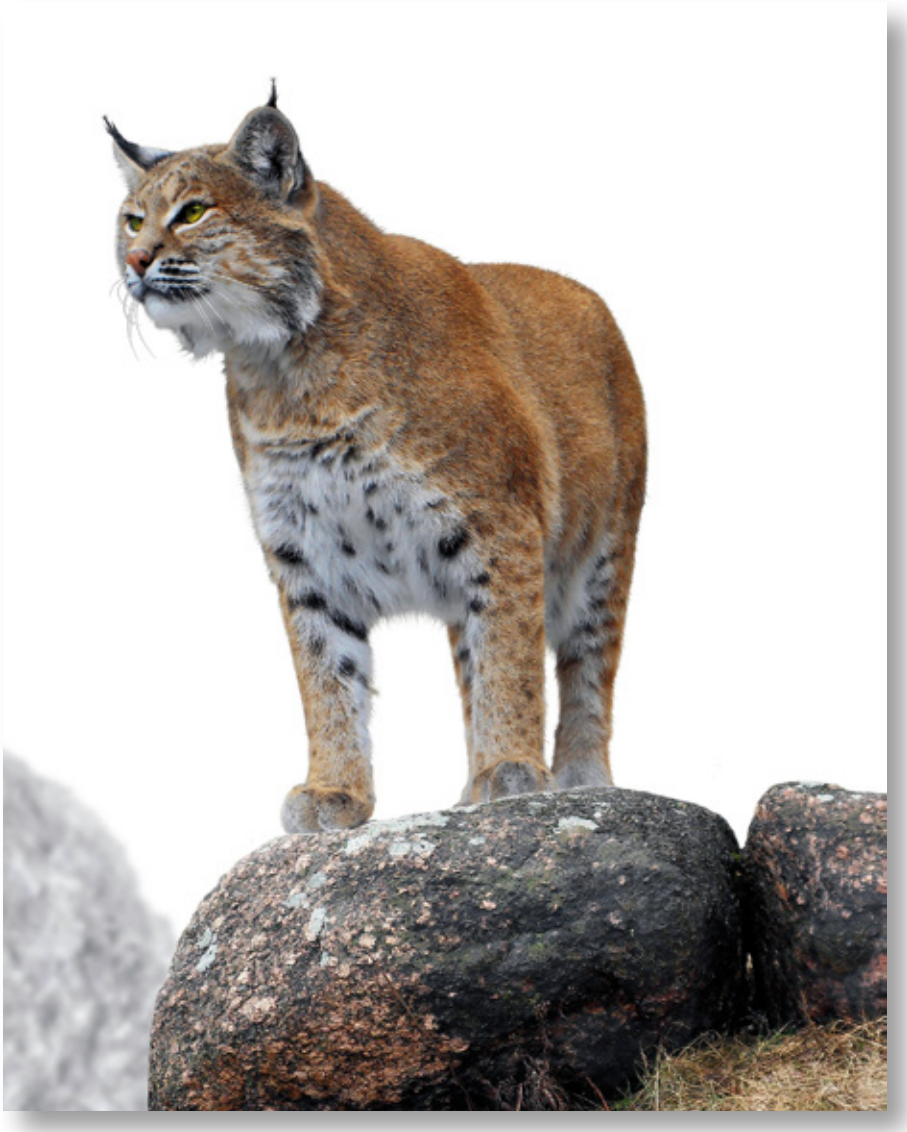
Hedgehog *Erinaceus europaeus*. Photo courtesy of Shutterstock.

[16] The scientific names of these species are: Beaver *Castor fiber*, Brown Bear *Ursus arctos*, Great Cormorant *Phalacrocorax carbo*, Grey Seal *Halichoerus grypus*, Hedgehog *Erinaceus europaeus*, Lynx *Lynx lynx*, Noble Crayfish *Astacus astacus*, Otter *Lutra lutra*, Pygmy Cormorant *P. pygmaeus*, Ringed Seal *Phoca hispida*, White Pelican *Pelecanus onocrotalus*, Wolf *Canis lupus*.

Respondents also said that other stakeholders could be included in the process of establishing a MP in different ways. The commonest of these (in combination, accounting for over 50% of records from 25 cases) involved stakeholder consultation prior to preparation of the MP or the opportunity to comment on a draft of it. Only in rare (less than 5%) instances were public meetings held to discuss MPs or were stakeholders integrated into the process/writing of an MP. In almost one-fifth of reports, stakeholders were not consulted at all during this process and so had no active input.

Role of the Media

The media might be used by different stakeholders to support or accentuate their viewpoint if there were conflicts over how a certain species should be managed (see chapter 9 for an exploration of the media). Respondents reported that, in about three-quarters of 23 cases, the media showed interest in the process of writing MPs or in the recommendations MPs offered to deal with an environmental conflict. In many cases (over 40%), the media were reported to have shown high interest, but the influence of this on MPs was not something that could be evaluated. In around 30% of cases, particularly in relation to the Brown Bear (Finland), Wolf (Finland and Sweden) and Otter (Czech Republic), media interest was actually a driving force, pressing for increased efforts (money and labour) to complete the plan. In around 25% of reports, media interest in MPs was considered by respondents to be 'very low' and probably had little, or no, influence on the MP writing process. In one case (the MP for Brown Bear in Austria), the media reporting was likely to have led to an adjustment of the recommendations set out in the plan.



Lynx *Lynx lynx*. Photo courtesy of Shutterstock.

One interesting factor to emerge was the relationship between media interest and level of stakeholder participation in the process of producing a management plan. Here, data suggested strongly that media influence or interest was relatively lower when stakeholders were integrated into, or participated in, the process of developing a MP (G-test = 10.72, p=0.057). Conversely, when stakeholders had less (or no) involvement in the development of MPs, media influence or interest tended to be higher.

Resources

According to respondents, the economic resources needed for writing a MP can come from a variety of different sources, although the flow of money can be complicated. For example, a government may divide its total budget between different ministries, according to the political and economic situation. Thereafter, the ministries themselves prioritise how to use the money. In some of the cases



Otter *Lutra lutra*. Photo courtesy of Dave Carss.

reported, the government indicated that a ministry should use the money for a certain purpose. Nevertheless, the ministry in question still handled the financial transactions and so was considered the financier of the management plan. Mostly (64% of 25 cases), the environmental/conservation ministries paid for the work - governments, NGOs or resource ministries paying for it less often. There was a strong association between the institution initiating an MP and the one paying for it (Cramer's $V = 0.83$; $p < 0.001$).

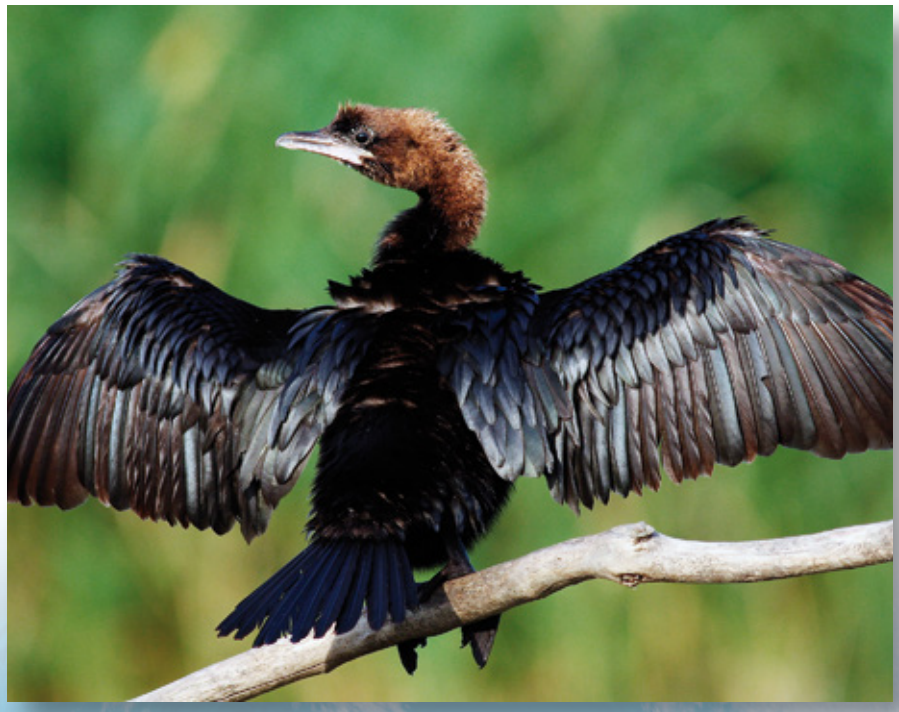
Universities were not reported to contribute economic resources towards producing MPs although, in some cases, they coordinated the work. In most cases, the university staff involved in the preparation of MPs were hired by the environmental ministries to do so. Governments, NGOs and resource ministries rarely appeared to coordinate the work. The association between the institution initiating an MP and the one coordinating work on it was relatively weak (Cramer's $V = 0.64$; $p = 0.077$).

Time

The median time for producing a MP for a conflict species was 3.04 years. But there was a large variation, from 6 months to 10 years. The longest period was for the White Pelican in Israel where the MP process evolved over a very long time.

Level of detail

Respondents said that the MPs they were reporting on differed in how detailed they were in relation to such things as the actions proposed, solutions and any likely recommendations on how to handle conflicts. Some MPs (33%) were very detailed in some respects — for example, how to administer compensation claims. Other plans (14%) referred to other documents relating to a law (for compensation) or a governmental decree stating the policy for different matters. Most of the plans (52%) had a few recommendations or referred to short manuals for actions on specific matters.



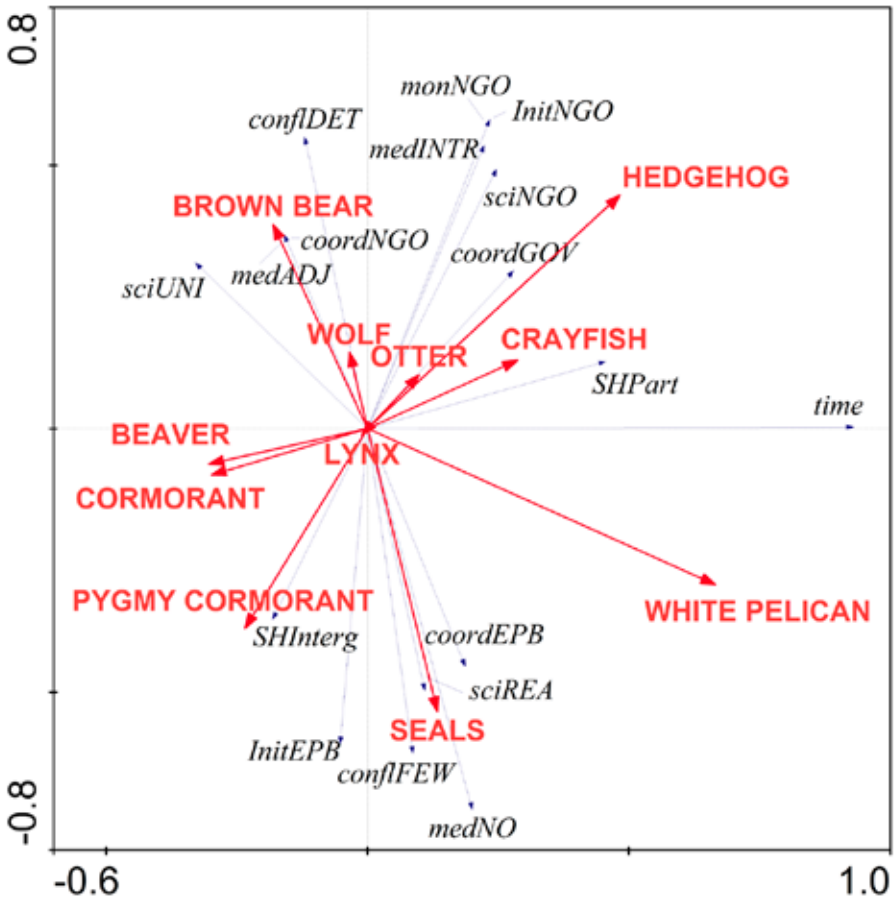
Pygmy Cormorant *Phalacrocorax pygmaeus*. Photo courtesy of Shutterstock.

5.4 Redundancy analysis: a general overview of the MP process

The multivariate analysis reported above gave an overview of all the MPs included in this study. As can be seen in Figure 5.1, the impression is a fairly muddled one because there is no common pattern regarding the processes for establishing MPs amongst those examined. For example, media interest tended to be highest for the Brown Bear, Wolf, Otter and Hedgehog cases, whereas seals did not get the same media attention. Overall, the most detailed recommendations for resolving conflicts, providing compensation and other measures were for the Wolf and Brown Bear. Scienctific input was found to be included in the MPs in one of three ways: (1) researchers (mostly from a university) providing/writing the background scientific material; (2) a university institution providing most of the data; or (3) in the case of the hedgehog, an NGO providing scientific data.

The most integrative processes with a high inclusion of stakeholders were only found in the case of cormorants (especially Pygmy Cormorants), seals and Beavers, although this was not the case for all MPs concerning these species, as there were differences between countries. Nevertheless, as can be seen in Figure 5.1,[17] no other MPs were closer to the arrow named SHInterg (meaning 'stakeholder integrated').

Figure 5.1 Overview of how management plans for different conflict species relate to institutions/organisation initiating the writing, coordinating the writing, how science was included, which institution/organisation payed for the work, how stakeholders were involved, how the media influenced the process, and the time from initiation of the MP to its approval. Red arrows indicate descriptive factors, black arrows indicate response factors. The vectors for InitNGO and monNGO are totally overlapping, as are the vectors for coordNGO and sciUNI. For interpretation, see text.



conflDET = the MP includes detailed information about conflict managment
conflFEW = the MP includes few instructions about conclict managment
coordNGO = an NGO coordinated the work
coordEPA = an environmental protection agency ccordinated the work
coordGOV = a national or regional government coordnated the work
InitNGO = an NGO took the initiative to produce the MP
InitEPA = an environmental protection agency took the initiative to produce the MP
medADJ = the intrerest and influence from media had an affect on the process
medINTR = the media showed interest in the MP, but were regraded to not influence the process
medNO = media showed no interest in the work
monNGO = an NGO payed for the work
sciNGO = an NGO produced the scientific background for the MP
sciREA = an manager read already published papers and produced an scitific background for the MP
sciUNI = an university was asked to produce a scientific background for the MP
SHPart = stakeholder were a part of the process, regulary meeting were held
SHInterg = stakeholders were integrated in the process ("sitting at the same table")
time = the time from the process was initiated until the MP was published

[17] In this figure response variables having a fit range lower than 15% have been excluded, which resulted in 17 remaining variables. Test for first canonical axis: F=10.86, p<0.01, test for significance of all canonical axis: F=2.70, p<0.01.

These results should be interpreted with caution because the outcome is dependent on the number of species-specific MPs obtained from different countries. Thus, the connection between an NGO and the Hedgehog is due to one single UK record. Similarly, details of MPs for White Pelican and Pygmy Cormorant were obtained only from Israel. The difference between seals and Wolf/Brown Bear might be because seals only have MPs in the Baltic and the three Baltic countries included here might have a different culturally-based tradition in MP work. The qualitative analyses revealed that even two adjacent, and in many respects similar, countries like Sweden and Finland show differences, both between, as well as within, countries.

Nevertheless, the redundancy analysis reveals the great variety of MP processes, further supporting the conclusion that MPs are mainly written as a reaction to, and a consequence of, a current situation rather than in terms of planning for the future. This is a very important point to make here when considering the dominant processes operating in terms of deciding that a management plan is needed and in devising it. One observation from the analysis is the difference between Wolf/Brown Bear and Cormorants — species for which MPs were relatively numerous in this study. Wolf and Brown Bear MPs tend to have more detailed conflict management recommendations than do the Cormorant MPs, although stakeholder involvement tends to be more frequent for Cormorants. This probably reflects differences in the basic reasons why the species need to be managed. The Wolf and Brown Bear are threatened species while Cormorants can cause conflicts due to their perceived high numbers and subsequent environmental impact. Cormorants have sustainable, self-reproducing populations and the main question for stakeholders that hold negative views is often how to induce a decrease in their numbers. For the Wolf and Brown Bear, each individual animal could be important for the species' long-term presence in an area, and therefore detailed recommendations and monitoring are necessary.



Swedish Parliament. Photo courtesy of Shutterstock.

5.5 Qualitative approaches to exploring the inclusion of science: expertise, stakeholder involvement and conflict management in MPs

The focus here is on comparing six selected MPs to explore the extent to which science is included in them. The results from Questionnaire Two are also incorporated to provide wider comparisons. Three species are considered in depth, one is endangered (Wolf), one was endangered but has increased in number in recent decades (Grey Seal), and one is increasing numerically and expanding geographically (Great Cormorant).

5.5.1 Background to three Finnish MPs

(A) Great Cormorant

Ornithological or environmental expertise was most important in the development of the Finnish Cormorant Management Plan, but one fisheries biologist also participated in the working group and another was invited for a discussion with the group. Other expertise involved people who could represent socioeconomic problems in fisheries and land-use and provide a description of legislation. Knowledge about Cormorants, and associated problems and conflicts, were to a large extent based on findings

of the international REDCAFE project.

In Finland, the increasing numbers of Cormorants has been well documented although monitoring and/or research has been modest. The diet of Cormorants has been studied, but only in relation to one coastal site. Fish stock changes are documented in the MP in respect of the Gulf of Finland and three specific species: Pikeperch (*Sander lucioperca*), Perch (*Perca fluviatilis*) and Whitefish (*Coregonus* spp.). Swedish experiences with Cormorants and fisheries are cited, but according to the plan there is not enough information to conclude anything about the Cormorants' effect on fish stocks.

Social and economic themes in relation to Cormorants are presented in general in the MP, as are ecological arguments also taken from background documents. In the MP each issue presented is discussed in relation to three factors:

1. whether the issue in question has been studied,
2. whether it has a factual basis, and
3. whether it is supported by qualitative and/or quantitative data.

A general conclusion within the MP is that the 'truthfulness' of arguments highlighting fisheries damages caused by the Cormorant have not been sufficiently proven. As the MP states, *'It is not enough that the effect has been detected.'* There is a need for *'objective measuring'* of the effect of Cormorants on the fish stocks and, further, on fisheries.

(B) Wolf

The information on wolves provided in the 'Management plan: the wolf population' was primarily written by a Wolf biologist from the Finnish Game and Fisheries Research Institute (FGFRI), who based the information on available literature, empirical studies and monitoring data. In addition, economic losses, legislative and management requirements are described in detail. The various chapters include contributions from seven people representing natural scientific knowledge. Documentation of damage to sheep, cattle, domestic dogs and reindeer are presented and refer to information provided by the Ministry of Agriculture and Forestry.

The section on 'Expectations and aims in the management of the Finnish wolf population' outlines the historical context of Wolf policy, summarises literature on how people perceive wolves and the results from the hearing procedures conducted during the preparation of the MP.



Ice forming on the Baltic coast. Photo courtesy of Shutterstock.

The last section is a summary from a separate report called 'The wolf discourse in Finland', which uses mostly qualitative methods for analysing regional and national expectations for the management of the Wolf population.

(C) Seals

Researchers from the FGFRI were mainly responsibile for drafting the 'Management plan for the Finnish seal populations in the Baltic Sea'. FGFRI carries out most of the monitoring of seal populations and also conducts biological research on seals. The background section (Part 1) of the plan consists of a literature review covering diverse topics from seal population numbers to the local public attitudes towards seals. However, unlike the Cormorant and Wolf MPs, there is no indication of the authors responsible for the chapters — although it is clear that the background section has been compiled by seal and fish biologists from the FGFRI.

The section on 'Local attitudes towards seals' presents results from a project which studied the perceptions of local people and national stakeholder groups towards seals in order to provide background information for the MP. For some groups, a large healthy seal population is an indication of a successful conservation effort, a cleaner sea and a more intact ecosystem. For others, especially commercial fishermen and people living along the coasts and in the Swedish and Finnish archipelagos, the seals are a competitor for the fish resources, both by predating on fish in open water and by eating fish caught in nets. The material was collected during regional public meetings and through questionnaires sent to regional and national stakeholder groups. This section also provides a short summary from the separate report 'The seal discourse' (Storm *et al.* 2007), and is divided into sections on public attitudes towards the Ringed Seal and the Grey Seal.



Lake and forest landscape, Sweden. Photo courtesy of Shutterstock.

5.5.2 Background to three Swedish MPs

(A) Great Cormorant

Both avian and environmental expertise were most important in the drafting of the Swedish 'Cormorant Management Plan' although fisheries biologists from the Swedish Board of Fisheries were asked to comment on a first draft of the MP. Knowledge about Cormorant biology and the problems and conflicts associated with the birds was, to a large extent, based on a literature survey, available research results and monitoring information derived from various studies in Sweden.

In Sweden, increasing numbers of Cormorants have been well documented and the data are presented in the MP. The monitoring of Cormorants has been modest but some research is presented. For example, the researcher who wrote the biological background for the MP later also





Baltic Sea in coastal Sweden. Photo courtesy of Shutterstock.

produced a thesis on Cormorant biology. Cormorant diet has been studied but at the time the plan was written this was only for one inland lake. Data on changes in fish stocks were not presented in the plan, and it was highlighted that Cormorant effects on fish populations are much debated. However, the MP states that Cormorants also take fish from the fishermen's nets and, that by wounding (biting) such entrapped fish, the value of the catch is reduced.

Social and economic themes regarding the Cormorant issue were presented very briefly in the MP, and it was clear that these themes have not been prioritised. Actions for culling birds, reducing the number of breeding colonies, and for scaring birds away from specific sites were proposed as it was felt these would help to reduce commercial fishermen's feelings of powerlessness. Conflicts involving groups of non-commercial fishermen are only mentioned briefly.

(B) Wolf

The background text on wolves in the 'Management plan for conservation of the wolf' was provided by researchers from the Swedish Agriculture University (SLU). The Game and Wildlife Institute also had a research project on wolves running at the same time and staff from this institution wrote the first version of the MP. Economic losses, legislation, myths and hearsay about Wolf behaviour, Wolf genetics and management are each described briefly in the MP. However, the differences of opinion between groups and/or any eventual polarisation is not mentioned. Nevertheless, SLU state that management should be based on facts, not rumours or opinions. The first goal of the actions proposed in the MP is that there should be 20 recruits per year to the Wolf population, which means that the total population should be about 200 individuals.

The Wolf MP refers to several other documents and regulations concerning hunting, compensation, monitoring and policies relating to large carnivores. Each provincial/regional government is required to set up its own specific MPs. As these all differ slightly, to accommodate local situations for example, there are actually 20 wolf MPs in existence in Sweden. However, in most cases these are also incorporated in MPs for Brown Bear, Lynx and Wolverine (*Gulo gulo*).

Table 5.3 Some details of the six MPs examined.

Management Plan	Year of publication of first version	Time from initiation to publication (years)	How many versions	Responsible organisations
Finland				
Great Cormorant	2005	1	1	• Ministry of the Environment • Technical College, University • Environmental Institute • Regional Environment Centre • Commercial fishers' organisation • Agriculture and forestry producers' organisation • Swedish-speaking agriculture producers' organisation • Finnish Game and Fisheries Research Institute
Wolf	2005	3	1	• Ministry of the Agriculture and Forestry • University of Helsinki
Seals	2007	3	1	• Ministry of the Agriculture and Forestry • Ministry of the Environment • Government of Åland • Finnish Game and Fisheries Research Institute • Hunters' organisation • Commercial fishers' organisation • Metsähallitus • Kvarken Council
Sweden				
Great Cormorant	2002	2	2	• Swedish Environmental Protection Agency • Environmental NGO • Fishing organisations (both sportfishing anf commercial)
Wolf	1995	4	?	• Hunting organisations • Environmental NGO • Swedish Agriculture University
Grey Seal	2001	8	?	• Swedish Environmental Protection Agency • Swedish Board of Fisheries • WWF • Environmental NGO • The commercial fishermen's organisation • Universities (a seal research group), An observer from HELCOM (see footnote no.18)

(C) Seals

Researchers from the Swedish Environmental Protection Agency (SEPA) were primarily responsibile for compiling the draft 'National Management plan for the Grey Seal in the Baltic Sea'. Together with the regional institutions, SEPA is also responsibile for monitoring seal populations through the sponsorship of biological research which is actually carried out by the universities, the Swedish Board of Fisheries and other governmental institutions. The background section of the MP consists of text covering very detailed information on historic background, population changes, damages to fisheries, ecotoxicology, measures to drive away seals from specific sites, and diseases.

Very little information concerning social aspects (e.g. attitudes towards

the seals) were included in the MP, although it states that people view the seal as a pest animal even though the species has been almost extinct in the Baltic for a long time. In none of the three Swedish MPs discussed here are the authors named.

5.5.3 Comparing MPs

Some details of the six MPs examined are given in Table 5.3. When compiling the Finnish and Swedish Great Cormorant, Wolf and seal MPs, biologists from universities, Finnish Game and Fisheries Research Insitute and the Swedish Board of Fisheries contributed significantly. As a rule, most of the relevant biological background information has been incorporated in all plans. In the Swedish MP for the Wolf, however, the basic biological information was very brief but did include references to other documents. In both Cormorant MPs, bird biology dominated with assistance provided by fisheries biologists. However, it was stated that evidence for a Cormorant effect on fisheries was limited, or did not exist. A common feature of the MPs was the anonymity of the authors, which may indicate that these MPs are considered to be merely 'technical' in line with the universality of science and, as such, separated from the human dimensions (i.e. from those who are involved in working on the MPs).

Most of the 13 answers concerning the governmental bodies responsible for developing the MPs indicated that the Ministry of the Environment (or equivalent) was usually the responsible institute. While all MPs concentrated on biological information, the inclusion of a range of stakeholders in the drafting of an MP often seemed to be considered sufficient to incorporate the human and social dimensions of species management and conflicts. Sometimes (e.g. the Finnish Wolf and seal plans), separate empirical studies and hearing procedures were also included in the MP process. Social science studies and approaches could be used to widen the knowledge-base of the MP in relation to people's interests and perceptions. In the Swedish MP for Great Cormorants, the recognition of fishermens' feelings of powerlessness as a motivation for offering some courses of action within the MP indicates, to some degree at least, the inclusion of local knowledge. The Finnish Cormorant MP tackles the problem from a different perspective, emphasising the need for quantitative measurements of Cormorant impact on fisheries before any action can be taken.

5.6 Stakeholder representation and public participation

In this section six selected MPs are reviewed and compared to explore the level of stakeholder representation and public participation in them. In addition, the results from Questionnaire Two are used to provide wider comparisons. As before, this section deals with the Wolf, Grey Seal, and Great Cormorant.

5.6.1 The Finnish MPs

(A) Great Cormorant

In the Finnish cormorant management plan there are five contributors, including ornithological or environmental authorities, researchers, and the chairman and secretary of the working group. One fish biologist from the FGFRI was



Finnish Parliament. Photo courtesy of Shutterstock.



Small commercial fishing boast on the Baltic coast. Photo courtesy of Shutterstock.

also invited to join the working group, other members include one representative of the following organisations: commercial fishers' association, agriculture and forestry producers' association and Swedish-speaking agriculture producers association. This working group had nine meetings. In addition, they made a field trip to one coastal site in 2004 where they consulted a local fisheries expert.

During the process of drafting the MP, the working group heard from selected experts, representing the Environmental Institute, Swedish Ornithological Association, the Swedish Board of Fisheries and TE-centre from Southeast Finland. The task of compiling the text for the plan, which was mostly based on existing literature, was divided between the core group members. There were no public hearings or specific empirical studies conducted during the process. A minority report was added to the MP by representatives of the commercial fishers' association, the agriculture and forestry producers' association and the Swedish-speaking agriculture producers association. They called for immediate actions to mitigate the problems they felt were caused by Cormorants.

(B) Wolf

The Ministry of Agriculture and Forestry prepared the drafting of a 'Management plan for the wolf population in Finland' in 2002. In order to base the MP on extensive public hearings, the Ministry requested that the Institute for Rural Research and Training at the University of Helsinki undertake a research project with the aim of studying the socio-economic issues connected with management of the Wolf population in Finland. Public hearings were identified as valuable in a proposal connected with the Rural Policy Programme, according to which plans for the management of individual species of large carnivores in Finland should assign appropriate weight to views from the general public and the business sector — without risking the favourable conservation status of the species. Another reason for the decision to use an extensive hearing procedure was the view that management of the Wolf population is also a sociological rather than a purely biological matter.

The final draft of the Finnish Wolf MP describes the process of public participation and stakeholder involvement as follows: *'In the course of preparing the MP, 30 public hearings were arranged in different locations in Finland. These meetings were open to everyone and the invitation was published in local and province-wide newspapers. A total of 1,617 people attended them to share their views on management*

of the wolf population. Each view, comment and question was written down or taped. In addition, 220 actors in various regional interest groups were sent a questionnaire concerning the management of the wolf population, and some 1,000 people were involved in preparing the responses. A similar process was also carried out with interest groups at the national level, this time with 14 answers. Separate meetings were arranged with all parties defined as stakeholders with the aim of establishing co-operation. A total of 16 such meetings were held, with over 200 participants in all.'

The Institute for Rural Research and Training submitted a draft of the MP to the Ministry of Agriculture and Forestry in 2005. The Ministry then prepared a version based on the draft that was widely circulated for comment. As a result, 61 comments were received. These comments are found in the 'Background' section (Part 1) of the draft providing more discussion on the definition of 'favourable conservation status', population management areas, the population targets set for those areas, and comments on derogations for the protection of the Wolf that are proposed in the section 'Aims and Measures' (Part 2). The MP was completed subsequently by the Ministry of Agriculture and Forestry on the basis of the comments received.

(C) Seals

When the Ministry of Agriculture and Forestry was given the task of preparing a draft version of the 'Management plan of the Finnish seal populations in the Baltic Sea', it was stated that the draft should be based on reliable data and knowledge regarding seal biology, and on public hearings representing a wide range of interest groups. Thus a survey (see below) was undertaken to record the attitudes of local and national stakeholders towards the Baltic seals and the management of their populations. The MP states that: *'The target groups were those whose livelihoods and everyday life are affected by the seals in one way or another, as well as actors representing organisations and authorities involved in the conservation and use of nature and monitoring that use'.*

The introductory section of the MP presents the procedures for the public hearings and empirical studies as follows: *'During the process of drafting the plan, a number of public hearings were organised, one in Åland and 10 on the mainland of Finland. A total of 439 people attended these and gave their views on the management of seal populations. In addition, 393 actors representing different regional stakeholders received a questionnaire on the subject. A similar survey was also conducted with stakeholders at the national level'.*

The introductory section also highlights that: *'The MP for seal populations was drawn up using the draft by a steering committee consisting of representatives from the Ministry of Agriculture and Forestry, the Ministry of the Environment, the Government of Åland, the Finnish Game and Fisheries Research Institute, the Finnish Hunters' Central Organisation, Metsähallitus, the Kvarken Council and the Association of Finnish Fishermen'.*

In 2007 a draft of the MP was circulated widely for comment and 61 responses were received. There were barely any comments regarding the background section (Part 1), which was generally considered an excellent source of information. Comments regarding the objectives and measures for the management of the seal populations (Part 2) included a desire to increase seal hunting but also to further protect seals. It was stressed that various comments, suggestions and areas for clarification should be taken into consideration, where possible, when finalising the MP.

5.6.2 The Swedish MPs

(A) Great Cormorant

In the 'Cormorant Management Plan' the environmental authorities and bird researchers produced a first version that was subsequently sent out for comments and suggestions to the Swedish Board of Fisheries, World Wildlife Fund (WWF), environmental NGOs, bird-watching NGOs, regional governments and hunting organisations. Responses were sent back to the environmental authorities and bird researchers who used them to produce a final version of the plan. The comments themselves are not presented in the MP nor are any other stakeholder representation indicated in it. No public hearings were conducted during the Cormorant MP drafting process.

(B) Wolf

SEPA produced a management plan for wolf in 2000 (revised in 2003). In it SEPA stated that communication between different groups was important in order to increase acceptance for national

policy and to create better understanding of the work done by monitoring staff. The MP focuses on conservation issues, genetic heritage and monitoring. There was no indication in the plan that stakeholders had been involved in any way. The attitude in the MP seems to be that stakeholders should be informed about different laws and regulations, and that communication between different stakeholder groups should take place in other forums, separate from the process of writing the MP. This appears to be rather different to the process of drafting the Great Cormorant MP described above.

(C) Seals

In the Swedish 'National Management plan for the Grey Seal in the Baltic Sea' there is no mention of how different stakeholders were involved in the process. However, the MP does state that SEPA started a group/project called 'Seals and Fishery' in 1993. The steering committee of the group consisted of representatives from SEPA, the Swedish Board of Fisheries, WWF, an environmental NGO, SFR (the commercial fishermen's organisation), and the seal research group, with additional participants from several universities. The group also included an observer from HELCOM.[18] Reasons for the establishment of this group did include conflict mitigation — although some people may view Cormorants in coastal areas as being more of a problem than seals because birds have increased in numbers and many stakeholders associate this with decreases in fish catches.

5.6.3 Comparing MPs

The six Swedish and Finnish MPs studied revealed a broad range of procedures in relation to stakeholder involvement and representation and to public participation. One approach can be called a 'scientific model', which uses the expertise of governmental bodies and scientific institutions to develop the MP and then consults selected organisations before finalising it. Stakeholder views can be incorporated by inviting representatives to the writing group or to discuss the process. Public hearings and surveys may also be conducted. These can be regarded as measures for not only widening the knowledge base but for also attempting to increase the legitimacy of the planning process, and thus the MP itself. Planning strategies which use participatory approaches for incorporating stakeholder perspectives also seem to involve stakeholders in the MP writing group and the circulation of drafts for comments. These approaches could thus be considered as 'participatory models'.

There were also differences in how much information could be gleaned from each MP about the actual process of devising it. However, the transparency of the MP procedures was apparently connected to whether public participation and stakeholder representation was considered important. It may not be far-fetched to conclude that especially in the 'scientific model', which concentrated on scientific facts and mutually agreed recommendations, little attention was given to reviewing stakeholder involvement and discussing how the differing interests, values and knowledge have influenced the MP. However, with the use of a minority report, contrasting views can also be presented in the MP document — as in the case of the Finnish Cormorant MP, where a working group was responsible for the stakeholder involvement.

For all the MPs examined, most of the 13 responses regarding disagreements or consensus when making the MP described the tensions between conservationist



Lake and forest landscape, Finland.
Photo courtesy of Shutterstock.

[18] HELCOM stands for The Helsinki Commission. HELCOM works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental co-operation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. Website: http://www.helcom.fi/



groups and groups like hunters and fishers, who felt there was a need for strict actions against pest species. There were also disagreements concerning the damage caused by a particular species and about the legal or scientific basis for proposed measures to combat this. In relation to how participating groups were selected and whether some relevant ones were left outside the MP-drafting process, the most typical answers stressed that all, or almost all, relevant groups were included. Although some did indicate that only the main interest groups were involved, or that some particular group was absent for unknown reasons. Overall, the stakeholder involvement process took one of three types: (1) participation in hearings/surveys as part of the MP drafting process, (2) membership of some form of working group (or participants who are listened to) during the drafting process, and (3) people being able to send comments to a draft of the MP.

5.7 Recommendations in MPs for Conflict Management and Research

As in previous sections, selected MPs are compared, incorporating information provided in Questionnaire Two and the focus is on three species (Wolf, Grey Seal, Great Cormorant) of different numerical abundance, geographic spread and conservation concern.

5.7.1 The Finnish MPs

(A) Great Cormorant

At the beginning of the 'Suggestions for Action' section of the Finnish 'Cormorant Management Plan' there are explicit comments on the list of problems thought to be caused by the birds presented by stakeholders. However, it also states that the 'truthfulness' of the arguments for Cormorant impact on fisheries have not been sufficiently demonstrated and so it was not clear that there was an immediate need for action concerning the number of Cormorants. The MP comments that: *'What is not undisputable is the effect on fish stocks in a way that could be objectively measured and which would threaten immediately some specific interest — in this case regarding fishing (commercial and/or recreational) or the coastal fish stocks'*.

The MP concludes that there is a need for *'improving the level of documentation'* and so the working group recommends that the following issues be studied: (1) the variety of targeted fish species taken by Cormorants during the nesting period; (2) Cormorant effects on fish stocks and their structure and food webs; (3) Cormorant effects on fish stocking and methods for mitigating the loss of fingerlings (i.e. young-of-the-year fish); (4) Cormorant effects on the spawning success of fish; (5) the extent of Cormorant-induced gear damage and associated catch reduction; and (6) the quantity and extent of damage to fish farming caused by Cormorants and other birds.

In addition, this MP states that there should be monitoring and studies regarding the effects of guano (Cormorant faeces) on vegetation and tree damage as well as the possible effects of the Cormorants on birds and other fauna on the nesting islands. The MP also states that a questionnaire survey should be conducted on people's *'feelings about the Cormorant'*. The plan also highlights that although quantitative data showing the Cormorants' deleterious effects are insufficient,[19] some timely actions should be prepared in order to offer solutions for local problems such as: (1) creating clear criteria for proving the injurious effects; (2) creating a system for compensation based on reported damage; (3) restricting the damage through proactive management; and (4) creating options for restricting the Cormorant population through force. Comments in the minority

[19] The issue of cormorant 'impact' at fisheries and the difficulties in defining and quantifying this are discussed in detail in chapter 9 of Carss *et al.* 2012.

report presented the same four types of actions for mitigating local Cormorant problems but demanded that these actions should begin 'immediately', rather than 'soon'.

(B) Wolf

The 'Aims and Measures' section in the Finnish 'Management plan for the Wolf population' first presents the principles and conditions for management of the Wolf population. Thereafter, it suggests three population (game) management regions: the reindeer herding area, eastern Finland and western Finland with different management measures outlined for each of the three areas. Technical measures, like Wolf-proof fencing, are presented as potential solutions for mitigating or preventing some damage and conflicts. The testing of livestock guarding dogs was also suggested. On the other hand, the development of new methods to protect domestic dogs which are often victims of wolf attacks was also recommended. The plan suggested, moreover, a reformed economic compensation system for damage caused by game animals.

In connection with the derogations for the conservation of wolves, the MP states that: *'The Ministry of Agriculture and Forestry can give the game management districts further responsibility depending on the development of the wolf population. However, … coordination at the national level continues to be vital for the present'*.

Local-level decision making by the game management districts is already allowed in eastern Finland where Wolf populations are largest. This has been justified by the existence of local knowledge about, for instance, the number of wolves and their territories, the damage caused by wolves, the threat that they pose, and the potential for applying satisfactory solutions other than eliminating wolves.

The MP stresses the need for monitoring in order to produce up-to-date information on the development of the Wolf population. The scope of research will be expanded to include both ecological and sociological aspects. The plan also lists various means for disseminating science-based information and supporting the training and supervision of hunters. The plan also made some suggestions regarding the role of wolves in eco-tourism.

Various means for fostering cooperation between stakeholders were also suggested. In the game management districts cooperation between stakeholder groups will be encouraged and discussion forums established if necessary. Since the end of 20th century, several regional, voluntary, large carnivore discussion forums have been established in Finland, particularly in areas with dense Wolf populations. These forums have not been a part of the official decision-making system, although they have promoted dialogue and collaboration between interested regional groups. The MP also calls for intensified national and international cooperation. Finally, it is noted that the implementation of the MP will be monitored and that the plan will be updated as necessary.

(C) Seals

When setting the objectives and measures for the 'Management of the Seal Populations', Part



Finnish archepelago islands, Baltic Sea. Photo courtesy of Shutterstock.

Two of the plan first outlines seal population management policies. The objectives regarding the Grey Seal, which clearly induces more conflicts than does the Ringed Seal, is *'to enable the coexistence between seal and man in such a way that the grey seal is seen as a valuable natural resource that can be utilised in a diverse and sustainable way'*. Secondly, three regional management areas are proposed with separate objectives for management tools and monitoring. The hunting of Grey Seals will mainly be focused in areas with a high population and where damage by the seals is evident. As before, the game management districts will be guided by the Ministry of Agriculture and Forestry in hunting licence procedures.



The section of the MP dealing with 'utilisation of seals' emphasises the need to promote and support adventure and eco-tourism activities related to seals. Another perspective in the MP promotes seals as a natural resource stating that the *'possibilities to use seal products for human consumption will be examined.'* Furthermore, one objective of the MP is that the damage to coastal fishing and fish farming caused by individual seals will be reduced by applying technical solutions to fishing gear and at fish farm sites. So-called 'problem' seals will be eliminated mainly through derogations issued by the Ministry. In addition, the potential of developing seal traps to capture animals and subsequently relocate them will be examined. The MP also aims to pay compensation to fishermen and fish farmers for damage caused by seals.

The plan stresses the need for monitoring both seal numbers and the general health of their populations. When listing the research needs, mostly biological themes were identified, including: (1) satellite tracking of the movements and distribution of seals; (2) seal diet and impact on fish stocks; (3) the occurrence of new environmental contaminants; and (4) discussion of the establishment of a 'tissue bank' for the Baltic seals.

Lastly, social science research needs were described only in a very general way in the MP by stating that: *'Socio-economic research on the utilisation, management and conservation of the seal populations should be initiated'*. The plan suggests that more information on seals should be made available both nationally and internationally. The Finnish organisation of hunting and game management bodies (and other organisations) contributes to training and guidance, which includes both tolerance towards seals and training of seal hunters.

One aim of the MP is to strengthen cooperation between stakeholders regionally within all three seal population management areas, and also between these areas. The need for closer administrative, stakeholder and research cooperation at the national level was also identified. Thus, where necessary, discussion forums *'will be set up to maintain interaction and dialogue between the different groups, to develop a regional view on the management of seal populations, and to increase the distribution of information regionally'*. The MP stresses the importance of the regional game administration but notes that *'as a completely independent regional management scheme is not possible at present, the seal management will be coordinated at a national level'*. Finally, an aim to influence international conventions and EU legislation and their interpretation was highlighted. The idea is that *'national features will be reflected in the decision-making'* and that *'the principle of sustainable use remains the basis for utilising natural resources'*. The implementation of the MP for seal populations in the Baltic Sea, published in 2007, will be monitored and updated every five years.

5.7.2 The Swedish MPs

(A) Great Cormorant

The Swedish 'Cormorant Management Plan' states that *'The management guidelines are intended to minimise conflicts between cormorants and fisheries by alleviating, preventing or reducing real damage and by reducing perceived damage'*. In another part of the plan the authors state that *'Large-scale changes of fish populations due to cormorant predation have not been documented in Sweden, except for one recent study that indicates such a linkage. In some small lakes with high densities of cormorants, a reduction in fish catch that may be linked to the cormorants has been observed. As fish farming is rare in Sweden, conflicts between this practice and cormorant are very small'* (p.6). Thus, the MP highlights that an immediate need for action concerning the number of Cormorants is not clearly scientifically proven

although it does suggest that the impact of Cormorant predation be investigated further. Cormorant impacts on stocked Eels (*Anguilla anguilla*) were specifically mentioned and the examination of Cormorant predation on other threatened fish species was also recommended.

The MP recommends that priority should be given to the development of fishing gear, in order to prevent Cormorants from 'stealing' the catch, and to other measures such as preventing fish from being injured or caught by Cormorants and preventing birds from drowning in fishing gear. Firstly, the regional governments and SEPA should try to guarantee that the hunting of Cormorants is done in specific areas where it is needed. This is because more general hunting, where Cormorants are shot wherever they are encountered, will not give the desired results as it is unlikely that hunters would be able to kill the high numbers of birds required for a reduction in the overall Cormorant population. The MP also states that regional governments and SEPA should also inform people that Cormorants can be eaten.

(B) Wolf

The Swedish 'Management plan for conservation of the wolf' briefly mentions pro-active management measures, although it mostly discusses the regulations and the compensation system for damage caused by them. New actions suggested in the MP involve cooperation between Scandinavian countries, as well as research/monitoring (e.g. Wolf counts, establishment, migration, dispersal, reproduction and hunting) and information about the new rules for financial compensation. The MP highlights that individual wolves, especially those migrating to Sweden from Finland, should be radio-tagged in order to prevent illegal hunting. Genetic analyses are considered important, as well as provision of a database for DNA-sequences from different populations/individuals. The plan also lists various means for disseminating science-based information.

There was no request in the MP for research concerning attitudes and other social issues connected with management of the Wolf population in Sweden. Moreover, the MP made scant reference to public participation and stakeholder involvement in the future process. Institutions, symposia and groups for such cross-communication were mentioned but there was no recommendation concerning how it should be done.

(C) Seals

The management policies for the grey seal are outlined in the introduction of the Swedish 'National Management plan for the Grey Seal in the Baltic Sea'. Here, it states that *'The management guidelines suggested in the plan are principally for creating conditions for a subsequent positive development of a self-sustaining population of Grey Seals, and a sustainable co-existence between Grey Seals and the coastal fishery'*. The hunting of Grey Seals is heavily restricted as seals are protected by law, and the authors of the MP highlight their fears that if the legislation does not change then illegal hunting will increase rapidly. According to the MP, the ecological risk assessments that have been done indicate that the Grey Seal population will tolerate some culling — a maximum of 180 seals per year is recommended. In the meantime, while waiting for new legislation, the hunting of Grey Seals can be carried out according to the guidelines approved by HELCOM in 1996 (of between 500–1,000 seals per year). The MP also states that the implementation of the MP for seal populations in the Baltic Sea, published in 2003, will be monitored and updated every five years.

5.7.3 Comparing MPs

The recommendations made in the MPs can be divided in two basic categories: (a) those which address management actions, and (b) those which address needs for further research.

In many of the studied MPs, scientific research (especially in the field of biology) was seen as an important prerequisite for management actions. Also, the efficient dissemination of science-based information was a typical recommendation, whilst the need for social and economic research is mentioned in some MPs. An interesting aspect of the analysis deals with the high uncertainty of knowledge typical in these complicated human-wildlife conflicts, and particularly how the relationship between the level of scientific knowledge and action is interpreted. For example, how is it possible to determine when there is sufficient scientific documentation or evidence to legitimise the management actions? Moreover, to what extent does local practical



Wolf *Canis lupus*, Finland. Photo courtesy of Shutterstock.

knowledge legitimise actions? These interpretations seemed to vary greatly among the MPs.

For Questionnaire Two, the 13 informants were asked about co-operation between scientists and fishers/hunters or other local people. Answers varied from negative to close co-operation. For example, in Germany local people from different interest groups are selected to be trained by experts and to serve as integrative key players at the local level. Mostly the collaboration cited was in relation to data collection.

Questions were also asked about the kinds of measures suggested for conflict mitigation and whether these included increasing the role of the local level or stakeholder involvement in decision-making. On the basis of the 13 responses, and the document analysis of the Finnish and Swedish MPs, it was clear that technical tools and economic compensation were the most common recommendations for conflict management cited in the plans.

For the conflict species examined, reducing their numbers was a more controversial issue and a rarely suggested management tool. However, when the species can be utilised for human consumption or use (like seals in Sweden and Finland and, potentially, Cormorants), attitudes may become more positive. In some countries (e.g. Norway) Cormorants are traditionally consumed, and the birds were eaten by some people in Sweden, Denmark and Finland in earlier times. Many MPs seem to lack recommendations which aim to improve the institutional arrangements in governance, such as developing stakeholder participation and regional collaboration. In spite of this, stakeholders do often participate in the various phases of planning and management, and this itself can sometimes be seen as a tool for mitigating conflicts.

5.8 Summary of findings

It is apparent from the answers provided to Questionnaire One that MPs are mainly initiated, paid for, and coordinated by, environmental/conservation ministries, the initiative usually coming from the national level. However, in some countries the provincial level takes the lead, probably reflecting differences between countries in the degree of independence that provinces/regions might have. Alternatively, this situation might also reflect that management actions are only requested in certain areas.

Motives for taking the decision to initiate the process for compiling a MP are political, and politicians are generally more or less sensitive to opinions and arguments generated through the media.

There are also large variations in how different stakeholders are involved in the MP process. In a few cases stakeholders were not involved at all, whereas in other cases they were integrated in the process. Interestingly, if stakeholders are integrated in the process, there tends to be less media interest in the issue. This might be because the conflict issues are handled within the group preparing the MP but in cases where stakeholders feel excluded from the process, they may air their opinions via the media (see chapter 9 for an exploration of media representations of Cormorant-fisheries issues). Thus, the media and/or public opinion are the driving force for MPs in many cases. It seems that if stakeholders are properly involved and integrated into the process of developing a MP there is scope for an open discussion about problems and issues, perhaps providing less interesting material for the media which often tends to focus on conflicts and controversy.

In general, the key findings from our analysis of MPs for twelve conflict species can be summarised as follows.

- The institution in charge of the MP process is most often a part of a governmental environmental administration.
- Environmental/conservation ministries are usually legally responsible for the MPs and thus wildlife and fishery managers are likely to have influence on the final version of the MP.
- The media and/or public opinion can be a driving force for MPs.
- The input of professional scientific experts, especially biologists, is central to the process of making MPs for conflict species.
- The available scientific knowledge is usually well compiled in the background sections, but the MPs strongly recommend further documentation and research.
- Interpretations vary regarding the emphasis of scientific knowledge versus other types of knowledge in actions suggested in the MPs' recommendations.
- The level of public participation and stakeholder representation in the MP processes varies considerably but, usually, no stakeholder analysis is undertaken.
- Where stakeholders are integrated into the MP process, media interest in the MP seems to be low. Conversely, media interest appears higher when stakeholders have little, or no, involvement in the preparation of MPs.
- Technical tools and economic compensation are the most popular types of recommendations for mitigating conflicts in the MPs.
- The MPs often lack recommendations for improving the institutional arrangements, such as regional collaboration in management or research, and stakeholder participation.
- It often takes up to two years between initiating the development of a MP for a conflict species and its final approval but the process can take considerably longer.

Recent and updated scientific knowledge is incorporated in almost all MPs included in this study. In most cases experts are asked to write a document that forms the basis of the MP, a task often given to a university institution. Thus, science is, at least initially in the process of establishing an MP, a significant source of knowledge. However, it is less clear to what extent science or scientists are involved in the whole process (e.g. financing, recommendations, actions, implementation, conflict management) although in some cases, there is little if any input into MPs other than that from scientists. Sometimes there are also attempts to integrate other (non-science) stakeholders in the process of devising MPs, or at least to have them participate at some stage. While the participatory approach to MPs and natural resources management in general is now a major objective in European policy arenas (Renn, 2006:3) and there is considerable literature on the subject (see for example Stoll-Kleeman & Welp, 2006 and references therein), it is also clear that incorporating both scientific contributions and the views of other stakeholders into MPs, for conflict species at least, is by no means a certainty. This lack of stakeholder involvement is of concern for at least two reasons. First, lack of involvement invariably makes people feel excluded from the MP process, less likely to feel they have 'ownership' of it and, hence, to accept and adopt its findings and/or recommendations. Second, as discussed below, there is a growing consensus that MPs should be

flexible and adaptive, so they can evolve as circumstances dictate. Stakeholder involvement is a vital element of this and the maintainance of dialogue between all those involved and affected by a MP should be the goal. However, it may be difficult (both conceptually and financially) to maintain a working 'stakeholder network' once a MP has been accepted despite the potential long-term benefits in doing so.

5.9 The way forward — a few words on flexibility and adaptability in MPs

Although much time and effort (and hence, money) is spent on developing and drafting a MP, the document should not be considered the ultimate end-point of this process. As well as the expected, and necessary, monitoring of any actions taken under the auspices of any MP, **INTERCAFE's** work found a growing awareness that MPs for Cormorants at least needed to be flexible, adaptive and, ideally, to acknowledge the transboundary nature of the issues they are supposed to address. For example, Denmark was one of the first countries in Europe to develop a national management plan for Cormorants (Skov-og Naturstyrelsen 1992) and the MP has evolved for over 20 years. (see Table 5.5).

This evolution has been the result of changes in Cormorant numbers and renewed pressures, mainly from various fisheries stakeholder groups, to mitigate against apparent Cormorant damage to their interests. In Denmark, there is a reasonably strong tradition of stakeholder consultation in general, and in the process of drafting MPs in particular. In the case of Cormorants, stakeholders participated over the years in an officially-appointed stakeholder advisory group. The advisory group consisted of five or six representatives of stakeholders, one or two representatives from the Ministry of Environment, one representative from the ministry responsible for fisheries, as well as one or two experts on fish and fisheries and one expert on Cormorant ecology and management. The advisory group met up to three times each year and discussed management policies, revision of MPs, handling of the issue by the press, needs and constraints in passing on relevant information to stakeholders and the general public.

Since the second management plan was developed in 2002, regular meetings have been held in the advisory group. The group was closely involved in discussing the principles behind regulating

Table 5.5 Main instruments available in the Danish Cormorant MP. Text with * next to it indicates new or changed measures, arrows indicate continuation of measures (information from EIFAC 2008).

1980 Protection	1992 1st Management Plan	1994 Expansion of objectives	2002 2nd Management Plan
			Experimental hunting*
			Mitigate conflicts related to salmon and trout smolts*
		Culling of eggs by oiling in colonies on state owned and private land*	→
		Stop establishment of new colonies*	→
	Development of technical mitigation measures*	→	→
Protective hunting 100 m from fishing nets all year (with permit)	→	500 m* from fishing gear all year (with permit)	1,000 m from fishing gear outside breeding season* →
Permission to scare Cormorants away from forestry	→	→	→

Cormorant numbers in local areas and in drafting the third MP which has been in use since the autumn of 2009. In 2011 it recommended that the Ministry improved their communication to stakeholders and the general public. Overall, this process has ensured the involvement of representatives of the major national stakeholders and the Ministry of Environment has greatly benefitted from this despite there still being disagreements between stakeholders and the Ministry over some issues.

From the exploration in this chapter, it is clear that such stakeholder involvement in the development of MPs can be a complex and time-consuming process. Furthermore, the experiences from Denmark suggest that, once devised, an MP is not a static thing but one which can be developed and refined where necessary. This strongly reinforces the importance of maintaining dialogue between all involved and affected by a MP and the understanding that the process of management is on-going and will need to be re-visited regularly as circumstances change.

Both the Wolf and Cormorant are clearly candidates for international cooperation for conservation and management. For example, Kojola *et al*. (2006) showed that the range of reproductive Wolf packs in Fennoscandia covered both Norwegian and Swedish territory, and also that between Finland and the Russian Federation. Furthermore, they suggest that some of their radio-tracked 'Finnish wolves' could have dispersed into the Russian Federation. Similarly there is good evidence on the migratory flyways of European Great Cormorants (see review by van Eerden *et al*. 1995) and numerous specific studies documenting their seasonal movements between countries within Europe and beyond (e.g. Raymond & Zuchuat 1995, Poluda *et al*. 1997).

The first serious attempt to explore the issues of Cormorant ecology, impacts at fisheries, and potential mitigation or management measures at the European level occurred during the 1990s (see van Dam & Asbirk 1997). Both the REDCAFE EU Concerted Action (Carss, 2003, Carss & Marzano, 2005) and the **INTERCAFE** COST Action have subsequently worked to build networks of researchers and other interested parties to address Cormorant-fisheries issues and, wherever possible, to act as a hub to coordinate data collation and knowledge exchange. Part Two of this publication thus builds on this overview of processes involved in wildlife management to explore how science, law, policy, the media, and different values all frame the arguments surrounding Cormorants and human interests in Europe.

References

Bisi, J, and Kurki, S. 2005. Susipuhetta Suomessa. Maakunnalliset ja kansalliset odotukset ja tavoitteet susikannan hoidossa. [The wolf discourse in Finland. Provincial and national expectations and objectives for the management of the Finnish wolf population.] Julkaisuja 3. Helsingin yliopiston Maaseudun tutkimus- ja koulutuskeskus, Seinäjoki.

Carss, D N (editor). 2003. Reducing the conflict between cormorants and fisheries on a pan-European scale — REDCAFE, volume 1: pan-European Overview. Report to EU, contract no. Q5CA-2000-31387, pp169. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. Reducing the conflict between cormorants and fisheries on a pan-European scale — REDCAFE, volume 2: Summary and National Overviews. Report to EU, contract no. Q5CA-2000-31387, pp373. Available at: http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J. 2012. The **INTERCAFE** Field Manual — research methods for Cormorants, fishes, and the interactions between them. COST 635 Final Report II. ISBN 978-1-906698-08-9

EIFAC. 2008. Report of the EIFAC Workshop on a European Cormorant Management Plan, Bonn, Germany, 20–21 November 2007. EIFAC Occasional Paper No.41.

Engelen, E, Keulartz, J, and Leistra, G. 2008. European nature conservation policy making. From substantive to procedural sources of legitimacy. In: Keulartz, J, and Leistra, G (editors) pp.3–21, Legitimacy in European nature conservation policy. Case studies in multilevel governance. The International Library of Environmental, Agricultural and Food Ethics, vol 14, Springer.

Elo, S, and Kyngäs, H. 2008. The qualitative content analysis process. Journal of Advanced Nursing 62(1): 107–115.

Jongman, R H J, ter Braak, C J F, and van Tongeren, O F R. 1995. Data Analysis in Community and Landscape Ecology. Cambridge University Press, Cambridge.

Kojola, I, Aspi, J, Hakala, A, Heikkiene, S, Ilmoni, C, and Ronkainen, S. 2006. Dispersal in an expanding wolf population in Finland. Jouirnal of Mammalogy 87(2): 281–286.

Poluda, A M, Chernichko, I I, Serebryakov, S S, Siokhin, V D, Korzyukov, A I, Zhmud, M E, Koshelev, A I, Shchegolev, I, and Beleshkov, I D. 1997. The cormorant *Phalacrocorax carbo* in Ukraine. Ekologia Polska 45(1): 105–110.

Raymond, A, and Zuchuat, O. 1995. Perch fidelity in Cormorants *Phalacrocorax carbo* outside the breeding season. Ardea 83: 281–284.

Renn, O. 2006. Participatory processes for designing environmental policies. Land Use Policy 23(1): 34–43.

Šidák, Z. 1967. Rectangular confidence regions for the means of multivariate normal distributions. Journal of the American Statistical Association 62: 626–633.

Skov-og Naturstyrelsen. 1992. Skarvforvaltningsplan. Skov- og Naturstyrelsen, Miljøministeriet. In Danish.

Sokal, A. 2008. What is science and why should we care? Third Annual Sense About Science lecture February 27, 2008, UCL Cruciform Lecture Theatre.

Stoll-Kleemann, S, and Welp, M (editors). 2006. Stakeholder dialogues in natural resource managements: theory and practice. Berlin, Heidelberg: Springer Verlag.

Storm, A, Routti, H, Nyman, M, and Kunnasranta, M. 2007. Hyljepuhetta — Alueelliset ja kansalliset näkökulmat ja odotukset merihyljekantojen hoidossa. Finnish Game and Fisheries Research Institute, Kala- ja riistaraportteja nro 396. 65 pp.

ter Braak, C J F, and Šmilauer, P. 1998. CANOCO Reference Manual and User's Guide to Canoco for Windows: Software for Canonical Community Ordination (version 4). Microcomputer Power,Ithaca, New York.

Tuomi, J, and Sarajärvi, A. 2004. Laadullinen tutkimus ja sisällönanalyysi. Jyväskylä: Gummerus Kirjapaino Oy.

van Dam, C, and Asbirk, S (editors). 1997. Cormorants and Human Interests. IKC natuur beheer, Wageningen.

van Eerden, M R, Koffijberg, K, and Platteeuw, M. 1995. Riding the Crest of the Wave: possibilities and limitations for a thriving population of migratory cormorants *Phalacrocorax carbo* in man-dominated wetlands. Ardea 83: 1–9.

5.10 Appendix 1. Questionnaire One

The idea of this study is to illustrate the process occurring before a management plan is published and/or accepted by the government.

Species — Country

When the management plans have been chosen, the following questions should be answered:

1. Who initiated the writing?
2. How was the scientific knowledge involved in the process?
3. Where the stakeholders involved, and if so, how?
4. Where media or public opinions concerned. If so, how?
5. Which organisation (governmental) paid for the work?
6. Which organisation coordinated the work?
7. Time from initiation to accepted product.
8. How detailed is the list of actions or the manual? For example; are there any recommendations for how to handle a situation if something happens (conflicts)?

5.11 Appendix 2. Questionnaire Two

Please try to give answers to the following questions (please develop and edit):

1. Are there several government bodies (e.g. environmental & other sectors) involved in management and were these represented in the process of making the management plan?
2. How were the participating stakeholder groups selected? Were some relevant groups left outside the management plan process?
3. Did the participants reach consensus when making the management plan or was there e.g. a minority report included? If there was polarization what was the core of the disagreements?
4. What kinds of measures for conflict mitigation were suggested? Did these include

measures for increasing the role of the local level or stakeholder involvement in the decision making?

5. Have there been updates of the management plan? How do the suggested conflict mitigation measures differ between separate versions of the plan if such exist?
6. Does the management plan include suggestions for co-operation between scientists and fishers/hunters or other local people, e.g. regarding collection of data and interpretation of practical measures needed? Does the management plan comment on the roles of scientific and local/practical knowledge?
7. What are the professional backgrounds (and education) of the main actors in making the management plan? In the same way, could we ask for background information on the person who has answered these questions?

6 INTRODUCTION TO FRAMING THE ARGUMENTS

Part Two: Framing the Arguments: science, law, policy, and the media

David N Carss and Mariella Marzano

This part of **INTERCAFE's** exploration of social, cultural and legal perspectives on Cormorant-fisheries conflicts focusses on how different perspectives are framed and on the relationships between science, law, and policy (see also chapter 1). These perspectives are not necessarily scientific or legal ones where facts are presented and balanced one against the other by people in a formally recognised process. Instead, the arguments examined here are the explanations given by people (e.g. individuals, institutions, formal and informal groups) of the complex and multi-dimensional environmental themes and problems with which they are dealing. As such, they convey the kinds of positions that people take that incorporate values, attitudes and beliefs. These explanations and positions are often presented in diverse vocabularies (cf. Jamieson, 2008: 24–25) and are said to represent the 'frames' through which people see and interpret the world around them (e.g. Gardner, 2003).

At their most fundamental, such positions or rhetorical arguments are consolidated and laid down as instruments in EU law and apply to all. At the other end of the spectrum, the positions given or reported by the popular media are perhaps the most diverse. However, despite the possible wide disparity between these two situations, an understanding of both of them (and their associated vocabularies) is important when considering Cormorant-fishery conflicts and associated issues. These, and related themes, are discussed in a series of four chapters in Part Two.

Chapter 7 is a brief description of legal institutions and instruments in EU law, including the Wild Birds Directive, the most relevant legal instrument in relation to Cormorant-fisheries conflicts within the EU–27 Member States. While this is the primary pan-European legal frame within which Cormorant-fishery issues have to be considered, there is inherent flexibility here in relation to national frames relating to environmental conditions, problems and needs. This flexibility can lead to tensions between EU regulatory powers and national discretion — between the desire of the Community to protect wild birds and the right of Member States to balance this against their own public policy interests.

It is the balancing of these interests that is explored in **chapter 8** in relation to the use of science in making, interpreting and applying environmental law. One important issue discussed here is that of legitimacy in relation to science, law and policy and the public.

Cormorant-fisheries conflicts across Europe can generate considerable media interest and, importantly in this context, previous work (Carss, 2003:55–57) has shown 'popular literature' to be the most frequently recorded source of information informing stakeholder groups about Cormorant-fishery conflicts. Here, the print media was a commonly cited source of 'popular' information, and so this may have an important role to play in relation to the frames which influence beliefs about how wildlife-related issues should be addressed and resolved (Siemer *et al.*, 2007).

Chapter 9 thus explores the representation and perspectives of cormorants in the media where a

preliminary analysis of the issue is presented. Perhaps one of the strongest themes to emerge from this media analysis is that of the 'values' of the various spokespeople upon which media artices are based. Indeed, the issue of values has recurred throughout the work of REDCAFE (Carss and Marzano, 2005: 6–7, 11) and **INTERCAFE** and is very important. As in earlier work, **INTERCAFE's** process of dialogue with stakeholders has highlighted that, as with many other environmental issues, the environmental values of stakeholders involved in Cormorant conflicts are complex and, as highlighted by O'Brien and Guerrier (1995), are a 'thorny nest of intellectual and political problems. [They] delineate a complex field whose ideas and visions, rights and responsibilities encounter traditions and interests, institutions and technologies, all of which are essentially contested at the level of experience.'

Finally, **chapter 10** draws from previous chapters in its exploration of ethical perspectives in law and public debate. Here the word 'ethical' is used within the discipline of moral philosophy — in terms of such things as people's positions on what is 'right/wrong' and 'good/bad' (see Jamieson, 2008: 46). As **INTERCAFE** (and particularly WG3) has shown, notions of 'good' and 'right' (and of 'bad' and 'wrong') are often at the heart of European Cormorant conflicts (for example, see chapter 9) and so this chapter explores how people decide which sorts of things are good, which acts are right, and how various acts, practices, or institutions might be evaluated as being right or wrong by different stakeholder groups.

By examining these topics, Part Two explores the role of social, cultural and political issues in human:wildlife conflicts in terms of the diversity of arguments posed or positions taken by various stakeholder groups. Furthermore, it highlights how these positions are the result of people's values, attitudes, experiences and beliefs and that they very often differ between groups, be they local stakeholders, policy advisors, or biologists.

References

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265pp. http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Gardner, R. 2003. 'Process Frames'. *Beyond Intractability*. Conflict Information Consortium, University of Colorado, Boulder. Available at: http://www.beyondintractability.org/essay/process-frames

Jamieson, D. 2008. Ethics and the Environment: an introduction. Cambridge University Press, Cambridge.

O'Brien, M, and Guerrier, Y. 1995. *Values and the environment*. In: (Guerrier, Y, Alexander, N, Chase, J, and O'Brien, M. editors) Values and the Environment. Wiley: xiii–xvii. 359.

Siemer, W F, Decker, D J, and Shanahan, J. 2007. Media frames for black bear management stories during issue emergence in New York. Human Dimensions of Wildlife, 12: 98–100.

7 LEGAL INSTITUTIONS AND INSTRUMENTS IN EU LAW

Ilona Cheyne

The purpose of this chapter is to offer a brief introduction to a complex area of law and policy. It will begin by sketching out a concept of law and the limits of what it can be expected to achieve in contested situations such as Cormorant-fisheries disputes. A snapshot will be given of the three levels of international, EU and national law, the institutions and legal instruments of the EU, and the role of the Court of Justice of the European Union ('the Court'). Finally, key aspects of the legislation most relevant to the Cormorant-fisheries dispute, the Wild Birds Directive, will be examined.[20]

7.1 What is law, and what can we expect from it?

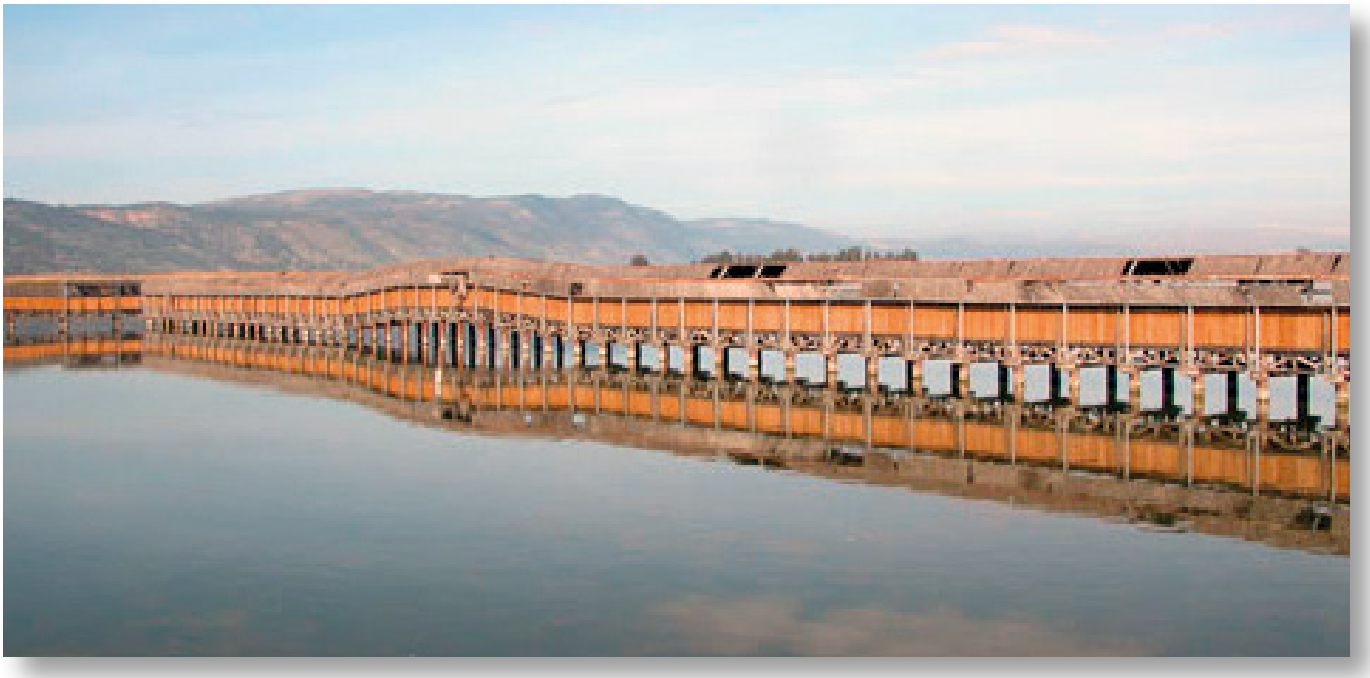
Although the Cormorant-fisheries conflict is often cast as a bipolar dispute between opposing sides, the picture is more complex. The dispute is multifocal and multisource, and it demands careful and nuanced responses according to specific context and circumstances. Law has a role to play in managing these conflicts but, in this case at least, it cannot provide simple answers.

Briefly put, law is made up of rules and principles which may be applied in order to determine rights, duties and capacities. Law can be distinguished from political decision-making by its emphasis on consistency and non-arbitrariness. As Aristotle suggested, *'it is more proper that law should govern than any one of the citizens'* (2009: 3.16). When law works correctly, therefore, it should promote certainty and predictability. However, it is important to remember that law is a tool, and that its formal reach is limited in scope and effect. This is particularly true in the area of environmental law. Environmental law is probably best understood as any law that affects the state and use of the environment. For example, it not only covers species conservation but also such things as town planning and landowner rights (Bell & McGillivray, 2008). The breadth



INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE**.

[20] Directive 2009/147/EU of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, OJ L/20 7 (codified version of Directive 79/409/EEC).



'Hides' from where visitors can watch wildlife, INTERCAFE field trip, Hula Valley, Israel. Photo courtesy of **INTERCAFE**.

and reach of environmental law directly and inescapably engages with science, politics, economics and other social considerations, and — therefore — it cannot be considered in isolation from the wider context in which it operates (Bell & McGillivray, 2008: 8–13; Fisher *et al*., 2009). In particular, law can only result from political consensus, and the clarity of legal provisions depends on the level of agreement that can be achieved in negotiations or by a legislature – a deliberative assembly such as a parliament with power to pass, amend and repeal laws. Thus, law will be limited to the level of consensus that can be found about a number of aspects of a problem, including the existence of the problem, its scale, the solutions that can be implemented, and the solutions that should be implemented. The first (political) questions for the Cormorant-fishery conflict should therefore be how it can be conceptualised as a regulatory problem, how much consensus can be developed to formulate legal rules and principles, and what law is intended to achieve.

Once sufficient consensus is established, drafting legislation requires some thought about the most appropriate regulatory technique. For example, a law that regulates hazardous chemicals might list the substances by name, or it might identify them by characteristics such as acidity or toxicity. The choice of regulatory style will affect how easily regulation can remain up-to-date and be interpreted in different situations. There are advantages and disadvantages in both approaches. 'Listing' is precise and easy to interpret and apply, but it leaves no room for judgment about the proper application of the law, may not include what should be included because of oversight or ignorance, and can become rapidly out-of-date unless frequently reviewed and amended. Categorising by characteristic avoids the disadvantages of a list of names by emphasising the link between the subject matter of the legislation and its purpose, and it does not require review except when an entire regulated category needs to be included or removed. (Cheyne, 2002: 63) In the case of the Wild Birds Directive, both techniques are used. Thus the category of all *'species of naturally occurring birds in the wild state'* in the territories of the EU Member States are to be protected.[21] However, birds listed in Annex I are subject to special conservation measures,[22] birds listed in Annex II may be hunted (with conditions),[23] and birds listed in Annex III, Part A, may be killed, captured or otherwise acquired (with conditions).[24] These lists need to be regularly reviewed and updated on

[21] Birds Directive, Articles 1 and 3.
[22] Article 4
[23] Article 7.
[24] Article 6.

the basis of scientific evidence, as happened in 1997 when the Great Cormorant (*Phalacrocorax carbo sinensis*) was removed from Annex I (Commission, 1997). At the same time, it remained within the category of protected birds under Articles 1 and 3 of the Directive.

As well as the general style of regulation, the legislative provisions require interpretation and this involves a range of specific techniques. Some law is very open-textured, in the sense that it is capable of different interpretations because of the vagueness — or generality — of the language; other law may be quite precise. In any case, language almost always contains ambiguity, so courts often need to choose between possible meanings when applying it to the facts of a case. The underlying purpose is always to determine the intention of those who drafted the law. To assist in this purpose, there are three main types of interpretation used by courts: literal or textual, the golden rule, and purposive interpretation.[25]

Literal interpretation focuses on the natural and ordinary meaning of the words, even if the result may be surprising. It assumes that the legislator intended exactly what the words mean, and that the court has no power to substitute its own ideas because it does not have law-creating powers. The golden rule may be used where there is more than one possible interpretation to allow the court to choose the meaning that seems to achieve the most sensible result. Purposive interpretation is also used where a provision is ambiguous but in this case the outcome is determined by examining the purpose of the law. This type of interpretation is particularly useful in cases of open-textured law which is deliberately left imprecise. It is particularly suited to the legislative style of EU directives (discussed below), and it is consequently an approach that is often used by the Court of Justice of the European Union.[26]



INTERCAFE meeting, Poland. Photo courtesy of **INTERCAFE.**

7.2 The Legal Landscape

7.2.1 Different levels of legal systems

There are three major levels of legal system — international law, regional law (e.g. EU law), and national law. International law refers to the system of rules and principles that operate between States at governmental or diplomatic level, for example the rules governing international trade or the use of armed force. Treaties are one way in which these rules come into existence as binding rules. International law binds States and intergovernmental organisations like the UN or the EU, although individuals sometimes have the right to bring complaints under international law, for example under human rights or investment treaties. Regional law also applies between States but, in the case of EU law, it has developed beyond the normal international law model to interact with individuals directly. Thus, EU law can be applied directly against individuals, for example in competition law, and individuals can invoke EU law directly when it is of direct and individual concern to them. As the Court put it, '[I]*ndependently of the legislation of member states, Community law... not only imposes obligations on individuals but is*

[25] This is sometimes known as the 'mischief rule' or teleological interpretation.

[26] Another reason is that teleological interpretation is also commonly used in civil law systems (those based on Roman law) rather than the Anglo-American common law system, and only one EU Member State uses the common law.

also intended to confer upon them rights which become part of their legal heritage'.[27] EU law is also applied at national level, sometimes directly and sometimes through implementing national legislation. EU law also governs external and internal trade and EU-wide policies such as agriculture, the environment and transport. National laws are created by the law-making institutions of each State and form distinct and different legal systems, although EU law creates some uniformity because it usually applies in all Member State legal systems in the same way. National laws include matters of both public and private concern, such as taxation, environment, marriage, transfer of property, and criminal law.

All three types of legal system are largely separate and independent from each other, but they can also interact and overlap in the same subject matter. In the case of wildlife conservation, for example, there are three interlocking instruments. The Bern Convention on the Conservation of European Wildlife and Habitats (1979) operates at the international scale and has been signed by all Member States of the European Union and many others. The EU Habitats Directive[28] was adopted in 1992 as the EU's regional response to the Bern Convention. In the UK, the Wildlife and Countryside Act 1981 consolidated and amended existing national legislation to implement both the Bern Convention and the Habitats Directive.

7.2.2 The EU: its institutions and legal instruments

The EU is an international organisation which is made up of a number of institutions, of which the most relevant here are the European Commission, Council of the EU, European Parliament and the Court of Justice of the European Union (Dashwood *et al*, 2011). The European Commission has a wide range of functions. For example, it proposes legislation, gives guidance on its interpretation, monitors compliance with EU law, and takes steps to enforce it through communications with Member States and, if necessary, by recourse to the Court. The EU Council is a political body comprising representatives from all the Member States, and it has the final say on legislation along with the Parliament. Originally, all Council decisions were made by unanimity but now they are mostly taken by qualified majority voting. The Parliament debates legislation and policy matters and, in most areas including the environment, it has the power to pass legislation along with the Council. The Court of Justice has jurisdiction (power) to interpret EU law and to assess the validity of institutional acts, including legislation.

Treaties

The primary source of EU law is its treaties — power-giving agreements that set broad policy goals, lay down fundamental rules and principles, and establish the EU's institutions. The most recent version is the Treaty on European Union and the Treaty on the Functioning of the European Union.[29] The latter treaty has replaced the Treaty establishing the European Community and is the most relevant for the purposes of this chapter since it includes provisions on agriculture, fisheries and the environment. This treaty, like its predecessors, is international in context. This would normally mean that the Member States had a high degree of autonomy in interpreting its provisions and, in the ordinary course of things, it is likely that EC and, later, EU law would have



INTERCAFE field trip, Po Delta, Italy.
Photo courtesy of **INTERCAFE.**

[27] Case 26/62, *Van Gend en Loos* [1963] ECR 1, 12 (right not to be charged new import tariff); C-41/74, *Van Duyn v Home Office* [1974] ECR 01337 (right not to be excluded from a Member State other than for personal conduct).

[28] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, OJ L/206 7.

[29] Available at: http://eur-lex.europa.eu/en/treaties/index.htm.





INTERCAFE meeting, Po Delta, Italy.
Photo courtesy of **INTERCAFE.**

developed quite slowly. However, the Court developed two doctrines that promoted an unexpectedly dynamic legal regime. The first principle is the supremacy of EU law.[30] This means that EU law, and the Court's interpretation of it, overrides national law and national interpretations of EU law (De Witte, 2011). The rationale behind this supremacy is that EU law would lose its effectiveness if it could be interpreted in different ways by national courts. The result is that there is a uniform understanding of EU law throughout the Community. In every case in which the Court is asked to assist a national court in the interpretation of EU law, its interpretation will also bind all other national legal systems.

The second principle is the doctrine of direct effect. The Court took the view early on that the EU Treaty was a new kind of international legal order, and not just an instrument which concerned States. It could be relied upon by private individuals because the intention of the Treaty was that they should also benefit.[31] So private individuals can use EU law in their disputes before national courts — they can use it to help interpret their own rights and duties, and they may be able to ask for the validity of EU law itself to be reviewed. Thus, the energy of private individuals has been harnessed to question, challenge and explore the scope and meaning of EU law. However, direct effect only occurs where the provision is clear, unconditional, does not need implementation by a national government, and is capable of giving rise to a right upon which an individual may rely. In practice, therefore, the use of direct effect by private individuals is limited by the nature of the provision and possibly the type of legal instrument in which it is contained.

Regulations and Directives

The EU has several types of binding legal instruments, of which the most relevant are regulations and directives. A regulation is generally applicable in that it binds all the Member States or other addressees. It is applied directly, which means that it does not need to be implemented through any further act. Regulations therefore have the benefit of reducing the costs of implementation by each individual Member State and the problems of investigating whether that implementation has been carried out correctly. However, regulations tend to impose the same obligations on all Member States and therefore they may not be sufficiently flexible or appropriate in situations needing environmental protection.

In contrast, directives are laws that are binding as to the result to be achieved, but, broadly, they leave it to national governments to decide on how to achieve that result. This form of legislation has advantages for environmental regulation because of its flexibility in coping with the different environmental conditions in each Member State and accommodating their different environmental problems and needs. However, the need to implement directives can impose heavy costs on national governments which may be required to carry out research, draft legislation and introduce sophisticated management procedures. The difficulty in persuading Member States to implement the Habitats Directive and the Wild Birds

[30] Case 6/64, *Costa v ENEL* [1964] ECR 585 (EC law could not be overridden by domestic legal provisions).

[31] Case 26/62, *Van Gend en Loos*, above n 7.



Harvesting a fish pond, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**

Directive (see 7.3) is partly due to this problem (Commission, 2010: 172). The Commission has recognised this difficulty by providing guidelines on the implementation of the Directives in order to try to lessen the burden, such as their Guidance document on the strict protection of animal species of Community interest under the Habitats Directive 92/43/EEC,[32] and the Guide to Sustainable Hunting under the Birds Directive.[33]

These types of guidelines are supplementary to legally binding instruments and fall within the category of a phenomenon known as 'soft law'. The concept of soft law covers a body of opinions, political statements, aspirations, guidelines and other materials that are relevant to the working of law, without being themselves binding. Soft law helps to clarify and develop our understanding of the law and, while the Commission guidelines on the interpretation of the Directives cannot trump the authority of the Court to make a definitive ruling,[34] they do indicate the likely policy of the Commission in enforcing the legislation.[35]

7.2.3 Access to the Court of Justice

There are two key ways in which cases may be raised before the Court of Justice: preliminary rulings under Article 267 TFEU, and direct actions for annulment under Article 263 TFEU.

Article 267 gives the Court jurisdiction to give rulings on the interpretation of the EU Treaty and acts of the institutions, and on the validity of acts of the institutions (including legislation). The Court considers questions referred to it by national courts when those courts need an authoritative interpretation of EU law in order to decide the case at hand. The Court therefore does not decide the case; it only explains how EU law should be interpreted after which the national court applies that interpretation to the facts of the case before it.

Article 263 gives the Court jurisdiction to review the legality of the acts of the institutions (including legislation). It can hear complaints against an institutional act on the grounds of lack of competence, infringement of an essential procedural requirement, infringement of the EU Treaty or of any rule of law relating to its application, or misuse of powers. Complaints may be brought by any of the institutions and by any Member State. Private individuals have some, very limited, access to this procedure. They may bring complaints where the act of an institution is of 'direct and individual concern' to them. The problem here is what is known as *locus standi*. This refers to the right to be heard in a case, and it requires the possession of a legal interest. Despite its generous interpretation of the right of private individuals to rely on EU law in cases before national courts, the Court has

[32] Final version, February 2007, available at: http://ec.europa.eu/environment/nature/conservation/species/guidance/index_en.htm.
[33] Latest version 2008, available at: http://ec.europa.eu/environment/nature/conservation/wildbirds/hunting/docs/hunting_guide_en.pdf
[34] Commission, Hunting Guide, n.11, p.5.
[35] See, for example, Commission, Note to the Guidelines for Population Level Management Plans for Large Carnivores, ENV.B.2 D/14591, available at: http://ec.europa.eu/environment/nature/conservation/species/carnivores/pdf/guidelines_for_population_level_management.pdf

been much more restrictive with regard to cases that are directly brought before it. For example, a legislative act is not of individual concern to people or enterprises on the grounds they are engaged in a particular activity if that activity could be carried out by other people. The decision must affect private individuals because they have attributes which are peculiar to them or because there are circumstances which distinguish them from all other persons.[36]

7.3 The Wild Birds Directive

The EU implemented its obligations to protect wild birds under the Bern Convention by means of Council Directive 79/409/EEC on the conservation of wild birds (the 'Birds Directive').[37] Geographically, it extends over the European territory of the Member States, with the exception of Greenland.[38] The Directive sets out general principles for the protection and management of wild birds which must be translated into national law by each Member State. Along with general obligations and specific prohibitions, the Directive also provides for a number of exceptions (derogations).

Cormorant-fisheries conflicts fall within this regulatory framework and are therefore governed by both restrictions and flexibilities.

The purpose of the Directive is to provide for the protection, management and control of wild birds and rules governing their exploitation. The general principle behind the Directive requires Member States to take the necessary measures to maintain the population of wild European bird species at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the population of these species to that level.[39] It follows that Member States shall take measures necessary to preserve, maintain or re-establish a sufficient diversity and area of habitats for all the species of wild European birds.[40] There is a balance here between the conservation of bird populations and other interests, but the presumption is that all wild birds, including migratory birds, are protected unless it can be shown that they fall within explicit exceptions. The Court has specifically stated that the concept of balance does not constitute a derogation from the general principle of protection.[41] The Commission has taken the view that the obligation under Article 2 is to maintain 'favourable conservation status' although this is not explicit in the wording.[42] In addition, Article 13 provides that measures taken under the Directive may not lead to deterioration in the present situation of conservation of wild birds. The Directive establishes four types of substantive rules.[43] These cover the classification and management of special protection areas (SPAs), prohibited acts, hunting and derogations. The Birds Directive has been amended by the later directive, the Habitats Directive, with regard to the management of SPAs, and SPAs established under the WBD are now incorporated in the Natura 2000 network established under the Habitats Directive (de Sadeleer, 2005). Although the establishment of SPAs is a vital part of the EU's conservation strategy, the focus here will be on the other three regulatory areas of prohibited acts, hunting and derogations.

Article 5 of the Birds Directive requires Member States to establish a general system of protection for birds. In particular, they must prohibit deliberate killing or capture of birds, the deliberate destruction of, or damage to, their nests and eggs or removal of their nests, and taking eggs. In addition, they must prohibit deliberate disturbance of birds, particularly during their period of breeding and rearing, if it would have significant impact on conservation. Thus Cormorants are protected by law against any or all of these acts. Equally, Article 7 of the Directive restricts which birds may be hunted, when and by what means (de Sadeleer, 2007: 46–51). Huntable species are those

[36] See, for example, Case 25/62, *Plaumann v Commission* [1963] ECR 95 (not sufficient to be a major importer of clementines, since other individuals may also become clementine importers); Case C-263/02 P, *Jego-Quere v Union de Pequenos Agricultores* (appeal from T-177/01) [2004] ECR I-3425 (private individuals have sufficient access to justice by seeking a remedy before their national courts).

[37] Now codifed as Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds, OJ L/20 7.

[38] Article 1.

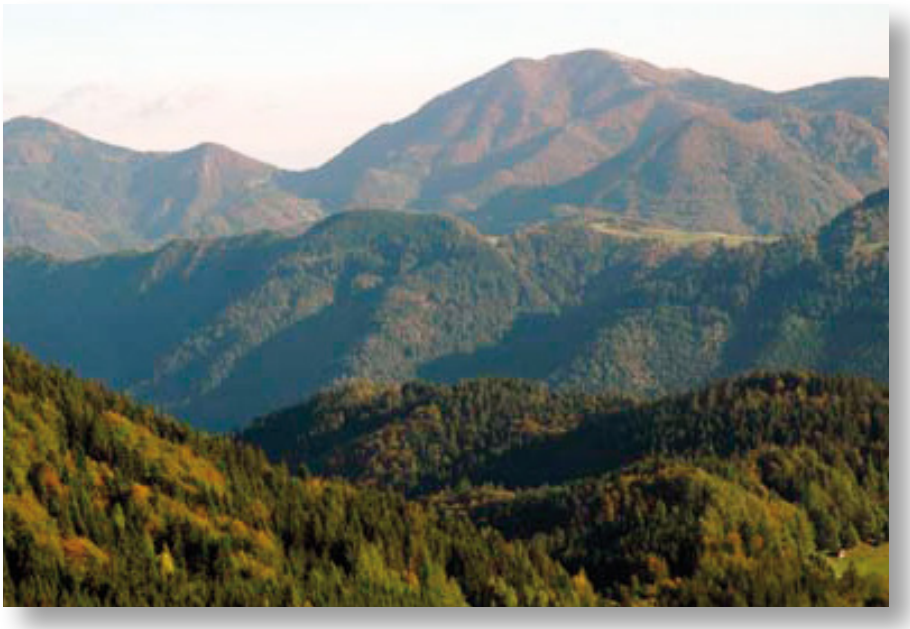
[39] Article 2.

[40] Article 3.

[41] Case 247/85, *Commission v Belgium* [1987] ECR 3029, para. 8; Case 262/85, *Commission v Italy* [1987] ECR.3073, para. 8.

[42] Commission, Hunting Guide, n.11, p.20 (n.28).

[43] Other provisions cover, for example, research, reporting, amendment procedures, and time limits for implementation.



Sub-Alpine catchment, INTERCAFE field trip, Slovenia.
Photo courtesy of **INTERCAFE.**

listed in Annex II, if appropriate *'to their population level, geographical distribution level and reproductive rate throughout the Community'*.[44] Hunting must be controlled by national legislation, and Member States must ensure that conservation efforts are not jeopardised in the birds' distribution area.[45] In particular, Member States must ensure that hunting complies with ecological balanced control and is compatible with maintaining appropriate conservation levels, especially for migratory species. Hunting cannot be carried out during the rearing or breeding seasons, and migratory species cannot be hunted during their period of reproduction or during their return to their rearing grounds.[46] This is a complex calculation, and the Commission and the ORNIS Committee (a group which assists the Commission in the implementation of the Birds Directive) have therefore developed and published information on the period of prenuptial migration and reproduction of each of the huntable species.[47]

With regards to the methods of hunting, large-scale or non-selective means of capture or killing are prohibited, as are any methods capable of causing the local disappearance of a species.[48] The Court has narrowly interpreted the hunting exception. It has insisted on strict controls on hunting, and it has applied a principle of 'complete protection' when applying Article 7.[49] For example, if a Member State wishes to have variable hunting dates, it must discharge the scientific burden of proof and show that the hunting of one species does not impede the complete protection of non-hunted species.[50] The fact that hunting is a recreational activity does not mean that it constitutes an exception to the restrictions imposed by Article 7(4).[51]

Although the Directive lays down obligations and restrictions, it does allow for exceptions, known as derogations, under Article 9 (de Sadeleer, 2007: 54–58). The Court has emphasized that the national legislation must be

[44] Article 7(1). Birds listed in Annex II, Part A may be hunted throughout the EU, and those listed in Part B may only be hunted in specified Member States.

[45] Article 7(1).

[46] Article 7(4).

[47] *Key Concepts of Article 7(4) of Directive 79/409/EEC*, Version 2009, available at: http://ec.europa.eu/environment/nature/conservation/wildbirds/hunting/docs/reprod_intro.pdf

[48] Article 8. In particular, methods listed in Annex IV are forbidden, including snares, limes, hooks, live decoys, tape recorders, electrocuting devices, artificial lights sources, mirrors, explosives, nets, traps, poisoned or anaesthetic bait, and semi-automatic or automatic weapons.

[49] Case C-157/89 Commission v Italy [1991] ECR I-57, para. 14; Case C-435/92, *Association pour la Protection des Animaux Sauvages and others v Préfet de Maine-et-Loire and Préfet de Loire-Atlantique* [1994] ECR 67, para. 13.

[50] Case 252/85, *Commission v France* [1988] ECR 2243; Case 262/85, *Commission v Italy* [1987] ECR 3073; C-157/89, *Commission v Italy* [1991] ECR I-57; C-435/92, *Association pour la Protection des Animaux Sauvages v Préfet de Maine-et-Loire and Préfet de Loire-Atlantique* [1994] ECR I-67; C-38/99, *Commission v France* [2000] ECR I-10941. The Member State bears the burden of proof when it relies on a derogation. See, for example, Case C-239/04, *Commission v Portugal* [2006] ECR I-10183. However, where the Commission claims that a Member State is in violation of its obligations, the burden of proof lies with the Commission. See Case 96/81, *Commission v Netherlands* [1982] ECR 1791, para 6; Case C-157/94, *Commission v Netherlands* [1997] ECR I-5699, para 59; Case C-166/97, *Commission v France*, para 40; Case C-221/04, *Commission v Spain* [2006] ECR I-04515.

[51] C-435/92, *Association pour la Protection des Animaux Sauvages v Préfet de Maine-et-Loire and Préfet de Loire-Atlantique* [1994] ECR I-67, para 19.



INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**

'sufficiently clear and precise'.[52] This includes the need to set out exhaustively the grounds for allowing the derogation.[53] In addition, the conditions contained in Article 9 must be shown to have been met, and the derogation must be interpreted strictly.[54] Transposing the Bird Directive's provisions on derogations must be done faithfully — it is particularly important when the management of the EU's common heritage is entrusted to Member States.[55] National legislation implementing derogations must be reported to the Commission annually, and the Commission is obliged to examine these reports to ensure that national measures are not incompatible with the Directive.[56] The process is therefore conducted under the Commission's supervision. Nonetheless, these derogations do permit flexibility and accommodation of individual situations, and are potentially extremely useful for the management of specific Cormorant-fisheries conflicts.

Article 9 allows Member States to derogate from the general prohibitions in the Directive and from the more specific provisions on marketing and hunting. However, derogations may only be used if it is ensured that the population of the species concerned is maintained at a satisfactory level.[57] The Court will also apply a test of proportionality, weighing a derogated act against its justification, which means that it must be shown to go only so far as is strictly necessary and does not jeopardise the Directive's objectives.[58]

Specifically, derogations must satisfy three conditions: (i) the Member State must show that there is no other satisfactory solution; (ii) the derogation must be based on at least one of the reasons listed; and (iii) the derogation must comply with precise formal conditions. Of the available reasons, the most relevant for Cormorant-fisheries conflicts are *'to prevent serious damage to crops, livestock, forests, fisheries and water'* and *'for the protection of flora and fauna'*.[59] With regard to the need to show that there is no other satisfactory solution, the Court has, for example, rejected hunting seasons that unnecessarily overlap with

---

52 Case C-418/04, *Commission v Ireland* [2007] ECR I-10947, paragraph 158 ; Case C 361/88, *Commission v Germany* [1991] ECR I 2567, paragraph 15.

53 Case C-118/94, *Associazione Italiana per il World Wildlife Fund and Others v. Regione Veneto* [1996] ECR I-01223, paragraphs 21-22; Case C-507/04, *Commission v Austria* [2007] ECR I-05939, paragraphs 299-300.

54 Case C-76/08 *Commission of the European Communities v Republic of Malta* [2009] ECR I-8213, decided 10 September 2009, paragraph 48; Case C-60/05, *WWF Italia and Others v Regione Lombardia* [2006] ECR I-5083, para 34.

55 See, for example, Case 262/85, *Commission v Italy* [1987] ECR 3073, para 9; Case 236/85, *Commission v Netherlands* [1987] ECR 3989, para 5; Case 247/85, *Commission v Belgium* [1987] ECR 3029, para 9; Case 252/85, *Commission v France* [1988] ECR 2243, para 5; C-38/99, *Commission v France* [2000] ECR I-10941, para 53; Case C-60/05, *WWF Italia and Others v Regione Lombardia* [2006] ECR I-5083 , para 24; Case C-507/04, *Commission v Austria* [2007] ECR I-05939, paragraph 92.

56 Article 9(3)-(4). See Case 262/85, *Commission v Italy*, [1987] ECR 03073, para 7.

57 Case C-76/08, *Commission v Malta* [2009] ECR I-08213, paragraph 59; Case C-60/05, *WWF Italia and Others* [2006] ECR I-05083, paragraph 32; Case C-182/02, *Ligue pour la protection des oiseaux and Others* [2003] ECR I-12105, paragraph 17.

58 Case C-76/08, *Commission v Malta* [2009] ECR I-08213, paragraphs 57-8.

59 Article 9(1)(a).

periods in which birds should be given particular protection because the birds being hunted were already frequent during the normal hunting seasons.[60] In another example, the Court rejected the argument that habitats can only be conserved by allowing hunting.[61]

Since Cormorants are not listed as a huntable species in Annex II, they can only be killed or disturbed if the conditions of Article 9 are satisfied. In the case of Cormorants, licensed culling is lawful provided that it can be shown that there is no other satisfactory solution to the problem of causing serious damage to fisheries or to fauna. Whether they can be controlled by hunting is a more open question. The Commission appears to have taken the view that hunting for non-recreational purposes would be a legitimate method of controlling birds for purposes listed in Article 9, even for birds such as the Great Cormorant that they are not listed in Annex II.[62] However, it would be important to ensure that such hunting took place under proper licensing and monitoring procedures to ensure that the requirements of Article 9 and the general objectives of the Birds Directive were being met.

During **INTERCAFE's** meetings and discussions with the EU's DG Environment, Nature and Biodiversity Unit, the following (Text Box 7.1) can be summarised as the Commission's view on the Great Cormorant in relation to the Birds Directive.

As with all species of wild birds, Cormorants are covered by the general scheme of protection of the WBD and its deliberate capture and killing, disturbance, destruction of its nest or taking of its eggs can only be allowed by Member States in accordance with the derogation system of the directive. Three species of Cormorants that naturally occur in the EU, Great Cormorant (*Phalacrocorax carbo*), Shag (*P. aristotelis*) and Pygmy Cormorant (*P. pygmaeus*) are given this protection under the Directive. The continental sub-species of the Cormorant (*P. c. sinensis*) was considered endangered in 1979 when the Birds Directive was adopted and was listed in Annex I of the directive as a species requiring special habitat conservation measures, including site protection. However, with increasing populations, the species is now considered to have a favourable conservation status. As a result, the Commission, having consulted the Member States, removed *P. c. sinensis* from Annex I of the Directive. *Phalacrocorax carbo* is a migratory species occurring in wetlands of international importance and so still needs to be subject to habitat conservation measures in Special Protection Areas established under the Directive.

The Commission is aware that there are conflicts between fishermen and *P. carbo* in certain parts of the Community and it has agreed with Member States that they can make full use of the derogation provisions of the Birds Directive to prevent serious damage by Cormorants to fisheries, where this is justified in the absence of alternative solutions. The Birds Directive does not provide for internationally binding management plans for species such as *P. carbo* and does not give the Commission powers to request Member States to take control measures. It is for each Member State to take the measures it considers necessary to manage populations and any conflicts that arise in relation to fisheries interests.

Text Box 7.1 Summary of the Great Cormorant in relation to the Birds Directive.

7.4 Concluding Summary

The role of law and the EU institutions is an important, though limited, part of managing Cormorant-fisheries disputes. The protection of wild birds is one part of implementing the international law obligations of the EU and its Member States, and a fundamental component of the EU's conservation strategy. The Birds Directive therefore imposes strong obligations on Member States to protect wild birds and significant restrictions on individual activities, particularly if they might lead to a deterioration of their conservation status. These obligations and restrictions have been strictly construed and applied by the Court. However, the Birds Directive also contains

[60] Case C-76/08, *Commission v Malta* [2009] ECR I-08213, paragraph 50; Case C-182/02, *Ligue pour la protection des oiseaux and Others* [2003] ECR I-12105, paragraph 16; Case C 135/04, *Commission v Spain* [2005] ECR I 5261, paragraph 19

[61] Case C-507/04, *Commission v Austria* [2007] ECR I-05939, paragraph 205.

[62] Commission, Hunting Guide, p.50, para. 3.4.20 and footnote 99.

flexibilities, most notably in the form of derogations. Derogations must be justified according to the requirements of the Directive and licensed through Member States' authorities. This means, *inter alia*, that they cannot be used without objective, science-based justification and must be in line with the overall conservation objectives of the Directive. There must be no other satisfactory solution so, for example, killing of Cormorants or disturbance while they are breeding will only be acceptable when other methods have been properly attempted and failed, or it can be shown that they would be ineffective. Nonetheless, the availability of the derogations option offers an opportunity to control and manage the activities of Cormorants when fisheries are threatened and the Commission has indicated that Member States may make full use of the power to license control measures under the derogation procedure.

In the next chapter both the WBD and the Cormorant-fisheries conflict are discussed further in terms of the relationships between science, law and policy.

References

Aristotle. 2009. Politics. (translated by Ernest Barker) Oxford: Oxford University Press.

Bell, S, and McGillivray, D. 2008. Environmental Law (7th Edition) Oxford University Press.

Cheyne, I. 2002. The Definition of Waste in EU Law. Journal of Environmental Law 14:1, 61–73.

Commission. 1997 Commission modifies the 'Birds' Directive with respect to the Great Cormorant', IP/97/718, 30 July 1997, available at http://europa.eu/rapid/press-release_IP-97-718_en.htm?locale=EN

Commission. 2008. Guide to Sustainable Hunting under the Birds Directive. http://ec.europa.eu/environment/nature/conservation/wildbirds/hunting/docs/hunting_guide_en.pdf

Commission. 2010. Working Document accompanying Report from the Commission's 27th Annual Report on Monitoring the Application of EU Law. SEC(2010) 1143 final. available at http://www.ipex.eu/IPEXL-WEB/dossier/document.do?code=SEC&year=2010&number=1143&extension=FIN

Dashwood, A, Dougan, M, Rodger, B, Spaventa, E, and Wyatt, D. 2011. Wyatt and Dashwood's European Union Law. (6th Edition) Wildy & Sons Ltd.

De Witte, B. 2011. Direct Effect, Primacy and the Nature of the Legal Order. Craig, P, and De Burca, G (editors). The Evolution of EU Law (2nd Edition) Oxford University Press.

Fisher, E, Lange, B, Scotford, E, and Carlarne, C. 2009. Maturity and methodology: starting a debate about environmental law scholarship. Journal of Environmental Law 21:2, 213–250.

de Sadeleer, N. 2005. Habitats Conservation in EC Law — From Nature Sanctuaries to Ecological Networks. Yearbook of European Environmental Law 5, 215–252.

de Sadeleer, N. 2007. The Birds, Habitats, and Environmental Liability Directives to the Rescue of Wildlife under Threat. Yearbook of European Environmental Law 7, 36–75.

8 SOME THOUGHTS ON SCIENCE, LAW AND POLICY

Ilona Cheyne

8.1 Introduction

The relationship between science, law and policy lies at the heart of environmental issues such as the Cormorant-fisheries conflict (Tarlock, 2002). Such disputes are primarily played out as challenges to the evidence offered by opposing sides as justification for their positions. As the work of REDCAFE (Carss, 2003, Carss and Marzano, 2005) and **INTERCAFE** (see full reporting on www.intercafeproject.net) has consistently shown, there are often numerous opposing 'sides' and 'positions' relating to Cormorant-fisheries conflicts. At its crudest, these can be distilled down to two opposing sides: a bird one and a fish one. These positions are examined in greater detail in chapter 9's media analysis. Whist both these sides have diverse and nuanced perspectives, 'science' is often treated as synonymous with bird protectionism and conservation although this is not always the case. In this chapter there is an exploration of the perspective of science in terms of a body of evidence (usually in relation to cause and effect and/or the quantification of biological/ecological processes or factors) to be incorporated into such things as management plans (see previous chapters) or aspects of the law.

Science has a crucial role in the identification and measurement of problems, and in the mitigation or remediation of those problems (Tarlock, 2002: 135). However, the relationship with law and policy is not always an easy one (Haack, 2009). There is tension between the desire of policy-makers to base their decisions on the knowledge and evidence offered by science, and public scepticism about the neutrality and efficacy of science. The claim to objectivity and impartiality (for example, Parsons, 1961: 335; Merton, 1973) has been challenged (for example, Jasanoff, 2005; Bloor, 1976), but the need to give an objective basis for policy decisions remains. Without objective justification, measures are likely to lose the legitimacy on which acceptance and compliance





Katy Rybackie forest and Cormorant Reserve signposts, INTERCAFE field trip, Poland. Photos courtesy of **INTERCAFE.**

largely depends, and they may be struck down in the face of judicial evaluation of their legality. Indeed, the use of objective scientific data and interpretation has been shown to be a key feature of many successful wildlife management cases (see chapter 3). Science may be particularly crucial to managing Cormorant-fisheries conflicts — it has been described by one leading commentator as *'the only potential unifying standard'* when parties to a dispute do not trust each other (Tarlock, 2002: 136).

The purpose of this chapter is therefore to explore, briefly, the use of science in making, interpreting and applying law in the context of environmental law and policy. This will include using science in questions of fact and defining rights and obligations. There are two questions that are particularly relevant to the management of Cormorant-fisheries conflicts. The first is how the use of science may affect the legitimacy of public measures and thereby their acceptability and probability of compliance. The second question is how science may operate in the context of good governance (Jasanoff, 2006) (see also chapter 4 for discussion on governance in relation to wildlife management plans). The present chapter examines firstly the meaning and implications of legitimacy for developing policies and laws that are widely accepted, and the role of science in achieving that legitimacy. It then explores the use of science, and particularly its use in standard-setting, when legislation is being drafted, interpreted and applied. Finally, it offers some remarks about the role of science in Cormorant-fisheries conflicts.



Public signpost in fish pond complex, INTERCAFE meeting, Czech Republic. Photo courtesy of **INTERCAFE.**

8.2 Legitimacy

Legitimacy is a complex concept that is used in different ways and which has no universally accepted definition. However, the core of the concept involves a sense of rightfulness, the idea that people can be drawn towards compliance with a measure without coercion, even though they might not otherwise have chosen to act that way (Franck, 1988: 705; Franck, 1990: 234). The practical advantage of legitimacy is therefore that willingness to accept a measure tends to lead to a high level of compliance and reduces enforcement costs.

Legitimacy covers a spectrum of substantive and procedural considerations. Substantive legitimacy occurs when there is consensus or acquiescence to the content of a measure. This may be the result, for example, of holding common values or the persuasiveness of one view over another. Substantive legitimacy is subjective to individuals, associations, countries and regions. It also involves a wide range of considerations, including economic, political, social, cultural and ethical values. It is not easy to find examples of clear consensus other than in groups of individuals who have chosen to associate with each other because they already share the same values, such as single-issue pressure groups (see discussion of pressure groups in section 9.3.1). In most cases, there is an irreducible diversity of preferences where differences of opinion cannot be entirely eliminated. In some cases this will be because the conflicting values are incommensurable,[63] meaning (simply put) that there is no common scale on which they

[63] This links both to the concept of 'intractable environmental conflicts' (see chapter 14) but also to issues discussed in chapter 10.



Fish pond manager, INTERCAFE field trip, Czech Republic.
Photo courtesy of **INTERCAFE.**

can be compared with each other. The intrinsic value of biodiversity and Cormorants cannot easily be measured against the right of the fishing industry to make a profit — they cannot be directly compared. This does not mean that one interest is necessarily more important than the other, a view that is termed 'value pluralism' and is best represented in the works of Isaiah Berlin. He argued that in situations where different values cannot be reduced to a common denominator it will be necessary to make 'tragic choices' — by necessity, some of one value will have to be sacrificed if we protect the other (Berlin, 2002: 214). This does not mean that the choice is absolutely in favour of one over the other, only that the loss one value suffers cannot be truly compensated by the gain of the other (Berlin, 1991).

Where consensus and thereby substantive legitimacy is difficult or impossible to achieve, the process of reaching decisions on how to act will become increasingly important and perhaps crucial. Procedural legitimacy occurs where the content of a measure may not be welcome but the measure is considered legitimate because it is the outcome of an accepted procedure, such as a publicly transparent debate (see chapters 4 and 5) or a democratic vote. This acceptance might be because the authority and process of the law-making body is recognised as legitimate or because it invokes a habit of obedience through tradition or respect for the rule of law (Weber 1964: 124–32). The task here is to identify core or shared values, usually through appropriate consultations with all stakeholders and view-holders, and to achieve a final policy or judicial outcome which can overcome substantive objections by virtue of the legitimacy of the decision-making process. This is commonly seen to be an aspect of good governance, requiring transparency, participatory discussion, accountability and reflexive regulatory practices (Corkin, 2008).

In some cases either substantive or procedural legitimacy may be enough to achieve acceptance and compliance, in the sense of a non-legislative policy that is widely respected or an unpopular law that is accepted because it has been decided by a widely respected procedure such as a democratic legislative process. The substance of a measure may be enough to achieve legitimacy and compliance, regardless of the process by which the decision to introduce that measure was made. However, the mere fact that a measure has gone through a particular procedure, for example an open and democratic decision-making process, may be enough to give it legitimacy, even if many people disagree with the actual content.

Arguably, therefore, basing decisions on objectively verifiable evidence and ensuring effective consultation and participation of all interested parties is crucial to the management of Cormorant-fisheries conflicts.

8.3 The role of science in law and policy

The legitimacy of a measure, such as a decision to preserve or to cull a problem species, is crucial to its success and to the debate on how to proceed in other circumstances or in the future. As suggested above, science has an important role to play in giving both substantive and procedural legitimacy to policy outcomes but, in both substantive and procedural aspects, the role of science is problematic.

There are two main types of criticism often levelled at the use of science in policy-making. One is aimed directly at scientific methodology by questioning the neutrality of the scientific method. It is argued that scientists do not necessarily ask the correct questions and that results are interpreted in a way that does not always lead to appropriate answers (Lee, 2005). The second, linked criticism is that scientific evidence and judgments are given privileged status in policy and law. As a result, it disproportionately affects both the exercise of discretionary powers by political institutions and in the interpretation of legal rights and obligations. Part of this criticism

is based on scepticism about the objectiveness of the scientific endeavour itself (Jasanoff, 2005; Bloor, 1976). More important for the purpose of this chapter is the concern that scientists bring the wrong questions and assumptions to bear on complex social and economic situations. For example, it is often said that individuals (and local, national and regional communities) perceive and respond to risks differently from scientists. This is not to say that non-scientific views are necessarily irrational; instead, they may be based on wider considerations than pure scientific methodology such as novelty, voluntary or involuntary exposure, and media attention (see chapter 9 for example). Given the importance of ensuring there is an objective basis for decision-making in Cormorant-fisheries conflicts, and the need to incorporate wider social, economic, cultural and ethical issues, the role of science needs to be shaped carefully.

8.3.1 Science in policy-making

The issue here is that an over-privileging of science may lead to the blurring of normal divisions in the making of policy and judicial decisions. Thus, the first stage of policy-making should focus on the gathering of evidence about the situation in which risks are feared; the second stage, however, should not be based solely on scientific evidence but should also incorporate other socially important considerations, such as economic, political, social, cultural and ethical values. This is an essentially political, not scientific, task in the sense that it requires the exercise of political power and discretion to find an outcome which is acceptable (and therefore legitimate) within the community at large (Cheyne, 2006). Failure to achieve substantive consensus or satisfy procedural acceptability is the responsibility of political institutions. In particular, care must be exercised when relying on scientific evidence for legitimacy to ensure that the methodology and conclusions are widely acceptable and that all non-scientific considerations are openly and adequately taken into account (Lee, 2005). Similar considerations apply to judicial interpretation and application of law where the full implications of legislation must be taken into account beyond simple reliance on scientific evidence.

In some cases, however, legislation requires the appraisal and advice of bodies such as scientific or technical committees. In the EU, 'comitology' is the term given to the use of expert committees to guide the Commission in the exercise of its discretionary powers.[64] Thus, for example, the Waste Directive provides for a scientific and technical committee to decide whether processes should be characterised as waste disposal or as recycling thereby determining which legal obligations should apply to the processer.[65] Committees are used for both the Wild Birds and Habitats Directives.[66] Although expert



Public sculpture celebrating carp production, INTERCAFE meeting, Třeboň, Czech Republic. Photo courtesy of **INTERCAFE.**

[64] This is the procedure under which the Commission executes its power to implement legislation with the aid of committees, based on Article 290 TFEU.

[65] The Committee for the adaptation to scientific and technical progress and implementation of Directive 2008/98/EC on waste. The Comitology Register is available at: http://ec.europa.eu/transparency/regcomitology/index.cfm

[66] The Committee for the adaptation to scientific and technical progress of the directive on conservation of wild birds (ORNIS), and the Committee on the conservation of natural habitats and of wild fauna and flora (HABITAT) respectively.

opinion on scientific and technical matters is essential for the proper implementation of the legislation, some care is needed in the use of comitology. One problem has been raised already, that of ensuring sufficient consultation with and participation by stakeholders to ensure legitimacy of the process.

The other is the need to ensure that the scientific and technical advice does not exclude proper consideration of other relevant issues. Courts in every jurisdiction are required to decide on questions of fact as well as law and, in some cases, questions of mixed fact and law. The use of expert advice is not unique to the EU, but the use of comitology suggests a reliance on scientific enquiry and evaluation. Science is therefore an integral part of law-making and law-interpretation in the EU context. There is an obvious temptation to delegate responsibility for determining legal rights and obligations to scientists when political consensus is difficult or impossible to achieve. However, where such delegation is based on scientific knowledge or methodology which does not yet exist or is controversial, interpreting the ensuing law becomes exceedingly difficult and may be ineffective in practice.

These issues are particularly important in the context of conflicts over environmental values. Non-scientific views of the environmental tend to be varied and subjective; scientific views may also be varied and subjective but normally lie within a narrower spectrum and are based on an obligation to offer robustly objective justification. What is important, perhaps, is the greater capacity of non-scientific approaches to value the environment for its own sake, rather than the more instrumental, cause-and-effect view of environmental factors that tends to characterise the scientific approach.

Fundamentally, the relationship between science, law and policy is about achieving legitimate outcomes, where the balance is accepted as appropriate and constructive. We need to know how to ask the right questions, be confident that we are asking the right questions, and to understand the evidence that our enquiry produces. Given that scientific findings, at least in environmental and biological science, can never be entirely conclusive, a reasonable view of the capacity of science to provide answers should be taken (Kriebel, 2009). In the words of one commentator: *'It is sometimes said that science is a search for truth; and this is right, if rightly understood. The core business of the sciences is inquiry; the object of the enterprise is to figure out answers to questions about the world and how it works.*' (Haack, 2009: 7). In other words, science needs to be true in order to be useful but not in an absolute or exclusive sense of truth — a claim that few, if any, disciplines could assert. Along with a realistic view of scientific evidence, there is also a need to be able to identify core and shared values (see also chapter 10). With these two aspects comes the requirement for an appropriate process in which open and educated debate can be conducted, with full participation of interested parties, and reflexive and accountable regulation.

8.3.2 Science in standard-setting

It has long been recognised that there are both similarities and differences between institutions of law and science. Most of the key differences are evident when science is used in litigation before a court, when the need to resolve the case definitively, promptly and formally may clash with an open-ended, investigative search for general principles in science (Haack, 2009). Here, the focus of the discussion is on the use of science in the formation of policy that becomes law, and in the setting out of rules, principles and tests that define the duties and standards that the law will enforce.

Although it is not new or peculiar to environmental law, the use of science is perhaps particularly embedded in the drafting stage (Tarlock, 2002). Unless a law is solely intended to implement a policy which is not based on any factual basis, such as a religious or perhaps ethical policy, it is hardly credible that laws intended to achieve practical outcomes of environmental protection could be drafted without recourse to scientific knowledge and understanding. This is not to say that other considerations will not be taken into account, most notably those that could be described as political, economic, social or ethical. But assuming that a law is intended to achieve its desired outcomes in practice, science must play a part in understanding the mechanisms by which those outcomes might be brought about. The nature of environmental policy-making and law therefore lends itself to the use of scientific



INTERCAFE meeting, Saxony. Photo courtesy of **INTERCAFE.**

concepts, methodologies and judgements in order to set a standard which will give rise to legal rights and obligations.

The use of scientific concepts to establish legally enforceable standards raises questions about whether legal standard-setting that is dependent on scientific knowledge and evaluation is actually possible. For example, Article 14(1) of the Habitats Directive requires Member States to ensure that the taking of listed wild fauna and flora is compatible with their being maintained at a 'favourable conservation status'. Favourable means, *inter alia*, the natural range and areas within that range are *'stable or increasing'*, and the specific structure and functions necessary for long-term maintenance exist and are likely to continue to exist for the foreseeable future.[67] There are at least two aspects that are notable here. The first is that the test that natural range and areas of a habitat is stable or increasing requires continual measurement both present and into the future. The role of science here is to gather and evaluate information. The second is that scientists will be asked to evaluate that the necessary structure and functions exist and, more challengingly, 'are likely to continue for the foreseeable future'.

Equally, Article 2 of the Birds Directive requires Member States to take measures to maintain wild bird populations 'at a level which corresponds in particular to ecological, scientific and cultural requirements'. In Special Protection Areas (SPAs), Member States must take appropriate steps to avoid 'significant' pollution or deterioration of habitats.[68] Allowable derogations include the judicious use of certain birds 'in small numbers'.[69] Examples of when these sorts of questions might need to be resolved include challenges to a Member State's refusal to classify an area as SPA, or its authorisation of a derogation, or its design of an inadequate management plan. Questions of assessing causation or damage will occur when, for example, a Member State is accused of allowing a natural habitat to deteriorate.

This use of scientific standards raises a number of questions, *inter alia*, about how scientists are expected to base a calculation on what is likely to happen in the future, how they should apply the appropriate time scale for the future, and how they should be expected to calculate the causation, scale and value of damage (Oreskes, 2004). This is not to say that scientific benchmarks are not essential in the management of environmental schemes, but it does mean that they should not be used as a way of avoiding difficult political decisions about suitable criteria for defining and assessing rights and obligations under environmental law and policy.

8.4 Science, Law and Policy in the Cormorant-Fisheries Conflict

It is not the purpose of this chapter to suggest how to find an appropriate balance between the authority of science and the operation of law and policy. There are, however, obvious

[67] Article 1(e).

[68] Article 4(4) WBD

[69] Article 9(1)(c) WBD



INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**

points of enquiry raised by the Cormorant-fisheries conflict which must be investigated if a workable management of the conflict is to be achieved. For ease of discussion, they can be brought within two general groups.

The first group of questions revolve around knowledge. One question concerns the reliability of some of the evidence put forward in the debate. It poses significant questions about the robustness and contestability of scientific findings, and the problem of using scientific studies as rhetorical devices without full consideration of their potential weaknesses or the conclusions of other studies. It also demands some enquiry into the relative value and reliability of mainstream science and the knowledge of other types of professionals and experts in fisheries, ornithology, environmental management, cultural and ethical practices, and so on. This type of enquiry — into our confidence about the strength and appropriateness of scientific evidence — is relevant not just to the cause and effect of the growth and geographic spread of Cormorant populations on fisheries, but also with regard to the feasibility, potential effects and future implications of various control measures for Cormorants and defence mechanisms for fish. It also requires consideration of local and regional solutions as well as universal (in this case, Europe-wide) approaches.

The purpose of examining the extent and reliability of current knowledge and what is needed to plan appropriate future investigations is to ensure that policy-making, and ultimately the application of legislation, is carried out to the largest extent possible without ignorance or prejudice. This not only has the obvious implication that such measures would be more effective in achieving agreed goals but also that the legitimacy of the measures would be higher, leading to a greater expectation of compliance. It is therefore an issue of great importance to the management of Cormorant-fisheries conflicts.

The second group of questions that need to be examined in this area can be characterised as questions of political decision-making. The aim here would be to gain clarification of social goals, which would involve finding a process for deciding, for example, whether biodiversity as a whole should be favoured over the lives of individual animals, or whether animals expressing natural behaviour should be allowed to over-ride the interests of humans (see chapter 10 for further discussion of this). The outcome would depend on identifying the boundary between the function of science in discovering and evaluating evidence and risks, and the function of political institutions in taking broader considerations into account. Fundamental to achieving a robust outcome for managing the conflict, in the sense of substantive and procedural legitimacy, must be the forum in which the debate is held and the style of the discussion and ultimate decision-making process. Failure to get this right will increase the possibility of non-compliance, the need for judicial interpretation of open-ended and

imprecise provisions, and heavy reliance on ex post facto scientific determinations. This places undue burdens on the judiciary and on the scientific community. In an ideal world, the Cormorant-fisheries conflict would be conducted in open, educated and fully participatory debate. Views would be properly argued and contested, science and opinion distinguished, and the process fully participatory. A satisfactory resolution of the Cormorant-fisheries conflict which effectively and appropriated employed science in its law and policy would be difficult and would require significant further effort, but it would be an opportunity to demonstrate that the EU and its conservation policy had finally come of age. Furthermore, addressing the issue of a species considered by some to have become 'over-abundant' is likely to set a precedent for many other environmental situations across Europe.

8.5 Conclusions

The role of science as a contribution to the legitimacy of Cormorant-fisheries conflict management is, as suggested above, both necessary and difficult. In the legal context, science can be used to define legal rights and obligations through legal standard-setting, to justify and challenge contested measures, and assess damage and causation for liability. In addition, as environmental questions become more controversial and more complex, the scientific community may be called upon to give authoritative guidance or determinations through scientific and technical bodies.

There are several key issues to bear in mind arising from the brief review above. There is need for scientific evidence to help manage the Cormorant-fisheries dispute, but also for recognition that current scientific knowledge is patchy and may never be completely certain. This does not invalidate the argument that policy should be science-based, but rather that scientific findings should be treated with caution and respect, and that continuing investigations are necessary to ensure robust policy-making and legal implementation in the future. In addition, using scientific benchmarks for legal standard-setting is problematic and cannot be implemented in isolation from the political domain. Complex decisions should not be left solely to scientific determinations. More broadly, science must be located within the broader matrix of policy and decision-making so that other approaches, values and interests can be properly incorporated. This does not mean the privileging of any particular viewpoint, whether it be bird conservation or the economic viability of fisheries. Rather it means that the legitimacy that science helps to bring to the policy-making and implementation process should be further buttressed by transparent and inclusive procedures that allow all stakeholders to be heard. These procedures should not stay primarily at EU or governmental level but be inclusive of local stakeholders and the general public. This will not avoid the need to make difficult choices and sacrifices, but management of the apparently intractable Cormorant-fisheries conflicts demands nothing less.

Within this apparently intractable conflict, there are a number of active stakeholder groups covering such issues as recreational angling, commercial fisheries, aquaculture, and nature conservation. For these groups the main source of their information on 'Cormorant conflict issues' was shown to be the media (Carss, 2003: 55–57). Thus the next chapter explores media representations of Cormorants and their associated conflicts across Europe.

References

Berlin, I. 2002. Liberty. Oxford, Oxford University Press.

Berlin, I. 1991. The Crooked Timber of Humanity. New York, Knopf.

Bloor, D. 1976. Knowledge and Social Imagery. Routledge.

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169 pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265 pp. http://www. intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Cheyne, I. 2006. Risk and Precaution in WTO Law. Journal of World Trade, 40:5, 837–864.

Corkin, J. 2008. Science, Legitimacy and the Law: Regulating Risk Regulation Judiciously in the European Community. European Law Review, 33:3, 359–384.

Franck, T M. 1988. Legitimacy in the International System. American Journal of International Law, 82:4, 705–759.

Franck, T M. 1990. The Power of Legitimacy Among Nations. Oxford University Press.

Haack, S. 2009. Irreconcilable Differences? The Troubled Marriage of Science and Law. Law and Contemporary Problems, 72, 1–23.

Jasanoff, S. 2006. Transparency in Public Science: Purposes, Reasons, Limits. Law and Contemporary Problems, 69, 21–45.

Jasanoff, S. 2005. Designs on Nature: Science and Democracy in Europe and the United States. Princeton, NJ: Princeton University Press.

Kriebel, D. 2009. How Much Evidence is Enough? Conventions of Causal Inference. Law and Contemporary Problems, 72, 121–136.

Lee, M. 2005. EU Environmental Law: Challenges, Change and Decision-Making. Hart Publishing, Oxford.

Merton, R K. 1973. The Sociology of Science : Theoretical and Empirical Investigations. Chicago University Press.

Oreskes, N. 2004. Science and Public Policy: What's Proof Got to Do With It? Environmental Science and Policy, 7, 369–383.

Parsons, T. 1961. The Social System. New York, Free Press.

Tarlock, A D. 2002. Who Owns Science? Penn State Environmental Law Review, 10, 135.

Weber, M. 1964. The Theory of Social and Economic Organization, Talcott Parsons (ed.), New York: Free Press.

9 MEDIA REPRESENTATIONS OF CORMORANTS: a preliminary analysis

Sandra Bell, Faustas Stepukonis, Jaroslav Boháč and Erik Petersson

9.1 Introduction

The aim of the study reported in this chapter (carried out between 2006 and 2007) is to shed light on how Cormorants are represented in some media sources and to consider what those representations tell us about the construction of a particular human-wildlife conflict common to many European countries.

The media - newspapers, journals, TV, radio broadcasting, e-media — plays an important role in people's lives, supplying information and influencing people's orientation towards cultural, political and natural events. At the same time, media is itself shaped by these events and by people's varied responses to them. By absorbing media representations our prejudices can be reinforced or shattered (Mediaknowall, 2005). Animals portrayed in the media can retain negative connotations, such as Wolves and Coyotes (North America), hyenas (Africa), and 'dirty or scary animals' such as rats, vultures, alligators, sharks, snakes and spiders (Tremblay, 2002). The media can amplify or distort the message that certain scientists seek to convey and therefore intensify an emergent rhetoric[70] of fear, blame and uncertainty. This has consequences for the relationship between science and society, and for the policy-making process (Nerlich & Halliday, 2007).

In relation to European environmental issues, one much-discussed event during the last few decades has been the numerical increase and geographical spread of the Great Cormorant *Phalacrocorax carbo*, a bird that had become unfamiliar in many places due to its previous decline and one which has also colonised new territories (van Eerden *et al*., 1995). Nowadays Cormorants are often regarded as causing problems for fisheries (and forestry) across many European countries (Carss, 2003, Carss & Marzano, 2005, Carss *et al*. 2009). In relation to these conflicts, Carss (2003:55–57) showed that the media was the main source of information on 'Cormorant conflict issues' for many stakeholders in recreational and commercial fisheries, aquaculture and nature conservation. In that work, 'media' included such things as newspapers, magazines, TV, radio, internet, letters of complaint to authorities and associated discussion, of which the so-called popular media accounted for 51% of records. Further, only 16% of these popular media articles that informed stakeholders were actually based on primary scientific publications or discussions around them (Carss, 2003: p.55).

The portrayal of human-wildlife relationships in the media can be studied and analysed and, in the case of Cormorants, important aspects of their representation can be summarised as follows:

- Mass media (TV, newspapers, radio) is the main source of information for many diverse publics. It reflects and helps to form the opinion of society about Cormorant-fishery conflicts over alleged damage to fisheries and to trees.
- Media coverage of the conflict can contribute and influence decision-making processes in political spheres.

[70] Rhetoric refers to communicative devices such as metaphor and narrative that are argumentative and intended to be persuasive. See Stecker and Meyer (2005).



Animals with negative connotations — Hyena *Crocuta crocuta* (top left), Alligator *Alligator mississippiensis* (top right), spiders (bottom left) and vultures (bottom right) — are often considered 'dirty or scary'. Photos courtesy of Shutterstock.

- Analyses of media coverage, given in this chapter, show that the media more or less correctly reflects positions towards Cormorants adopted by local people, specialists, stakeholders and politicians. However, the mis-representation of scientific information (quite common in the mass media) can create ungrounded worries within society.
- Comparing media coverage across countries reveals both commonalities and differences in how Cormorants are perceived and understood.

The study reported here is a preliminary analysis of Cormorants in the media, not necessarily solely as a source of information for interested stakeholders but in order to explain how Cormorant-fisheries interests are portrayed more generally (see also chapter 5 for a discussion of media interest in the development of management plans for 'conflict species'). Treatment of Cormorant-related problems — as they appear in the media — tend to portray various levels of emotions, values and attitudes that often contrast with scientific research. Nevertheless, these values and the language used (see chapter 8) to represent them are important to understand.

In this chapter, **INTERCAFE** participants from the UK, Lithuania, Sweden and the Czech Republic with expertise in ornithology, sociology, statistics and anthropology made a first attempt to examine representations of Cormorant-fisheries issues in the media using quantitiative and qualitative methods. To date very little research has been done on Cormorants with respect to the idea that human-wildlife interaction





Newspapers and television: two of the main sources of information for many people.
Photos courtesy of Shutterstock.

might depend on specific cultural roles played by animals in different communities or societies (Tremblay, 2002). Furthermore, a closer examination of how Cormorant-fishery interactions are portrayed in the media reveals insight into the 'frames' by which these issues are viewed by different 'spokespeople', how these different views are presented (largely through the use of language), and what factors might influence the reliability of the articles under consideration. All this is important if the true nature of European Cormorant-fisheries conflict is to be understood.

9.2 Methods

9.2.1 General approach

Media representations of Cormorants were explored (see 9.3) at a pan-European scale with data from 15 countries (see below). At a national level, representations from the Czech Republic media were collated (as part of a wider study, see 9.6) and compared with opinions gleaned from a regional questionnaire survey.

INTERCAFE participants then were asked to provide 10 of the most recent articles relating to Cormorant issues from their countries by selecting national media articles through *Google*™ by entering the words 'Cormorant, Cormorants' which could appear in the title or content of the articles. However, in some cases, participants selected articles from other widely-used web search sites, or directly from national and regional newspapers, organisation newsletters, hobby newspapers, journals, e-media and other sources when unable to use *Google*™ successfully (see 9.2.3 on data limitations).

A template was provided so that participants could include the following information in association with each article:

1. **Category of media source** 1-national newspaper, 2-regional newspaper, 3-organisation newsletter, 4-hobby newspaper or journal, 5-e-media, 6-other.
2. **Title of media source** (in original language), title of article (in original language), translation of publication title into English.



Here, data collection was standardised through *Google*™ searches where possible. Photo courtesy of Annette Shaff, Shutterstock.

3. **Comment** — a short description (in a few sentences) of the main ideas expressed in the article.
4. Participant's **judgement on reliability of information** 5 - very good, 4 - generally good, 3 - not good/not bad, 2 - generally bad, 1 - very bad.[71]

[71] The three aspects considered here were references to scientific publications, researchers and published reports (grey literature). We are fully aware that the reliability of our ratings was not necessarily objective. The rating was discussed among us, but there were at least three problems: (1) although we tried to perform an unbiased assessment of the articles, our own preconceptions might interfere; (2) language — as the articles were written in different languages it was not possible for us to compare articles from different countries. Rather, we were restricted to summaries in English given by respondents from particular countries; and (3) as some of the articles could be read and understood by only one of us there might be a bias in interpretation. The languages that we understood were: English, Lithuanian, Czech, Danish, Norwegian, and Swedish. Despite these shortcomings, we think that the reliability ranking was useful here. For the 10 articles from Finland reliability could not be agreed upon and so these were assigned 'missing value'.

5. **Details** given in media articles which can be used for **INTERCAFE** (e.g. where there was scientific information that would be useful).

A total of 175 articles published during the period 1997–2007 were identified by participants and sent to the authors. However, we decided to concentrate on articles published between 2002–2007 - a time when Cormorant populations appear to be stabilising in many European countries to reflect more recent opinion. Therefore, 124 articles were selected for analysis from Austria (6.5% of total), the Czech Republic (15.3%), Demnark (2.4%), Estonia (8.1%), Finland (8.1%), Germany (2.4%), Israel (2.4%), Lithuania (8.1%), Norway (5.6%), Poland (6.5%), Serbia (3.2%), Slovakia (5.6%), Slovenia (8.9%), Sweden (11.3%) and the UK (5.6%).

9.2.2 Data analysis

Narrative analysis, a form of discourse analysis, was used to examine how different individuals and groups from ornithological and fisheries sectors used the media to promote their claims, ideas and viewpoints on Cormorants through the use of meta-narratives, which are designed to persuade others of the 'objective truth' of what they themselves are stating. Narrative analysis included an exploration of the rhetoric devices used by different spokespersons in relation to Cormorants and fisheries. Cormorants were described in numerous different ways in the texts examined and, to examine the diversity (and type: positive or negative) of rhetorics used in the articles in relation to different spokespersons, these were clustered into different categories or 'main messages' (for further details see 9.3.3).

The so-called 'reliability' of the articles was determined by **INTERCAFE** participants on a scale of 1 to 5, where 1 = very bad (very unreliable, scientific information misrepresented) and 5 = very good (very reliable, science-grounded information). In eleven instances participants felt unable to judge comfortably the reliability of articles and so no reliability score was determined for these and statistical tests were based on a sample of 113 articles. The relationship (if any) between the apparent 'reliability' of the information provided in the article was then investigated in relation to (a) its year of publication, (b) the media source it is published in, and (c) the type of spokesperson involved, either the person interviewed in the article or the person writing it. Finally, a pan-European overview was generated through a redundancy analysis (ter Braak & Šmilauer, 1998; Jongman *et al*., 1995; Šidák, 1967) which distils all the information obtained into a simple interpretative diagram showing the strongest relationships between factors recorded in the original dataset.

In a more in-depth analysis (see 9.6), using the Czech Republic as a national case study, we examined how the media represents the Cormorant in relation to both the main spokespeople involved in fisheries conflicts and the general public. Here, an exploration of media representation and opinions was carried out through a pilot study in the Třeboňsko Landscape Protected Area and Biosphere Reserve, which looked at the knowledge and views of fisheries, local residents and visitors on Cormorants and their potential management.

9.2.3 Data limitations

There are several limitations to the data presented in this chapter which challenge our ability to generalise from it too widely. As discussed below, despite the theoretical starting point of a *Google*™ search for the words 'Cormorant' and 'Cormorants' in the title of an article, these words were also picked-up in the body of the text of on-line articles from newspapers and other popular publications.

INTERCAFE participants from several countries also reported problems with collecting articles using a *Google*™ search, whilst some country representatives collected more or fewer articles than were represented. Data are thus skewed, with a greater proportion coming from some countries and less from others. Nevertheless, all 15 countries were included in the analyses, regardless of the number of articles provided. To this extent, what is analysed here captures a snapshot generated by a pool of researchers who were making individual, subjective selections while simultaneously, in dialogue with one another, attempting to follow the same guidelines. Whilst being a preliminary analysis and a trial and evaluation of methods, this study is also a first formalised examination of Cormorants in the media on a pan-European scale and some consistent narratives appear to emerge from the specific data which very likely apply to other instances too.

9.3 Narrative analysis of media representations of Cormorants at the pan-European scale

9.3.1 Exploring the material

It was not possible to undertake a full-scale discourse analysis (Gee 1999) on our material because it consisted only of an English translation of the title of the relevant media article and a brief summary (also in English) of each text as supplied by INTERCAFE participants. A comprehensive discourse analysis requires access to the full text of each item in its original language together with competence to recognise tone, register and the cultural resonance of metaphorical references. Nevertheless, despite these constraints, we were able to attempt a less ambitious analysis by examining rhetorical narratives that underlie and connect much of the material. Most of our summaries had sufficient detail that, together with the title or headline, allowed us to identify thematic stories, or narratives. We could therefore examine the rhetorical processes contained within these narratives and study how they asserted competing truths about nature.

Social systems and environmental systems are connected and implicated through human communication. Thus *'the things we say about the environment, the stories we tell about it and the culture we erect within it have significant impact on the reactions we experience from nature'* (Shanahan and McComas 1999). In contemporary Europe, print and electronic media are major vehicles for telling stories about the environment, whether in the form of news reporting or personal opinion pieces. Professional journalists and members of different publics use these media to deploy rhetorical narratives intended to persuade or dissuade one another of the merits or demerits of certain positions, ideas, situations and circumstances.

Narratives are also used to differentiate publics by encouraging people who find themselves in agreement to associate with one another while disassociating themselves from other perceived publics that they disagree with. Stories — and the metaphors they contain — deploy rhetorical strategies that push people towards various directions and values so that they come to adopt similar (or opposing) lines to those of the story teller. In this sense narrative devices form part of the dynamic of claims-making and opinion-forming within social life and have an equally powerful capacity to influence people towards either co-operation or contestation. Clearly, these are important issues to explore in the context of Cormorant-fisheries conflicts specifically, and other human: wildlife conflicts more generally.





Print and electronic media — major vehicles for telling stories about the environment. Photos courtesy of Shutterstock.

Key players

In the debate about the environmental impact of Europe's growing Cormorant population different groups of stakeholders, or publics, engage with written media — electronic and non-electronic — to assert various 'objective truths' about nature: truths that actually rely upon very specific points of view. At its simplest, these different perspectives on Cormorants were found to be held by two main protagonists. The first is composed of commercial fishers, fish farmers, anglers and some fisheries biologists; hereafter referred to as the 'fisheries side'. The second consists of recreational birdwatchers, ornithologists and some conservationists; hereafter referred to as the 'bird side'. The term 'side' is used here to emphasise how the goal of these groups is to persuade decision-makers and members of the wider public of the validity and efficiacy of their own position. The term 'lobby' could have been used instead but, on careful consideration, the current terminology was adopted (even though some members of these groups may proactively promote their group's perspective on the issue).

Variations exist within these groups but in media representations they are obscured by the desire of participants to create an impression of solidarity and agreement: something that is amplified by the tendency of newspapers and other mass media to promote black and white oppositional categories (Anderson, 2003). Each group communicates and elaborates a particular meta-narrative with regard to Cormorants. In the context of environmental discourse, meta-narratives are stories — often cast as moral dramas — through which people propose and advocate their versions of appropriate attitudes and positions to adopt towards nature.

9.3.2 Meta-narratives and media accounts

The fisheries side

Despite differences in the type of fishery — with activities ranging from fish farming to commercial fishing and recreational angling — a single meta-narrative is used by the fisheries side to brand Cormorants as pests across all countries from which we had information. The narrative is generally constructed by projecting anthropomorphic characteristics onto Cormorants to facilitate their portrayal as transgressors of human moral boundaries, especially those surrounding rights of property. The representation of Cormorant's as thieves stealing huge amounts of fish from their rightful owners — the fishermen and fish farmers — is so familiar a characterisation of Cormorants that a regional newspaper in Saxony deploys it ironically in a story about a demonstration by pro-Cormorant lobbyists for which the heading translates *Pirate or Unlucky Fellow?*

In the anthropomorphic headline quoted above, the Cormorant has no chance to be just a bird but can only be seen as one or another type of 'person' having been rhetorically shifted from nature to culture. A similar move is neatly illustrated by a headline from an Estonian national newspaper proclaiming *Cormorants Fall into Disgrace*. The story tells how government officials, under pressure from coastal fishermen, agree to allow the oiling of Cormorants' eggs to prevent hatching: an act calculated as less acceptable to a wider, tax-paying public unless the pill is sugared by a headline stressing the 'moral decline' of Cormorants. According to the logic of the meta-narrative, Cormorants do bad things because they are inherently dishonest, driven by greed. Decisions to shoot Cormorants or despoil their eggs can thus comfortably be read as victims (fishermen) hitting back at villains (Cormorants).

Cormorants' alleged greed often goes unchallenged in media reports where it appears as the main reason for fearing their presence, exemplified by a headline from a Polish regional newspaper *There Won't Be a Single Fish Left* and echoed in a similar headline in a Serbian regional newspaper *Cormorants Destroyed Fish Stock*. The Serbian story tells of desperate fishermen forbidden by legislation to kill their adversaries but instead chasing around Lake Drinsko in boats trying to drive the birds off their fishing grounds. In Finland a regional newspaper — under the headline *Cormorant and Fisherman Fight for Same Fishing Grounds* — reports a fisherman from the Pori-Merikarvia district commenting on the illegal destruction of a Cormorant colony: *'The destroyer was a real nature protectionist. Cormorants do not belong to Finnish coasts.'*

This last story illustrates a particularly interesting and complex scheme whereby the

fisherman imposes his groups' perspective by rhetorically reversing the situation. People who enact and enforce laws protecting Cormorants under environmental legislation (see chapter 7) are imposters. The person who destroyed the Cormorant colony becomes a hero — 'the real nature protectionist'. Moreover, Cormorants themselves are also considered imposters and outsiders, putting them in the same category of 'not belonging' to the locality of the fishery as distant bureaucrats who formulate environmental regulations protecting almost all birds including those that eat fish. The ascription of alien status to Cormorants is particularly notable in countries where Cormorant colonies have returned after a long absence, such as Lithuania (Hampshire *et al*. 2004), or in countries like Israel and the Czech Republic where they are predominantly migratory birds passing through during certain autumn and spring months.

A slightly different rendering of Cormorants as alien birds appears in characterisations of them as unnatural or supernatural, exemplified in the headline from an Estonian newspaper *Cormorant ghosts need management*. In the accompanying story fishermen tell of 'voracious' and 'ghostly' Cormorants coming in the night to 'steal' fish from their traps. Cormorants are also characterised as unnatural because of their seemingly large numbers, making themselves more noticeable by their common habit of hunting in flocks, roosting together and breeding in colonies. 'Overpopulation' and 'over-breeding' are frequently cited as justifications for fear and anxiety. *Large numbers of Cormorants threaten the river Bečva ecosystem in the area of town Vsetín* is a headline from a Czech national newspaper that highlights fears among 'environmentalists and fishermen' that Cormorants are a menace to ecological balance by threatening rare species of fish and taking food from more publically desirable fish-eating species like the Kingfisher *Alcedo atthis* and Otter *Lutra lutra*.

Cormorant predation is also blamed for diminishing the reproductive capacity of commercial fish species and hence for the depletion of stocks. *Alien birds destroy fishes* is the headline in an Estonian national newspaper preceding a story claiming that Cormorants eat 90% of the commercial fish resources in the Väinameri coastal area. The birds' 'alien' nature is dramatically framed as a threat to the demographic integrity of Estonia by comparing the effect of the Cormorants' supposed preference for juvenile fish to the reproductive impact of removing all young girls from the country's villages. A similarly dramatic prediction of doom is relayed in another headline from a Czech national newspaper *Black Death Reaches Chomutov Area*, featuring a story in which fish farmers in North Bohemia petition their regional authority for permission to shoot Cormorants.

Stories claiming Cormorants' detrimental impact on fish stocks proliferate in written media across Europe; it is in fact the most usual story to be told about the result of Cormorant 'criminality'. What is striking is the way that Cormorants tend to be represented as agents reeking havoc upon nature's otherwise smooth operations, even when stories feature rivers artificially stocked with fish for recreational purposes in Slovenia or intensively managed fish breeding and harvesting operations such as the 50,000 commercial fish ponds of the Czech Republic. Very little attention is paid to detailing the management regimes of these highly managed aquatic habitats and their place in the wider ecosystem, even in quotations from spokespersons for the bird side whose observations occasionally find their way into these stories.

The bird side

Because the bird side's communicative strategy almost invariably aims to defend Cormorants against the negative rhetoric of the fisheries side (an interesting finding in itself), it is heavily influenced by it. The bird side is thus forced to construct a counter narrative: one that tries to balance blame heaped on Cormorants by fishers in order to redeem the Cormorant's reputation among wider publics. The direct influence of their opponents' rhetoric manifests in the way that stories told by the bird side attempt to turn the fishers' meta-narrative to their own advantage by making it appear laughably exaggerated and overhyped. One Lithuanian website, for example, has a headline *Cormorants — the Flying Sharks* (www.zvejys.net) even though the article it accompanies suggests fish surveys that implicate Cormorants are often paid for by fishermen's organisations and concludes that Cormorants are an integral component of nature, creating more good than harm in the functioning of wetland ecosystems.

Images of Cormorants as deviants and miscreants, coming from within the anti-Cormorant narrative, have become so pervasive and robust that people seeking to culturally rehabilitate Cormorants (e.g. by stating that they are part of the natural environment) have no choice but to try to disprove its major assertions. In so doing the bird side imitates its opponents by reaching for anthropomorphic images, seeking to create a meta-narrative of the Cormorant as innocent victim and scapegoat for human activities like overfishing, illegal fishing or hydrological mismanagement.

An extreme version of the innocent Cormorant story comes from Lithuania where a website (http://www.kopos.lt/bird/kolon.php) alleges that in the past fishermen attempted to exterminate a Cormorant colony on the Baltic coast. The rest of the piece defends the Cormorant by restoring its rightful place within the 'balance of nature' thus defying the denaturalised version of the fishermen's discourse. Rhetoric works hard to prove the Cormorants' innocence. The killing of trees resulting from the presence of roosting Cormorants and resulting guano production is said to provide an important habit for other species of birds, while the fish that Cormorants drop at their roosting and nesting sites helps support populations of heron and frog. No 'nature red in tooth and claw' here, but a demonstration of numerous interconnected ecological relationships, making sinners out of anyone who dares to disturb its balance by trying to reduce Cormorant numbers for instance.

The Cormorant-as-scapegoat narrative is also used to support the bird's protection, especially those legal safeguards it is supposed to enjoy under the EU Bird Directive; protection that can only be removed by the operation of special derogation by national governments of Member States. The argument sometimes centres around ethical issues but shooting is also said to be ineffective — new Cormorants soon arrive from other vicinities to fill the gap — and its practice nothing more than a ruse to reduce fishermen's anger.

Do not shoot Cormorants is the headline for a story in a Czech national newspaper presenting an atypically balanced account of how, despite the 'damage' to fish farming, shooting Cormorants is not an answer. The story reports on a conference entitled *'Fish ponds of upper Vistula river valley — people, fish, and birds'* where fish farmers and ornithologists were able to 'exchange information' and agree to work together for the good of birds and fish farmers. Thus in new communicative contexts, such as face-to-face dialogue, opposing narratives can be transformed into a shared story of co-operation through which it becomes possible to envisage 'solutions'. A similar tale comes from a Slovenian regional newspaper *'Attempts will be made to find long term solution for Cormorant problems'* recounts how Slovenian anglers and birdwatchers joined together for 35 evenings to undertake a census of Cormorant numbers. That the anglers and birdwatchers' consensus is forged from their fellow feeling as Slovenians — over and above their different perspectives on nature — is broadly hinted by the story's stress on their agreement that many Cormorants come from Croatia to forage the expensively stocked Slovenian fisheries. A new rhetoric opposes Slovenian fish to Croatian Cormorants.

These stories of unanimity between fishers and ornithologists are rare, but noteworthy. A frequent marker of the bird side's counter narrative strategy is to discredit the claims of their opponents, while the fisheries side tends to reserve stigmatisation for Cormorants.

In the context of European Cormorant conflicts, competing meta-narratives about Cormorants are informed by contrasting truths about nature. The dominant narrative surrounding contemporary Cormorant conflicts in Europe seeks to 'de-naturalise' these birds by portraying them as pests (Knight, 2000). The opposing narrative seeks to save them from 'pestisisation' by emphasising their cultural status as a protected wild animal and by creating a 'new' space for Cormorants in natural ecosystems.

9.3.3 Main rhetoric devices used by spokespersons

As some articles contained more than one main rhetorical theme, 185 instances of the use of rhetoric were identified in the 124 media articles analysed. Ten main rhetoric themes emerged from the articles examined, of which half were deemed 'positive' (to Cormorants) and half 'negative'. An eleventh category ('neutral') was used for those articles that appeared to either contain no rhetoric themes or a balance

between positive and negative ones. The rhetoric themes were based on our previous knowledge about how different stakeholders attribute (i.e. characterise) the Cormorant (Carss, 2003). We also added a few additional themes that become obvious when reading the articles or their summaries. One article can also present several, even conflicting, rhetoric themes. For example the Cormorant can be regarded as natural but the author or the people being interviewed might still express fear for what might happen to fish populations in the future. Another example is when both the 'bird side' and the 'fishery side' have been interviewed, then the rhetoric themes from both sides are presented in the article. Overall, each rhetoric theme can be broadly encapsulated in the following descriptions:

- **Innocent:** Cormorants do not have an impact on fish species and/or stocks and/or catches.
- **Other explanations:** The effect(s) (e.g. decrease in fish stocks/catches etc.) are accepted, but the Cormorant is not considered to be responsible for the effect and other factors are argued to be more important (e.g overfishing, pollution).
- **Environmentally friendly:** The Cormorant does not have any negative effect on the environment. Rather, the species has positive effects on ecosystems as a natural top predator.
- **Natural:** The Cormorant is a natural part of the ecosystem.
- **Attractive:** The Cormorant is a beautiful bird and its presence in wetland habitats is thus welcome.
- **Neutral:** Rhetorical words or phrases are either missing from the article or positive and negative rhetoric appear in broadly equal measure and so tend to balance each other out.
- **Greedy:** The Cormorant has unusual and remarkable habits, such as an enormous apetite compared to other bird species.
- **Unnatural:** The argument is that the Cormorant does not belong to the national and/or regional fauna but is an alien species.
- **Disaster:** The messages of the article is that the increase in Cormorant numbers has had a dramatic negative effect on fisheries and ecosystems.
- **Fear:** The focus is on negative expectations for the future. For example, what will happen when Cormorants further increase? What will happen if they start to breed here?
- **Blame:** Statements are made that the Cormorant is the main factor responsible for various negative effects (e.g. desceases in fish stocks/catches etc.).

Overall, in around one-third of instances (31%), the rhetoric used was positive, in around two-thirds (63%) it was negative, and in only a few instances (6%) was it considered neutral (Table 9.1).

Of the five main spokespersons identified for the articles, the highest proportion of 'neutral' articles were from Governmental institutions, followed by 'other' spokespersons, whilst articles where the main spokespersons were anglers, fish farmers or commercial fishers were categorised as neutral in only one article or not at all (see Table 9.2).

For non-neutral rhetoric (Table 9.3A), overall, one-third was positive and two-thirds negative. However, these proportions varied between spokespersons, with around 75% (73 - 79%) of the rhetorics used by anglers, fish farmers and commercial fishers being negative. For governmental institutions and ornithologists spokespersons, the proportions of negative and positive rhetorics used were more balanced with just over half (52 - 56%) being negative and just less than half (44 - 48%) being positive (Table 9.3 A). Overall, the highest proportion of positive rhetoric was used by 'other' spokespersons, followed by commercial fishers (22.4%), and Governmental institutions (13.8%, see Table 9.3 B), whilst the highest proportion of negative rhetoric (35.3%) was used by commercial fishers, followed by 'ornithologist' spokespersons (23.2%) and anglers (19.0%, see Table 9.3B).

Here, our data can be explored in two ways, the relative frequency with which different rhetorics are used by different spokesperson groups and the relative frequency with which each spokesperson group uses different rhetorics. Each rhetoric category was thus first explored in relation to the main spokesperson group associated with it (Table 9.2). The negative rhetoric of 'blame' was most commonly recorded (34% of instances) in articles assigned to commercial fishers, followed by anglers (23%). The rhetoric of 'fear' was most common in articles assigned to ornithologist spokespersons (36%) and to anglers and commercial fishers (23% each), and that of 'disaster' followed a similar pattern for ornithologist spokespersons and commercial fishers (46% and

Table 9.1 The number of instances where the main spokesperson group associated with each article used rhetoric, in relation to each of eleven rhetoric themes (percentages are for each spokesperson group — or all combined — in relation to the themes). 'Positive' rhetoric themes are shaded in green, 'negative' ones in red.

Rhetoric theme	Spokesperson group					Row Total
	Anglers	Fish farmers	Commercial fishers	Governmental institutions	Ornithologists	
Innocent	2 (6.9)	-	2 (3.7)	1 (4.4)	4 (7.1)	9 (4.9)
Other expl.	2 (6.9)	3 (13.0)	5 (9.2)	3 (13.0)	5 (8.0)	18 (9.7)
Env-friendly	-	1 (4.4)	1 (1.9)	-	2 (3.6)	4 (2.2)
Natural	1 (3.4)	1 (4.4)	3 (5.6)	4 (17.2)	6 (10.7)	15 (8.1)
Attractive	1 (3.4)	1 (4.4)	2 (3.7)	-	8 (14.3)	12 (6.5)
Neutral	1 (3.4)	1 (4.4)	-	5 (21.7)	4 (7.1)	11 (6.0)
Greedy	2 (6.9)	3 (13.0)	7 (13.0)	-	-	12 (6.5)
Unnatural	-	-	3 (5.6)	-	1 (1.8)	4 (2.2)
Disaster	-	1 (4.4)	4 (7.4)	2 (8.7)	6 (10.7)	13 (7.0)
Fear	5 (17.2)	3 (13.0)	5 (9.2)	1 (4.4)	8 (14.3)	22 (11.9)
Blame	15 (51.7)	9 (39.1)	22 (40.7)	7 (30.4)	12 (21.4)	65 (35.1)
Column Total = 100%	**29**	**23**	**54**	**23**	**56**	**185**

Table 9.2 The number of instances where different rhetoric themes were used in media articles, in relation to the main spokesperson group associated with each article (percentages are for each theme in relation to spokesperson groups). 'Positive' rhetoric themes are shaded in green, 'negative' ones in red.

Rhetoric theme	Spokesperson group					Row Total = 100%
	Anglers	Fish farmers	Commercial fishers	Governmental institutions	Ornithologists	
Innocent	2 (22.2)	-	2 (22.2)	1 (11.1)	4 (44.4)	9
Other expl.	2 (11.1)	3 (16.7)	5 (27.8)	3 (16.7)	5 (27.8.)	18
Env-friendly		1 (25.0)	1 (25.0)	-	2 (50.0)	4
Natural	1 (6.7)	1 (6.7)	3 (20.0)	4 (26.7)	6 (40.0)	15
Attractive	1 (3.4)	1 (4.4)	2 (3.7)	-	8 (14.3)	12
Neutral	1 (9.1)	1 (9.1)	-	5 (45.5)	4 (36.4)	11
Greedy	2 (16.6)	3 (24.9)	7 (58.1)	-	-	12
Unnatural	-	-	3 (75.0)	-	1 (25.0)	4
Disaster	-	1 (7.7)	4 (30.8)	2 (15.4)	6 (46.2)	13
Fear	5 (22.7)	3 (13.6)	5 (22.7)	1 (4.5)	8 (36.4)	22
Blame	15 (23.1)	9 (13.8)	22 (33.8)	7 (10.8)	12 (18.5)	65
Column Total = 100%	**29**	**23**	**54**	**23**	**56**	**185**

Table 9.3 The number of instances where either positive or negative types of rhetoric themes were used in media articles, in relation to the main spokesperson group associated with each article. Percentages (given in brackets) refer to (A) the proportion of either positive or negative rhetoric types attributable to different spokesperson groups, and (B) the proportion of positive or negative rhetoric types used by each spokesperson group. 'Positive' rhetoric themes are shaded in green, 'negative' ones in red.

(A) Type of rhetoric theme	Spokesperson group					Total = 100% by row
	Anglers	Fish farmers	Commercial fishers	Governmental institutions	Ornithologists	
Positive	6 (10.3)	6 (10.3)	13 (22.4)	8 (13.8)	25 (43.1)	58
Negative	22 (19.0)	16 (13.8)	41 (35.3)	10 (8.6)	27 (23.3)	116

(B) Type of rhetoric theme	Spokesperson group					Total
	Anglers	Fish farmers	Commercial fishers	Governmental institutions	Ornithologists	
Positive	6 (21.4)	6 (27.3)	13 (24.1)	8 (44.4)	25 (48.1)	58 (33.3)
Negative	22 (78.6)	16 (72.7)	41 (75.9)	10 (55.6)	27 (51.9)	116 (66.7)
Total = 100% by column	**28**	**22**	**54**	**18**	**52**	**174**

31%, respectively). The rhetoric of 'greed' was used mostly in articles assigned to commercial fishers (58%), fish farmers (25%) and anglers (17%) and was not used at all in articles where Governmental institutions and ornithologists were considered to be the main spokespersons. Finally, the 'unnatural' category was the least used negative rhetoric, being recorded in only four instances. Three of these (75%) were in articles attributed to commercial fishers, the remaining instance was attributed to ornithologists spokespersons (Table 9.2).

The positive rhetoric of 'other explanations' for problems some think to be caused by Cormorants was most common in articles assigned to ornithologist spokespersons and to commercial fishers (28% of instances each), followed by Governmental institutions and fish farmers (17% each). The rhetoric that Cormorants are a 'natural' part of ecosystems was used mostly by ornithologist spokespersons (40% of instances) and Governmental institutions (27%), whilst the rhetoric that Cormorants are 'attractive' was used mostly by ornithologist spokespersons (67% of instances) and commercial fishers (17%). That Cormorants are 'innocent' and do not have an impact on fish was mostly used by ornithologist spokespersons (44% of instances) and by commercial fishers and anglers (22% each). Finally, the rhetoric of the Cormorant being 'environmentally friendly' was the least used of the positive rehetorics (in four instances), being used by ornithologist spokespersons (50% of instances) and by commercial fishers and fish farmers (25% each, see Table 9.2).

The use of different rhetoric by the main spokesperson groups assigned to each media article could also be explored (Table 9.1). Here, the instances of the use of rhetoric were highest (56 instances) in articles assigned to ornithologist spokespersons. The most commonly used rhetoric was 'blame' (21% of instances), followed by 'fear' of Cormorants and their 'attractive' qualities (14% each) and the rhetorics that the birds were a 'disaster' to ecosystems and a 'natural' part of them (11% each). Commercial fishers most often used the rhetoric of 'blame' (41% of instances), followed by the rhetoric that Cormorants are 'greedy' (13%) and that they induced 'fear' and that there are 'other factors' resonsible for the problems some think are caused by Cormorants (9% each). Fewer instances of the use of rhetoric were recorded for other groups of spokesperson. Of these, articles attributed to anglers most often used the rhetoric of 'blame'

(52% of instances), followed by 'fear (17%) and 'greed', that 'other factors' besides Cormorants are more important, and that Cormorants are 'innocent' (7% each). Fish farmers again used the rhetoric of 'blame' most commonly (39% of instances), followed by 'fear', 'greedy' and 'other factors' (13% each), whilst Governmental institutions most commonly used 'blame' (30% of instances), followed by being 'neutral' (22%) and considering Cormorants to be a 'natural' part of the ecosystem (17%, see Table 9.1).

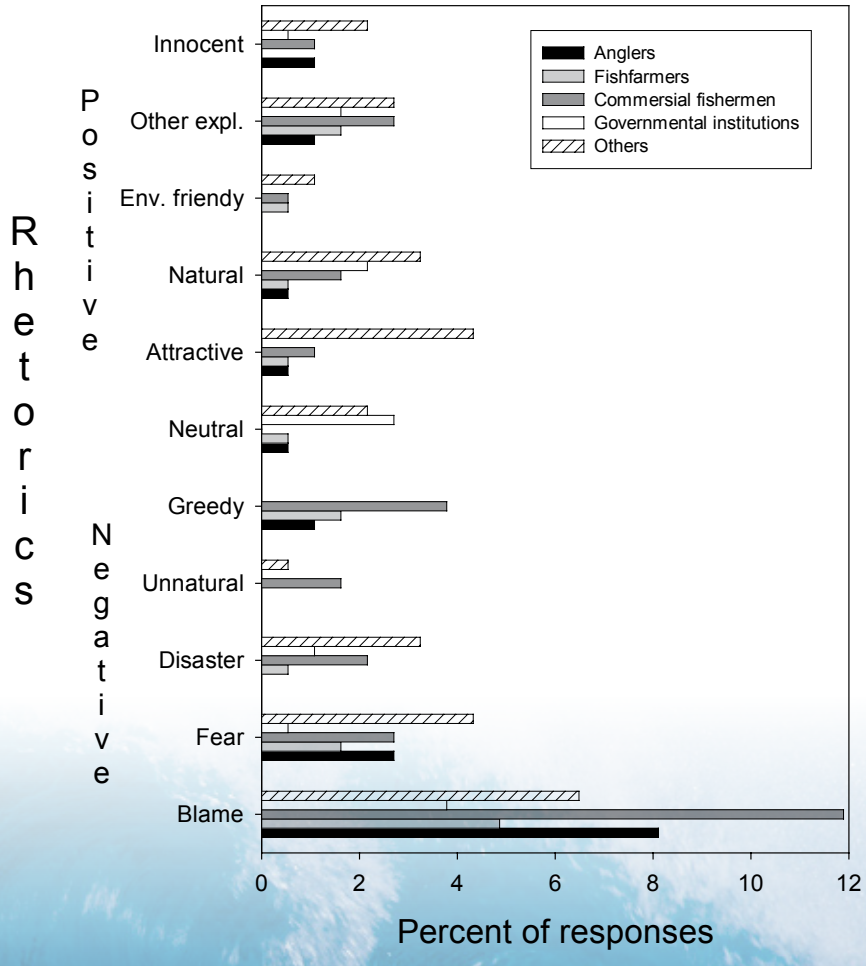
In summary (Figure 9.1), all spokespersons mostly used the negative rhetoric of 'blame' in relation to Cormorants. This use of 'blame' rhetoric may be counter-intuative in relation to articles assigned to ornithologist spokespersons who might be considered to be more 'pro-Cormorant' than others. However, presumably the use of rhetoric is context-specific. For example, an ornithologist article could mention/discuss the issue of 'blame' before addressing why this is not considered appropriate. Thus an article assigned to an ornithologist spokesperson may be recorded as using the rhetoric of 'blame' but it could do so as a report of what others are doing rather than as a statement of the beliefs of the spokesperson themselves. After 'blame', the three fisheries-related spokesperson groups in general used a range of negative rhetoric (particularly 'fear' and 'greedy') but they also used most of the positive rhetoric too (in particular 'innocent' and 'other factors') on occasion. The ornithologist spokespersons similarly used almost all rhetoric (both positive and negative) to some extent and, after 'blame', particularly used 'fear', 'attractive', 'disaster' and 'natural'. Spokespersons for Governmental institutions also most commonly used 'blame' but they used 'neutral' rhetoric more than did any other group. They also tended to use 'positive' rhetoric more frequently, particularly those of 'natural' and 'other factors'.

Interestingly, positive rhetoric is most often used by 'Others' (a category consisting of nature conservation NGO's and similar groups) but this category also uses negative rhetoric, which indicates two things. First, the category is not homogenous consisting of ornithologists/bird lobbyists, other environmental NGOs, and people with no clear stand-point. Second, ornithologists can also be concerned about the increase of Cormorants and how it will affect other bird species and/or habitats.

9.4 The 'reliability' of media articles

In the three figures that follow, what is of interest for each variable (i.e. six years of publication categories, 5 different media sources, and 5 main spokesperson groupings) is two-fold. First, how the range of 'reliability' ratings given to each article is spread

Figure 9.1 Main rhetoric themes used by different main spokesperson groups in media articles about Cormorants (N = 185 records).



for each category of variable and second, how the spread of reliability ratings differs (if at all) between the categories (i.e. year, source, and spokesperson). These 'spreads of reliability' tell us how much variability there was within participants' attempts to score 'reliability' and allow us to determine whether there are significant differences in ratings between the different variables under consideration. Whether or not these spreads of reliability ratings do indeed differ between categories is determined by a statistical test (the result of which is provided in the figure's legend). The spread of reliability ratings within each category is best represented by the figure itself, each of the five (or six) categories having an associated 'box and whisker' diagram. Whilst to the untrained eye these might seem complicated they are, in fact, relatively easy to interpret.

Within each category, the spread of reliability ratings (the figure in the standard box — the sample size — tells how many ratings were given in each category). The spread can be sub-divided into quartiles or percentiles each holding one quarter or 10%, respectively, of the ratings. As we are interested in the shape of this spread, that is, where the ratings lie, it is common to show the 'middle' half of this spread by a shaded box. The first 25% of the ratings lie to the bottom of the box, the box itself is bounded at the bottom by the so-called 1st quartile and at the top by the 3rd quartile. The last 25% of the ratings lie outwith and above the box. As the data in question here are not Normally distributed, the centre is denoted by the 'median' represented by a horizontal line within the shaded box. This median is not the average of all the ratings within a category but is the middle point seperating the lower half of the ratings' spread from the upper half. In some cases it is useful to know a bit more about the spread of data (i.e. ratings) beyond the 'middle half' represented in the box, and this can be done by the use of so-called 'whiskers' — vertical lines leading from the shaded box upwards and downwards. In the figures that follow, these lines represent the spread of the 10th to 90th percentile, that is the spread of 80% of the reliability ratings (i.e. all but the lowest and highest 10%).

9.4.1 Reliability by year of publication

There was no decreasing or increasing trend in the reliability ratings over the 6 years for which media articles were available (Figure 9.2). However there were differences between years caused by generally lower reliability ratings for articles published in 2002 and 2003, although the relatively small sample sizes in these years (n = 4 and n = 6, respectively) may have contributed to this. If these first two years are excluded, the remaining years do not differ ($\varkappa^2 = 7.57$, p = 0.056). Overall then, the articles available in this study were considered to be reasonably reliable or better, having ratings of 3 and upwards.

9.4.2 Reliability by media source

The reliability ratings assigned to articles by **INTERCAFE** participants were compared across five different categories of media source (Figure 9.3) Articles from different media

Figure 9.2 Reliability of the media information (N = 113 instances), as categorised by INTERCAFE participants, in relation to year of publication. Reliability ratings are from 1 = very bad to 5 = very good. Numbers in boxes indicate sample sizes (number of articles). No trends were apparent over the study period but there were differences between years (Kruskal-Wallis test: $\varkappa^2 = 11.94$, p = 0.036).

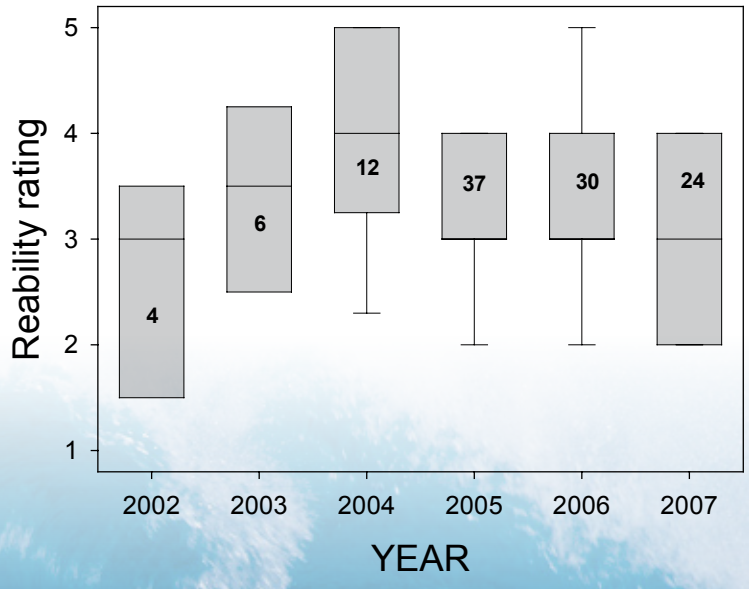
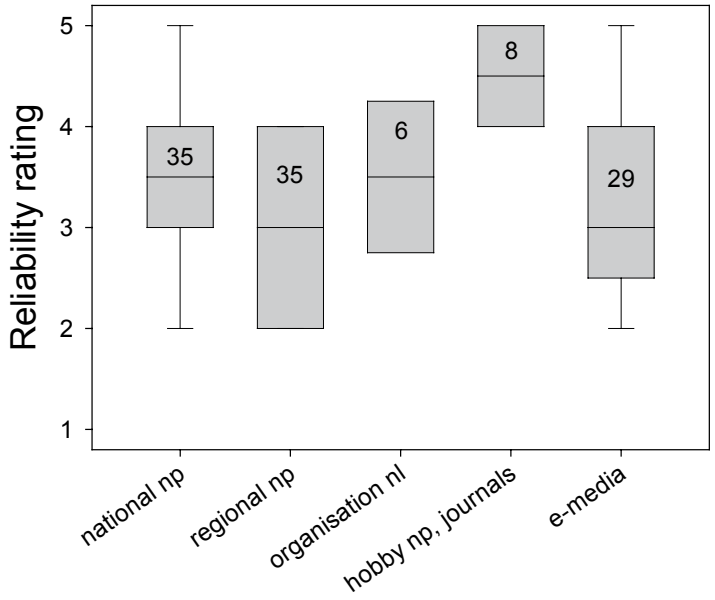


Figure 9.3 Reliability of the media information (N = 113 instances) as categorised by INTERCAFE participants in relation to category of publication (media source). Reliabilty ratings are from 1 = very bad to 5 = very good. Numbers in boxes indicate sample size (number of articles). The media sources differed in their reliability ratings (χ^2= 13.51, p = 0.009).



sources were assigned different reliability ratings, with those from hobby newspapers (published by untrained 'journalists') having the highest rating (i.e. thought to be the most reliable). However, the number of articles in this category is relatively small and this finding could be a result of the low sample size. A convincing explanation for this finding could be that people writing such articles are interested in the subject and spend time in researching arguments and facts from different sources, which might result in a presentation where rhetoric is minimised, or where positive and negative rhetoric are balanced. If the two categories with fewest observations are excluded (organisation newsletters and hobby newspapers and journals) the remaining media source categories do not differ in their estimated reliability (χ^2 = 0.96, p = 0.618).

9.4.3 Reliability by main spokesperson

Spokespersons are the professional groups, interest groups, institutions or organisations that, via the media, are able to express their standpoint. For this study, spokespersons were classified as follows:

Anglers: People that undertake sport fishing, non-commercial fishing, recreational fishing (i.e. fishing for pleasure or competition). This group is identical to 'Recreational' in the REDCAFE final report (Carss, 2003).

Commercial fishermen: People who catch fish (and other seafood) for commercial profit (for a living, it is their profession), in our case mostly from exploiting wild fish populations (but also fish from stocking programmes where the fish are stocked in natural waters). This group is identical to 'Commercial' in the REDCAFE final report (Carss, 2003).

Fishfarmers: People who commercially rear fish in outdoor ponds (rarely outdoor tanks) or off-shore cages. This group is identical to 'Aquaculture' in the REDCAFE final report (Carss, 2003).

Governmental: Legislators, administrators and arbitrators in the administrative bureaucracy who control a state (or a part, region of a state). This group was not identified in the REDCAFE final report (Carss, 2003).

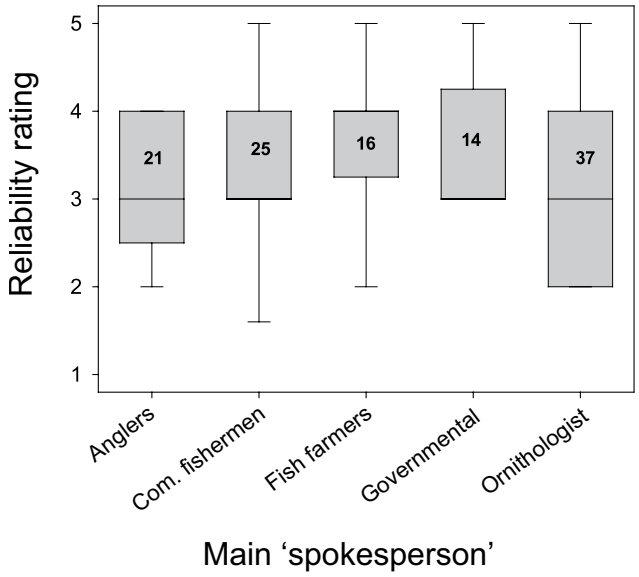
Ornithologist: This is a mixed group of spokespersons, representing slightly different interests. The majority represents the branch of zoology concerned with the study of birds and/or people that study birds as a recreational activity (i.e. 'bird-watchers'). In many cases, however, it was difficult to distinguish between 'pure' ornithologists and environmentalists (i.e. those in a non-governmental social movement concerned with issues of environmental conservation). For this reason, this spokesperson category includes both groups. This group is probably very similar to the 'Nature Conservation' stakeholder group in the REDCAFE final report (Carss, 2003). For the Czech study at the national level (see 9.6), the term 'Nature conservationists' was used instead of 'ornithologist'.

In most cases it was easy to classify the spokesperson in an article, for instance if a bird-watcher was interviewed in a bird magazine, the spokesperson was classed as

an 'ornithologist' according to the definition above. If, on the other hand, a national or regional newspaper is interviewing both fishermen and ornithologists, classification becomes more problematic. First we tried to identify the main spokesperson, for example if the heading of an article says *'The Cormorant threatens the commercial fishing in our region'* the main spokesperson is clearly shown. If an ornithologist is cited in the body of text saying 'there is no clear evidence and more studies are needed', this does not change the fact that the spokesperson for the article is a commercial fishermen. In some rare cases, two spokespersons were identified in one article.

The reliability ratings assigned to articles by **INTERCAFE** participants were compared across five different categories of spokesperson (Figure 9.4). For anglers, the 90th percentile was within the range of the third quartile, for commercial fishermen and fish farmers the median had the same value as the third quartile, and for Governmental institutions the 10th percentile was within the range of the first quartile and the median had the same value as the first quartile. For the 'ornithologist' category, the 10th percentile was within the range of the first quartile. Perhaps surprisingly, no differences were apparent between the reliability ratings assigned to articles associated with (or produced by) people from the different spokesperson categories.

Figure 9.4 Reliability of the media information (N = 113 instances), as categorised by INTERCAFE participants, in relation to the main 'spokesperson' identified for the article. Reliability ratings were from 1 = very bad to 5 = very good. Numbers in boxes indicate sample size (number of articles). Different categories of 'spokesperson' do not differ in the reliability ratings assigned to the articles associated with, or written by, them ($\chi^2 = 6.44$, $p = 0.168$).

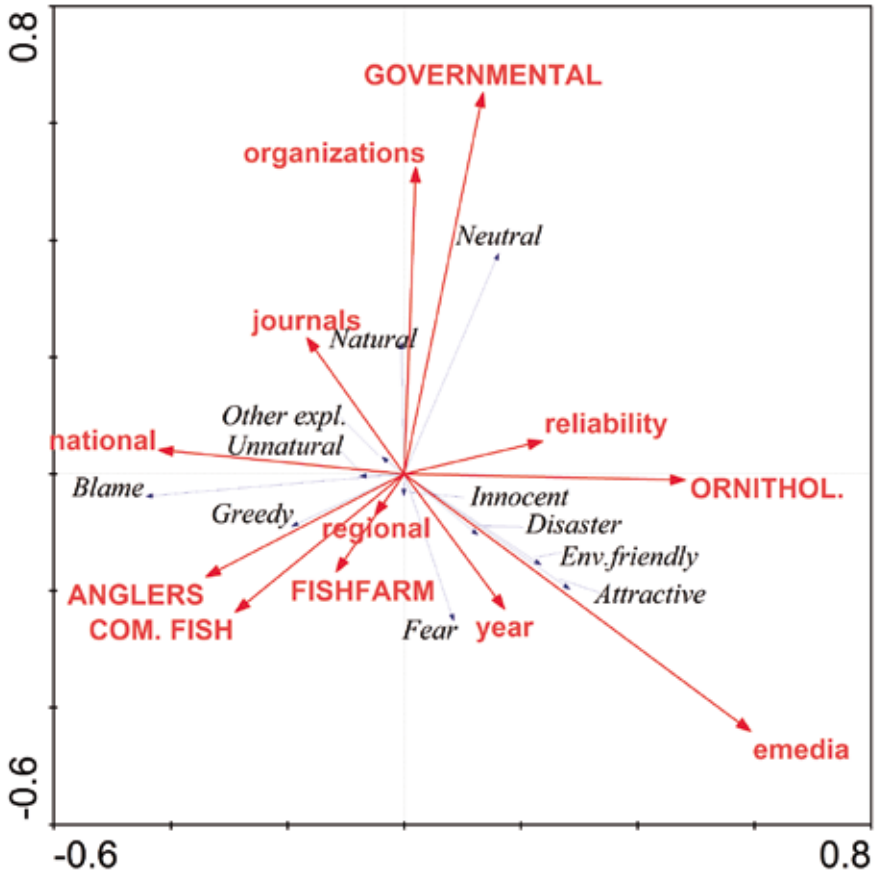


9.5 pan-European summary

All the information from the previous figures (9.1–9.4) can be distilled into a simple interpretative diagram (Figure 9.5) that shows the strongest relationships between factors recorded for the articles under investigation . This figure does not show every relationship but focusses on the main ones emerging from the analysis. It thus gives a general picture of the strongest relationships between spokesperson groups, the media sources they use, the year of publication, and the range of rhetoric used. In Figure 9.5, arrows in the redundancy analysis show the relative importance of this factor: the longer the arrow, the more important its corresponding factor in explaining variation within the overall dataset. The angles between arrows can be used to indicate correlations (or covariance) that is, the 'degree of relatedness' between factors.

Spokespersons form three distinct groups: Governmental institutions stand alone from the rest (top of Figure 9.5), whilst ornithologist spokespersons appear separate (far right) from the three fisheries-related groups which are clustered closely together (bottom left). Thus anglers, fish farmers and commercial fishermen are grouped together and are almost exclusively the spokepersons that use 'greedy' as rhetoric in their arguments against the presence of Cormorants at their fisheries. Their opinions appear to be mostly published in the regional media. The rhetorics of 'blame' and 'fear' are also used by these three groups, but the lesser degree of relatedness indicates that the other groups also use these rhetorical categories — although probably less commonly. Governmental institution rhetoric is most often 'neutral' in the analysis, and the rhetoric of the 'natural' place of Cormorants in ecosystems is also associated with this group of spokespersons.

Figure 9.5 Redundancy analysis showing relationships between (i) main 'spokesperson' groups, (ii) media sources and year of publication, and (iii) the rhetorical theme used. NOTE: Red upper case words indicate spokesperson groups (see text): GOVERNMENTAL. = governmental institution; ANGLERS = anglers/ sportfishing; FISHFARM. = fish farmers; COM. FISH. = commercial fishermen; ORNITHOL. = ornithologists, environmentalist and similar NGOs. Red lower case words indicate different descriptive variables: journals = publications published weekly or less often, emedia = websites or publications only exposed electronically, regional = regional newspapers, national = national newspapers, organisations = magazines or similar published by an organisation (NGOs or other spokepersons), year = year of publication, reliability = reliability of information (as described in section 9.2.3). Black words indicate response variables, in this case the occurrence of eleven rhethorical devices used to describe the Cormorant (see section 9.3.3).



Rhetoric that categorises Cormorants as 'disastrous', 'environmentally friendly' and 'attractive' are most apparent in articles in the electronic media. Rhetorics such as 'innocent', 'unnatural', and 'other explanation' are used less commonly than others. The number of electronic articles concerning Cormorants has increased during the years covered by the research, perhaps illustrating that the internet-based media is increasing in importance. The reliability of the publications was most positively related to the ornithologists, i.e. this heterogeneous group presented the most scientifically sound view of the Cormorant according to our categorisation. Surprisingly no other spokesperson groups were assigned the same degree of reliability — anglers, commercial fishermen and fishfarmers tended to have lower rankings in relation to reliability: these spokesperson categories also tended to use terms like 'greedy' more frequently when describing the Cormorant. Governmental institutions and publications from NGO's tended to describe the Cormorant as neutrally as possible, within the categories explored here at least.

9.6 Media representations of Cormorants in the Czech Republic

Here, the Czech Republic is taken as a case study to examine in more detail how the media represents the Cormorant in relation to the main spokesperson groups. This media representation is also compared with a small pilot study carried out in the Třeboňsko Landscape Protected Area and Biosphere Reserve, which looked at the knowledge and views of fisheries, local residents and visitors on Cormorants and their potential management. The views of visitors here are important because nature and its flora and fauna, including birds, is one of the main tourism pillars in the Czech Republic and such protected areas thus benefit because they are extremely attractive for tourism (Vítek & Pešout, 2010).

One of the authors (JB) was conducting a pilot study of the key stakeholders in Cormorant-fisheries conflicts in the Czech Republic,[72]

[72] 'Biological, economic and sociological tools for assessing Cormorant conflict resolution at different scales in the Czech Republic' — supported by the Ministry of Education, Youth and Sport of CR.

offering a good opportunity to explore media representations in one country in more detail than the pan-European exploration described earlier. An important reason for this study was that fish farmers did not appear to have their media-borne messages reflected by broader public opinion, outside their local area at least. Whilst this could be related to an outsider's lack of personal experience of either Cormorants or the damage they are claimed to do, it could also be due to the low level of relevance the Cormorant-fishery issue has to many people's lives.



Harvesting fish at a Czech fish pond. Photo courtesy of Shutterstock.

The same methods were used here as before (see 9.2). The words 'Cormorant' and 'Cormorants' were put into the *Google*™ search engine to find media articles, but no limitation was placed on the number of articles that were collected nor on the date of publication. In total, 51 articles published in national newspapers between 1998–2007 were examined.

9.6.1 Narratives and rhetorics

As highlighted by Seiche (2003) and Seiche *et al*. (2012) and explored in chapter 13, fish pond aquaculture has a long history in the Czech Republic. Until the beginning of the last century, fish farming was primarily extensive and the problem with fish-eating birds was not considered to be too important. Moreover, fish-eating predators such as Otters *Lutra lutra* and fish-eating birds were strictly controlled up to the middle of the 19th Century. Cormorants were thus a very rare and protected species in the Czech Republic by the second half of the 20th century. However, media coverage of Cormorant-related issues increased during 1998–2007 with the greatest coverage in 2007. This trend may indicate that the Cormorant-fisheries conflict is becoming more apparent, and therefore more newsworthy, as Cormorant numbers are increasing in the Czech Republic (see Seiche, 2003).

The most common spokespersons in the Czech Republic media were fish farmers (about 90% of the articles analysed). Around 10% of the articles were based on information from ornithologists, nature conservationists or prepared from other sources (e.g. parliament, government officials). In this sample of the Czech media, there was a general absence of certain categories of spokespersons such as academics and members of the general public. Fewer positive rhetorics were found in the Czech Republic sample of media articles than in the pan-European one explored in section 9.3.3, with those claiming Cormorants to be 'innocent', 'environmentally friendly' and 'attractive' being absent in the Czech media. Overall, in the Czech media sample, the majority (73%) of instances were of negative rhetoric, followed by positive rhetoric (17%) and in ten percent of instances it was considered 'neutral' (Table 9.4).

Of the three main spokespersons identified for the articles, the highest proportion of 'neutral' ones (83% of instances) was for those assigned to 'nature conservationists' spokespersons, the only other record being a single instance in an article assigned to fishfarmers (Table 9.5).

For non-neutral rhetoric (Table 9.6), overall 18% of this type of rhetoric (54 instances) was positive and 82% was negative (Table 9.6B). Articles assigned to fish farmers and 'nature conservationist' spokespersons had similar proportions of negative rhetoric (around 80% of

Table 9.4 The number of instances where the main spokesperson group associated with each Czech Republic media article used rhetoric, in relation to each of eleven rhetoric themes (percentages are for each spokesperson group — or all combined — in relation to the themes). 'Positive' rhetoric themes are shaded in green, 'negative' ones in red.

Rhetoric theme	Spokesperson group			Row Total
	Fish farmers	Governmental institutions	Nature conservationists	
Innocent	-	-	-	-
Other expl.	1 (2.9)	-	1 (5.3)	2 (3.3)
Env-friendly	1 (4.4)	-	2 (3.6)	4 (2.2)
Natural	1 (2.9)	-	1 (5.3)	2 (3.3)
Attractive	-	-	-	-
Neutral	1 (2.9)	-	5 (26.3)	6 (10.0)
Greedy	1 (2.9)	-	2 (10.5)	3 (5.0)
Unnatural	1 (2.9)	-	-	1 (1.7)
Disaster	1 (2.9)	-	-	1 (1.7)
Fear	4 (11.4)	2 (33.3)	5 (26.3)	11 (18.3)
Blame	20 (57.1)	4 (66.7)	4 (21.0)	28 (46.7)
Column Total = 100%	**35**	**6**	**19**	**60**

Table 9.5 The number of instances where different rhetoric themes were used in media articles from the Czech Republic, in relation to the main spokesperson group associated with each article (percentages are for each theme in relation to spokesperson groups). 'Positive' rhetoric themes are shaded in green, 'negative' ones in red.

Rhetoric theme	Spokesperson group			Row Total = 100%
	Fish farmers	Governmental institutions	Nature conservationists	
Innocent	-	-	-	-
Other expl.	6 (75.0%)	-	2 (25.0)	8
Env-friendly	-	-	-	-
Natural	1 (50.0)	-	1 (50.0)	2
Attractive	-	-	-	-
Neutral	1 (16.7)	-	5 (83.3)	6
Greedy	1 (33.3)	-	2 (66.7)	3
Unnatural	1 (100.0)	-	-	1
Disaster	1 (100.0)	-	-	1
Fear	4 (36.4)	2 (18.2)	5 (45.4)	11
Blame	20 (71.4)	4 (14.3)	4 (14.3)	28
Column Total = 100%	**35**	**6**	**19**	**60**

instances each) whilst all rhetoric identified in articles assigned to Governmental institutions was negative (Table 9.6B). Overall, the highest proportion of positive rhetoric (70% of instances) was given by fish farmers, and the rest (30%) by 'nature conservationist' spokespersons, whilst no instances of Governmental institutions using positive rhetoric were recorded (Table 9.6A). Around two-thirds (61%) of the instances of negative rhetoric were attributed to fish farmers, a quarter (25%) to 'nature conservationist' spokespersons and the rest (14%) to Governmental institutions (Table 9.6A).

As the numbers of instances of the use of rhetoric by both Governmental institutions and 'other' spokespersons was low (Table 9.6B), there was a strong tendency for the media data from the Czech Republic to be dominated by that relating to fish farmers. Consequently, it is not possible to compare the use of rhetoric amongst these three groups too rigorously. Nevertheless, it is very clear that the majority of rhetoric used in media articles was negative, particularly so for the category of 'blame' which was frequently recorded in articles attributed to fish farmers (Table 9.4). Interestingly, in the limited number of instances where rhetoric was recorded for Governmental institutions, it was consistently negative, whilst the limited data assigned to 'nature conservationist' spokespersons was both more frequently neutral than that of the other two spokesperson groups and, when it was non-neutral, tended to be more often negative than positive (Table 9.4).

Table 9.6 The number of instances where either positive or negative types of rhetoric themes were used in media articles from the Czech Republic, in relation to the main spokesperson group associated with each article. Percentages (given in brackets) refer to (A) the proportion of either positive or negative rhetoric types attributable to different spokesperson groups, and (B) the proportion of positive or negative rhetoric types used by each spokesperson group. 'Positive' rhetoric themes are shaded in green, 'negative' ones in red.

(A) Type of rhetoric theme	Spokesperson group			Total = 100% by row
	Fish farmers	Governmental institutions	Nature conservationists	
Positive	7 (70.0)	-	3 (30.0)	10
Negative	27 (61.4)	6 (13.6)	11 (25.0)	44

(B) Type of rhetoric theme	Spokesperson group			Total
	Fish farmers	Governmental institutions	Nature conservationists	
Positive	7 (20.6)	-	3 (21.4)	10 (18.5)
Negative	27 (79.4)	6 (100.0)	11 (78.6)	44 (81.5)
Total = 100% by column	**34**	**6**	**14**	**54**

The primary frame in the Czech media articles examined was that Cormorants create problems for fishermen and fish farmers (Table 9.6). The articles describe how the goverment provides financial compensation for damage to fisheries thought to be caused by Cormorants, and permits the shooting of birds as a form of damage reduction. However, the main message is that these measures are not sufficient because migrating Cormorants originating from outside the Czech Republic (e.g. Poland and other Baltic states) are increasing the damage to fisheries. Increased numbers of Cormorants on migration are said by some to be the result of warmer winters brought on by recent climate change.

Examples of 'neutral' rhetoric were relatively scarce in the Czech media articles which concentrated on mitigation and wider environmental issues. An article describing how *the control of Cormorant numbers by shooting is rising and is officially permitted*,[73] gives the twin message that shooting birds is an option open to people and also that it is not always illegal to do so. Whilst the efficiency of this mitigation measure may not have been discussed in this case, elsewhere it might be. Thus we are told that *the using of pyrotechnics works well against Cormorants*,[74] presumably offering hope that workable solutions are available.

Neutral articles also made the point that Cormorants are not acting on Czech fisheries with any intent due to the fact that damages are small, but that wider environmental issues are at play, whereby *climate change affects the presence of birds and their migration*.[75] Thus, Cormorant presence and resulting predation pressure is shown in a much broader context here, implying that whilst the birds might be affecting local ecology, they themselves are merely being affected by, and responding to, the wider issue of environmental change.

Information about the protection of Cormorants and their aesthetic value is rare in recent Czech media sources. The main positive associations were generally expressed in relation to the renewed presence of the species in the Czech Republic. In some cases this phenomenon is merely stated factually, for instance that *rare species is once again present*.[76] However, in other articles it is seen as having added significance, whereby *conservationists are inspired by the return of Cormorants, absent for a long time*.[77] In this context there is also mention of the *positive phenomenon of Cormorants on rivers in the centre of towns*[78] where, for example, to locals and tourists alike, the birds are considered *attractive to watch in Prague*.

[73] Source: MF Dnes — jižní Čechy (27.10. 2006). MF Dnes is a leading daily newspaper in the Czech Republic.
[74] Source: Litoměřický deník (30.11.2006).
[75] Source: MF Dnes (30.11.2001), Lidové noviny (12.12.2006).
[76] Source: MF Dnes — jižní Morava (3.2.2006).
[77] Source: MF Dnes — jižní Čechy (27.10.2006).
[78] Source: MF Dnes (15.1.2005), Lidové noviny (1.2.2006, 11.7.2006).



Cormorant originally ringed in Finland and shot at a fish pond some 1,750 km to the south-west, INTERCAFE field trip, Czech Republic.
Photo courtesy of **INTERCAFE.**

The main negative associations with Cormorants are expressed in a number of ways. The increasing numbers of birds, mostly originating from countries outside the Czech Republic, is frequently detailed. Here the tenor of articles is that the *overbreeding of Cormorants causes great harm for fishermen*.[79] This also raises the issue that the birds may, in some way, be behaving unnaturally by 'overbreeding'. The great harm caused to fish farmers is often described in articles, such as the instances of *total decimation of fish in some areas*[80] and others where the *original fish species disappeared from rivers due to predation of Cormorants*.[81] Another element to these narratives is often that those whose livelihoods are threatened by Cormorant predation are unable to solve the problem because of the protected status of some of the birds' foraging grounds. Thus we hear that *Cormorants attack fishponds in protected areas and they are claimed to be more devastating than flooding or tsunami*.[82] Associated with this report that Cormorants are foraging in protected areas is some further indication of the perceived scale of destruction caused by the birds. Whilst one solution to the issue of Cormorant predation is financial compensation, there appear to be concerns over the scale of payments where *large (millions) amounts of compensation for fishermen in fishpond areas are made*.[83] In truth, these concerns over large amounts of financial compensation are very probably linked back (either explicitly or not) to the earlier rhetoric that Cormorants are having a catastrophic effect on fishes in fishponds — if the damage is large, then the compensation payments must be too. Finally, not only are Cormorants considered pests but they can also be seen as the carriers or vectors of other pestilence, as in the chilling *possibility of bird flu epidemic due to Cormorants*.[84]

Overall, this exploration showed that a number of main topics were consistently described and/or discussed in the Czech media articles. These were damage to fishponds (n = 10 instances), the decimation of fish communities, including local (and regional) fish species (8), the inadequacy of financial compensation payments (7), the invasive migration of birds, particularly from abroad (7) and the subject of controlled Cormorant regulation through shooting (5). The predominance of these negative issues is believed to relate to the national authority that is given to fish farmers in the Czech Republic as a popular professional group who maintain the country's long tradition of fish farming.

There were several topics that were not found to be covered by the

[79] Source: MF Dnes (11.11.2000), MF Dnes (9.4.2004), Halo noviny (29.11.2006), Českobudějovický deník (3.10.2006), Právo, (13.3.2007).
[80] Source: MF Dnes (18.1.2006).
[81] Source: Právo (21.10.2006), Právo (20.1.2007). Source: MF Dnes (3.4.2001), MF Dnes (27.10.2006).
[82] Source: MF Dnes (3.4.2001), MF Dnes (27.10.2006).
[83] Source: MF Dnes (11.11.2000), MF Dnes (9.4.2004), Halo noviny (29.11.2006), Českobudějovický deník (3.10.2006), Právo (13.3.2007).
[84] Source: MF Dnes 18. 1. 2006).

media in the Czech Republic. These include the position of the state in guaranteeing nature protection (Ministry of the Environment of CR) and its responsibilities to fisheries (through the Ministry of Agriculture of CR). Whilst the position of the state is not clear from the media articles retrieved here, neither is the position of local people and visitors, nor how to mitigate the conflict or, indeed, any discussion of public understanding or opinions about the conflict. Public views are rarely publicised in the Czech media, which may be related to the period of transition to democracy.

Media accounts also demonstrate a lack of information about national or regional management plans for Cormorants that are found in some other EU countries (e.g. Denmark). There is also little published awareness in the media sources examined of conflict management tools that are used elsewhere in Europe. However, the results of scientific research are normally published exclusively on the specialised web sites of the Ministry of the Environment of CR. Also absent are explanations about the results of academic research, as well as information on the levels of environmental knowledge held by members of the general public. In the Czech Republic, there seems to be very little media interest in applied conservation measures, such as the management and mitigation of Cormorant issues (see Czech Republic and the implementation of norms of EU in the environment. Report for DG Environment EU, Global Analysis and Consulting and Charles University in Prague, 2001), whilst any relevant scientific research remains, presumably, largely hidden from the general public, in scientific journals. The question of how 'public opinion' – be it that of local people, tourists or visitors for instance – might differ from (or be similar to) that of fish farmers – the main spokesperson group at the heart of the Czech Cormorant-fisheries conflict – is addressed in the following section.

9.6.2 Comparing the perspectives and opinions of fish farmers and the public

The perspectives and opinions of fish farmers in relation to the issue of Cormorants seemed relatively clear from the examination of media publications. However, as highlighted above, those of the 'public' were not clear because these perspectives were underrepresented, or often not represented at all, by the Czech media. Given this lack of information on public opinion, a pilot study (Boháč *et al*. 2005) in the Třeboňsko Landscape Protected Area and Biosphere Reserve (2005–08) was undertaken. This involved a standardised survey of the views of the public – of both tourists and visitors, and also of the local population and local fishermen on the presence and perceived increase of Cormorants in the area. This area was chosen as it is a region where Cormorant-fisheries conflicts commonly occur. The survey involved questionnaires spread over the three stakeholder groups (tourists and visitors, fishfarmers, local people). The questionnaire (Berman, 2002) was developed to evaluate the sociological aspects of Cormorant conflict and to understand the level of knowledge respondents had about Cormorants, their view on damage caused by them as well as mitigation measures (e.g. financial compensation, shooting). The questionnaire also assessed whether participants supported the preservation of, or a reduction



INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE.**



Historical sign depicting birds and fishes in local lagoons, INTERCAFE meeting, Po Delta. Photo courtesy of **INTERCAFE.**

in, the Cormorant population. In total 180 people were contacted personally and completed a questionnaire. Data were evaluated statistically using the descriptive statistics method (Hendl, 2004).

Details of the respondents and their general views (Table 9.7) show that although there were some differences in the characteristics of the three groups whose opinions were canvassed by the questionnaire in tems of age-structure, level of education, and sex ratio, these were slight. Clearly many of the local population, and the fish farmers themselves, had lived in the area for considerable periods of time and had differing views on the Cormorant-fisheries issue than did people who were merely visiting the area, as tourists and visitors.

The views of fishermen differed from the other stakeholder groups, probably due to their personal experiences with Cormorants in the study area. All fish farmers and 70% of the local population responding to the questionnaire knew about the Cormorant, the conflict with fisheries and had seen the birds in the local environment. In contrast, almost all (90%) of tourists and visitors to the region claimed not to have seen Cormorants in the wild, knowing about them only through the media. Furthermore, 15% of tourist and visitor respondents thought that Cormorants did not occur in the Czech Republic at all.

Both fish farmers and local people were aware of the damage Cormorants were considered to inflict on the fishery. All fish farmers were aware of it and considered the damage 'unbearable', whilst 70% of local respondents also knew about the issue. In comparison, only 15% of tourist/visitors said they knew of the damage caused by Cormorants at fisheries.

The dominant view of fish farmers in relation to mitigating Cormorant damage to fisheries was that birds should be eradicated locally through shooting (67% of respondents), although the remaining respondents did not answer this question. All of the local respondents had a view on Cormorant management and cited a combination of controlled shooting and financial compensation for fish farmers. Two-thirds of tourist/visitors had no view on the issue of Cormorant management, the remainder supported the preservation of the birds but with some form of sustainable reduction of the migratory population.

This pilot study shows that public opinion on the Cormorant issue within the Třeboňsko Landscape Protected Area and Biosphere Reserve is diverse. Indeed, each of the three 'publics' questioned had different views. Whilst local fish farmers and other residents tended to have similar views, the fish farmers generally felt more strongly about the levels of damage inflicted by birds on their fisheries and the control measures needed to reduce or prevent them. In contrast, very few 'outsiders' to the study area had ever seen a Cormorant in the wild and so the tourist/visiting public had little, if any, personal experience of the birds. Only a relatively small proportion of tourists/visitors knew that Cormorants were thought to damage fisheries and most had no opinion on how the birds should be managed locally. Those that did were in favour of some form of sustainable action that continued to protect the birds.

Although the analysis of Czech media articles showed clearly that fish farmers were the predominant media actors, their views did not appear to be well-reflected among members of the broad general public (tourists and visitors) sampled in the study area. However, the views of those living

Table 9.7 Characteristics of stakeholder groups in the Třeboňsko Landscape Protected Area and Biosphere Reserve, and their dominant views as expressed in questionnaire responses.

	Tourists and visitors 60 people completed questionnaires.	**Fish farmers** 60 people completed questionnaires.	**Local population** 60 people completed questionaires.
Characteristics of the three stakeholder groups canvassed	**Age categories** 21–60+ years, with frequency of 10–28% in each category.	**Age categories** 18–60 years, with frequency of 13–30% in each category.	**Age categories** 18–20 years = 13%, 21–30 years = 27%, 31–40 years = 10%, 41–50 years = 23%, 51–60 years = 10%, 60+ years = 17%
	Education basic school (8%) apprentice school (33%) middle school (45%) university level (14%)	**Education** basic school (8%) special school (40%) middle school (53%) university level (7%)	**Education** basic shool (31%) apprentice school (40%) middle school (23%) university level (9%)
	Length of time in area Temporary — short-term visitiors periods of hours, days, or a few weeks.	**Length of time in area** 60% of fish farmers have lived in the locality for more than 10 years, 20% for 6–10 years, and 20% for up to 5 years (mostly young graduates of the University of South Bohemia or of the Middle Fishery School in Vodňany).	**Length of time in area** 73% of local people have lived in the locality for more than 10 years, 10% for 6–10 years, and 13% up to 5 years.
	Sex ratio (m:f) 0.9:1.1	**Sex ratio (m:f)** 1.9:0.1	**Sex ratio (m:f)** 0.9:1.1
General knowledge of the 'problem'	N = 54 (90%) of respondents have not seen Cormorants in the wild and know about the birds only from the media. Nine (15%) think that the Cormorant does not occur in the Czech Republic.	All fishermen have good knowledge about Cormorants and financial compensation awarded for damage.	N = 42 (70%) of respondents have information about the conflict and they know about Cormorants from seeing and experiencing them in the local environment.
Views on damages caused by Cormorant	Nine (15%) of respondents know that Cormorants cause some damage to fisheries.	This group feels that damage to their fishery by Cormorants is unbearable.	Most (n = 42, 70%) of respondents have knowledge of the fisheries damage believed to be caused by Cormorants.
Views on management of Cormorants	Twenty-two (37%) of respondents opted for protection of birds and sustainable reduction of the migrating population.	Most (n = 40, 67%) of respondents opted for reduction of birds by shooting.	All respondents opted for controlled shooting of Cormorants and financial compensation payments for fishermen.



INTERCAFE meeting, Lisbon. Photo courtesy of **INTERCAFE.**

locally did accord more closely with those of the fish farmers. It is thus clear that both the relationship between media spokespersons and the public, and also the ability of the former to influence public opinion generally are complex, and perhaps affected to a considerable degree by personal experience. If fish farmers have influenced public opinion at all, it is probably only that of the local residents who have closer ties to the fish farmers and their fisheries than do those from elsewhere. The fact that very few 'outsiders' had any experience of Cormorants at all and that only about one in seven of them knew of the issue of damage to fish farm stock, suggests several things. Although the media analysis shows that voice is still given to fish farmers in the Czech Republic as a popular group of professionals upholding long-held national traditions, questionnaire responses revealed a general level of ignorance in the broader (i.e. non-local) public at least of Cormorant issues. Furthermore, on the few occasions where opinions on management actions were offered, these were not the actions favoured by the fish farmers themselves because they involved being seen to be compensated financially for the presence of birds. Thus, on the strength of this analysis at least, there is a mismatch between the opinions of fish farmers as expressed both in the wider (regional and national) media and in the local questionnaire consultation and the opinions of those questioned whilst visiting the Třeboňsko Landscape Protected Area and Biosphere Reserve, an area where Cormorant-fisheries issues are actually very pertinent.

9.7 Summary and conclusions

Overall, 124 media articles from 15 European countries were selected for analysis. Three types of analysis were conducted. Firstly the articles were examined to identify how different groups promote their views of Cormorants and their place in nature. This was done through analysis of rhetoric that is presented in meta-narratives or stories aimed to persuade the reader of the robustness and 'objective truth' of particular arguments. This included an exploration of the main rhetoric devices used by different spokespersons. Secondly, a range of statistical analyses examined whether the reliability of articles depended on the type of publication or viewpoint that was presented. The Czech Republic case study followed with a detailed exploration of how different spokespersons represented Cormorants based on 51 media articles. Finally, this was compared with views of three stakeholder groups interviewed in the Třeboňsko Landscape Protected Area and Biosphere Reserve, with particular emphasis on the differences of opinion between fish farmers — the predominant actors in media articles — and the local and broader publics.

Within the media, rather than setting its own agenda, what we called the 'bird side' seems to be limited by its defensive position of having to counter the fishermen's accusations against Cormorants. This may be why the bird side resorts to a meta-narrative of Cormorants as an innocent scapegoat, even though it is not at all credible to fishermen frustrated by the degree of legal protection afforded to the birds. Both groups call on science to support their positions (see the role of science discussed in chapters 3 and 5): the 'fisheries side' to prove the Cormorant's responsibility for the decline in fish stocks and

catches, and the bird side to support its vision of the Cormorant's rightful place as a top predator in wetland ecosystems.

It also appeared that many of the media articles attributed to the bird side are focussed on defending Cormorants, leading to accusations that the fisheries side spokespersons are making exaggerated and implausible claims. Whilst articles attributed to the bird side do sometimes touch on wider environmental issues that might make wetlands more attractive to Cormorants, most of the effort appears to go towards redeeming the Cormorant's reputation. It should also be noted that the bird side is not necessarily all 'pro-Cormorant'; some ornithologists may express worries about the Cormorant supplanting other bird species. In a similar way, environmentalists and nature conservationists may express worries that the Cormorant will have an negative impact on the flora of breeding sites, as the guano (droppings) from the Cormorant kill many plant species. In short, much of the media representations of Cormorant-fisheries issues are polarised, where one side is merely trying to outflank the other. In the articles available to us, neither the fisheries side nor the bird side appeared very often able to produce a more balanced account of the wider situation.

A full analysis of the selected media articles from across Europe shows that the meta-narratives of Cormorant conflicts are ideologically framed to present emotionally-charged contrasting pictures of nature. At its crudest, there are two 'sides' to this. The tactic of the fisheries side, one of criminalisation, is not uncommon in human-wildlife conflicts when animals come to be viewed as vermin or pests (Knight, 2000). Attribution of immoral characteristics to animals makes it easier to justify killing them or, in the case of Cormorants, interfering with their reproductive capacity through destroying nests and eggs.[85] When people turn animals into problems by sharing strongly negative reactions against them, the social outcome is often to consolidate human solidarity and collapse identities. Cormorants thus enable commercial fishers, anglers and some fisheries scientists — who might otherwise concentrate on their differences — to appear united.

The only promising new narrative to emerge is the one that sees the two parties as allies in an effort to better understand the relationship between Cormorants and the wetland ecosystems in which they live. Indeed, many of these ecosystems are considered to be 'damaged' and Cormorant presence in such large numbers there may well be a consequence of this damage and not its cause (see Carss *et al*. 2009, also van Eerden *et al*. 2012 chapter 13). The advancement of this narrative will demand the abandonment of certain cherished representations of Cormorants that each protagonist has enshrined in their current meta-narratives, plus a willingness to replace them with



Local festival celebrating the Carp harvest, INTERCAFE meeting, Saxony.
Photo courtesy of **INTERCAFE.**

[85] Humans have always (consciously or unconsciously) assigned animal species a rank in a hierarchy, with the human at the top. This a view that can be traced back to Aristotle (384–322 B.C.E.). The impressive achievements of chimpanzees (or dolphins) do not make it wrong to kill and eat cows, sheep, pigs and chickens. (cf. Pickering & Norman, 1978). Some animal species might be regarded as 'fellow creatures'; we do eat them and argue that it is important to kill them in a humane way. But for some animal species we use terms like 'vermin' and then it is easier to argue that they must be hunted (cf. Diamond, 1978). There are also policy-makers that argue that 'nature' must be used and managed if mankind is to thrive and survive (cf. Arnold and Gottlieb, 1994).

representations better able to tell more complicated and nuanced stories.

Statistical analysis of the reliability of media materials by year or category of publication showed no significant temporal trend nor any major differences in relation to either the type of media source or to the main spokesperson groups to whom articles were attributed. Analysis of the statements made by different spokespersons showed that 'blame' was the predominant rhetoric device used. The opinions of the fish farmer and commercial fisher groups, mostly published in regional media, appeared similar and these groups almost exclusively used 'greedy' as rhetoric in their arguments. Governmental rhetoric was most often considered neutral, presumably as their task is usually to have a neutral stance in all conflicts, aiming to listen to all sides. Rhetoric such as 'disaster', 'environmentally friendly' and 'attractive' were mostly apparent in electronic media where the number of articles concerning Cormorants has increased over recent years: in 2005 it was 15%, and two years later 40%.

The case study from the Czech Republic showed the dominance of national newspapers among media sources there in terms of the level of coverage of Cormorant issues. The primary media frame was that the Cormorants create problems for fish farmers. Information about the protection of the Cormorant and its aesthetic value was rather sparse. Negative associations prevailed in the material where an analysis of topics covered by articles showed that the main issues discussed included damage to fishpond stock, the inadequacy of financial



Display showing Carp production and fish diversity in ponds, INTERCAFE field trip, Saxony. Photo courtesy of **INTERCAFE.**



A freshly harvested winter Carp from the Czech Republic. Photo courtesy of Shutterstock.

compensations, the invasive migration of the birds (particularly from abroad), controlled regulation (shooting), and decimation of fish communities including local (regional) fish species. Topics not covered in the media included the position (or opinion, or values/attitudes) of the Ministry of the Environment, academics and a range of lay publics. There was also an absence of knowledge on management plans for Cormorants in other countries in Czech media articles, while conflict mitigation techniques were not covered either. This suggests that such information — which might help people to become better informed on both Cormorant issues across Europe in general and on practical management options — is not readily available in the media.

Currently across Europe, print and electronic media are major vehicles for promoting values and opinons about the environment and its inhabitants. Indeed, in relation to the Cormorant-fishery conflicts, Carss (2003:55–57) found that, in the majority of cases, people used the popular media as the main source with which to inform themselves. Thus, 'the media' could be a very important aspect of both understanding and managing such a conflict. The preliminary analysis of media representations of Cormorant-fisheries conflicts given in this chapter provides evidence that much of the coverage is perhaps one-sided. Whilst the over-simplified concept of 'sides' is not always useful in understanding Cormorant-fisheries issues, it seems appropriate here where media articles are very often



attributed to either the fisheries side or the bird side. We found evidence suggesting that the media articles emerging from the fisheries side were used predominantly to amplify concerns that Cormorants were having a negative impact on fisheries through their predation on fish. In many cases, these articles 'criminalised' or 'demonised' the birds and proclaimed that their increasing numbers and voracious appetites were destroying commercial fisheries. The theme of Cormorants being seen as 'alien' and 'not belonging' was also a consistent one. These articles seldom, if ever, considered any negative environmental issues that might arise from fisheries activities and management practices.

Neither was there much evidence, in the in-depth Czech study at least, that wider publics had actually been influenced by any on-going media attention. There could be several reasons for this. First, because opponents were spending all their efforts either attacking each other or defending themselves. Second, because any such balanced approach might be less controversial, thus leading to weaker ties between like-minded individuals and institutions who might have used the Cormorant issues as a unifying rallying-call. Associated with this, any reduction in controversy might lead to less overall coverage by the press who might have used the conflict as a newsworthy one to sell more newspapers and increase their circulation. As much of the media representations of Cormorant issues are polarised, so too are they biased towards particular perspectives through the use of rhetoric. Given the apparent importance of the media as an information source in this context, closer collaboration between the media, researchers and fisheries/ornithological stakeholders could potentially decrease the associated bias — both positive and negative — towards Cormorants and also begin to contribute meaningfully to the management of Cormorant-fisheries conflicts.

One development which might occur relatively quickly and easily could be in the form of popular media articles produced by scientific spokespersons where current ecological information is provided on Cormorant status and distribution, their relationship with wetland ecosystems and, where available, quantification of their damage to fisheries. However, for this to be useful, all interested parties would need to agree with both the scientific data and its interpretation,[86] and given the current polarisation between some stakeholders this seems unlikely at present. For example, one statement from an EIFAC workshop (EIFAC, 2007) claims *'the enormously increased impact of Cormorant predation on fish species conservation and the losses caused to aquaculture pond owners, professional fishermen and anglers has reached unacceptable levels'*. This is far from the standpoint of Bird Life (2011) who have described the action used by fish farmers and fishers as threats to the species because Cormorants are often persecuted by the aquaculture industry and may be shot, drowned or poisoned in attempts to control numbers. Nevertheless, both sides state that collaboration between them is crucial for handling the situation.

Much of this media analysis has involved exploration of the use of rhetoric as a communicative device that argues for a particular perspective or value. Whilst many of the articles described in this chapter have been rather black and white in terms of being either pro- or anti-Cormorant, underlying positions — which are framed by numerous, often diverse, values — emerge as being far from black and white. As the interactions between Cormorants and their environment are complex (e.g. see chapter 9 of Carss *et al.*, 2012 and chapter 12 of van Eerden *et al.* 2012), so too are the expressions

[86] As an example from the UK, see 'Cormorants- the facts' a document produced by the Moran Committee available at: http://www.environment-agency.gov.uk/static/documents/Business/cormorantfacts_234731.pdf

of views between people and institutions when these issues are discussed. This wide variety of so-called ethical views is an important element of the Cormorant-fisheries conflict and, as such, is discussed in detail in the next chapter.

References

Anderson, A. 2003. Media, Culture and the Environment, London and New York: Routledge (originally published 1997 by UCL Press).

Arnold, R, and Gottlieb, A. 1994. Trashing the Economy: How Runaway Environmentalism is Wrecking America, Free Enterprise Press, Bellevue, Washington, 2nd ed.

Berman E. 2002. Seven steps to the participation of public. ANGORA, Mechenice, 95 pp. (in Czech).

Boháč J, Šípová, M, and Roudnická M. 2005. Sociological aspects of Cormorant overpopulation (view of tourists and visitors, local population and fishermen) in Třeboňsko landscape protected area and biosphere reserve (the Czech Republic). In Křiváčková O, Pecharová, E, Frelich, J. (editors): Ecotrend, 2005, Renewal and function of anthropogenic impacted landscape. Proceeding of International scientific meeting. University of South Bohemia in České Budějovice, Faculty of Agriculture, pp.136–140.

Bird Life. 2011. BirdLife species factsheet — Great Cormorant (*Phalacrocorax carbo*). http://www.birdlife.org/datazone/speciesfactsheet.php?id=3679

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169 pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265 pp. http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Bell, S, and Marzano, M. 2009. Competing and Coexisting with Cormorants: Ambiguity and Change in European Wetlands". In Heckler, S (editor) Landscape, Process and Power: A New Environmental Knowledge Synthesis. New York: Berghahn.

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J (editors). 2012. The **INTERCAFE** Field Manual — research methods for cormorants, fishes, and the interactions between them. COST Action 635 Final Report II, ISBN 978-1-906698-08-9.

Diamond, C. 1978. Eating meat and eating people. Philosophy 53(206): 465–479.

EIFAC. 2007. Report of the EIFAC Workshop on a European Cormorant Management Plan, Bonn, Germany, 20–21 November 2007. EIFAC Occasional Paper No. 41

Gee, P J. 1999. An introduction to discourse analysis: theory and method. New York: Routledge.

Hampshire, K, Bell, S, Wallace, G, and Stepukonis, F. 2004. 'Real' Poachers and Predators: Shades of Meaning in Local Understandings of Threats to Fisheries. Society and Natural Resources 17:305–318.

Hendl J. 2004. The review of statistical methods for data evaluation. Portál, Praha, 582 pp. (in Czech).

Jongman, R H G, ter Braak, C J F, and van Tongeren, O F R. 1995. Data Analysis in Community and Landscape Ecology. Cambridge University Press.

Knight, J (editor). 2000. Natural Enemies: People-Wildlife Conflicts in Anthropological Perspective, London and New York: Routledge.

MEDIAKNOWALL. 2005. (http://www.mediaknowall.com)

Nerlich, B, and Halliday, C. 2007. Avian flu: the creation of expectations in the interplay between science and the media. Sociology of Health & Illness 29(1): 17.

Pickering, F L, and Norman, R. 1978. Some Animals are More Equal than Others. Philosophy 53(206): 507–527.

Seiche K. 2003. The conflicts between Great Cormorants *Phalacrocorax carbo sinensis* and Carp fish farming: attempted resolution and strategy in Saxony, Germany. Vogelwelt 124, p.349–354.

Seiche, K, Gerdeaux, D, Gwiazda, R, Lévai, F, Musil, P, Nemenonoks, O, Strod, T, and Carss, D N. 2012. Cormorant-fisheries conflicts at Carp ponds in Europe and Israel — an **INTERCAFE** overview. COST Action 635 Final Report V ISBN 978-1-906698-10-2.

Šidák, Z. 1967. Rectangular confidence regions for the means of multivariate normal distributions. Journal of the American Statistical Association 62: 626–633.

Shanahan, J, and McComas, K. 1999. Nature Stories: Depictions of the Evironment and their Effects: Hampton Press, Cresskil, New Jersey.

Stecker, I, and Meyer, C. (editors). 2005. Rhetoric, culture and theory. Berghan, Oxford.

Tremblay, P. 2002. Tourism wildlife icons: attractions or marketing symbols? Journal of Hospitality and Tourism Management, June 1, 2002. (http://search.informit.com.au/documentSummary;dn=246205691439607;res=IELBUS)

ter Braak, C J F, and Šmilauer, P. 1998. CANOCO Reference Manual and User's Guide to Canoco for Windows: Software for Canonical Community Ordination (version 4). Microcomputer Power, Ithaca, New York.

van Eerden, M R, Koffijberg, K, Platteeuw, M, and Zijlstra, M (editors). 1995. Riding on the Crest of the Wave. Special Issue: Ardea 83 (1): pp.338.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I, ISBN 978-1-906698-07-2.

Vítek O, and Pešout P. 2010. The importance of tourism for nature conservation — a challenge or threat? The Nature Conservation Journal, special issue, 1–7.

10 ETHICAL PERSPECTIVES IN LAW AND PUBLIC DEBATE

Ilona Cheyne

10.1 Introduction

As shown throughout this publication, but particularly in Part Two, Cormorant-fisheries conflicts are essentially conflicts about values. Consequently, an important step towards being able to resolve these conflicts is to gain a better understanding of the values underlying the debate surrounding them (see chapter 9 for some of the rhetoric used in this debate). There is a need for clarity about what values people hold, how important those values are, and how they are prioritised. Some aspects of such an investigation have been explored in the legal texts as part of understanding the law and its operation (see chapters 7 and 8). Here, however, the analysis is about the debate rather than the law itself. Ethical analysis of environmental law and policy is a useful tool for understanding the values and interests that inform the approach of policy-makers and stakeholders to the environment. It is an essential step in trying to understand how conflicts between different values arise and how they might be resolved, and thus it has particular relevance to the long-running and apparently intractable Cormorant-fisheries conflicts. This chapter does not attempt to give a definitive solution but instead attempts to outline a way forward to a better understanding of the conflicts and to identify possible paths towards finding resolutions.

10.2 Background

There are two important aspects of the debate about Cormorant-fisheries conflicts. Firstly, the formation and meaning of the applicable legislation, and secondly the conduct of the debate amongst stakeholders (which is partly described, in the context of the media at least, in chapter 9). Although this chapter focuses on the second aspect, the relevance of ethical analysis to legal texts is also mentioned briefly.

Policy formation and law-drafting are done through the institutional procedures developed in each jurisdiction. In the course of these legislative procedures, different values are typically canvassed, evaluated and prioritised. These values are explicitly or implicitly based on ethical beliefs about



INTERCAFE meeting, Poland. Photo courtesy of **INTERCAFE.**

what is the right way to act, and decisions to act through legislation are therefore underpinned by these ethical choices. In practice, since legislation almost always contains ambiguous language, the meaning and intention of law will often depend on the interpretation of courts developed over time in the context of resolving disputes. Inevitably, therefore, judicial interpretation of legislation will usually involve identifying, interpreting, evaluating and applying the ethical values embedded in that legislation. As noted in chapter 7 on the Wild Birds and Habitats Directives, the interpretation of legal texts involves several techniques, most importantly the literal, contextual and teleological approaches. The literal and contextual approaches give primary importance to the wording of a text, either the strict meaning or the meaning that appears to be the most appropriate in their context.

Both the literal and contextual approaches focus on the role of the judge as a simple interpreter of the political will of the legislator, and they imply that he or she will have no creative role in extending or expanding the law. In contrast, the purposive or teleological approach examines the purpose of the legal text in order to discover how it ought to be interpreted. It therefore gives the judge a much greater role in deciding how the law should be interpreted and how it should be developed in new circumstances. This type of approach tends to be favoured by the Court of Justice of the European Union (the Court) and, in any case, when EU legislation is of open-ended design (which is common



Grayling *Thymallus thymallus* in sub-Alpine river, INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**

in the case of directives), it will demand a purposive approach. As a result, the values embedded in EU legislation are often relevant to our understanding the development, formation, interpretation and application of EU law (see also chapter 7).

There are two approaches that may be used when considering the role of ethics in law and the policy debates that surround it, namely the normative and descriptive approaches. Ethical analysis of law and policy can be normative in the sense of engaging with the ethical arguments and offering a view of what would be the appropriate outcome. Descriptive ethical analysis focuses on the discovery of the ethical values and interests that underlie a debate that appears to be conducted in non-ethical terms. The use of ethical analysis of law and policy in this chapter falls largely within the latter approach. Its purpose is not to argue for a particular outcome but rather to tease out the values and interests that are embedded in the debate. The aim of this kind of analysis is therefore not only to identify implicit assumptions behind these debates but also to clarify the choices that must be made in order to resolve apparently intractable conflicts (see also publications discussed in 18.8).

Whether implicit or explicit, the ethical values underlying any legal instrument will have a significant impact on the legitimacy of the measure, either because those values are widely shared or because the ethical approach adopted is the result of an appropriate and accepted process of decision-making. Given the seemingly intractable controversy that surrounds Cormorant-fisheries conflicts, a search for the ethical perspectives inherent in opposing views offers useful clarification of the values and interests that





Lagoon-reared flatfishes, INTERCAFE field trip, Po Delta, Italy. Photos courtesy of **INTERCAFE.**

underlie the conflict. This would be valuable for at least two interlinked reasons. First, without clarity about the values and interests being advocated and defended, it is difficult to see how the conflict can be resolved or managed in a way that is not simply coercive. Second, greater clarity about the values being defended might also increase the chances of achieving a resolution which is accepted by all sides and is therefore more likely to have practical effect through a high degree of voluntary compliance.

10.3 Elements of ethical analysis

10.3.1 The main schools of thought

Ethical perspectives tend to fall within one or more broad theories or traditions: the Judeo-Christian tradition, utilitarianism, deontology, virtue ethics, biocentrism, and ecocentrism or the land ethic. The Judeo-Christian tradition is based on the idea that human beings have 'dominion' over the world around them. At its worst, it grants power to exploit everything that is non-human without regard for the interests of other species or the environment in general. Indeed, it has been argued that this tradition is at the root of our current environmental woes (White, 1967). However, more recent interpretations of the Bible have promoted the concept of dominion as 'stewardship', thereby seeing human beings as custodians or guardians of the world and giving us duties as well as rights (Passmore, 1974). In legal instruments, this might be recognised by the use of words such as 'custodian', or 'responsibility' or 'ought'.

Utilitarianism is based on the idea that the only thing we can be certain about is that happiness is good and that suffering is bad. An ethically good act is one that maximises happiness (Mill, 1998). This approach requires us to calculate relative and aggregate happiness when deciding what is the right thing to do. It is a consequentialist ethical theory, because it determines whether an action is good or bad by reference to its consequences. It follows that it is possible to intend an action to be good but for it to turn out to be ethically wrong if the consequences are not what were expected. Utilitarianism was originally developed to incorporate human interests but has been extended to other species (most notably by Peter Singer, 1995). There are obvious practical problems with this theory. It is difficult to make the calculation required because of lack of information about what humans want or how the results of our actions (however well-meaning) might turn out. The difficulties of assessing, valuing and privileging the happiness, suffering, or interests of non-human species is even more difficult in this regard. Worse, the reliance on consequence rather than motivation means that repugnant actions that lead to happiness for

some people might be considered to be ethical, such as pleasure derived from torturing animals.

Although utilitarianism is the basis of most decision-making in liberal democracies, it has a significant problem from an environmental point of view because it may fail to protect important values. For example, utilitarianism may permit extinction of a species, acquiesce to inaction in the face of complex risks such as climate change, or tolerate the loss of environmental goods that are only valued by a minority. In practice, therefore, utilitarianism is usually constrained by techniques such as using expert evidence or ring-fencing certain values or rights. Indications of a utilitarian approach include the use of explicit references to happiness, suffering or welfare, or attempts to find a balance between competing interests and values.

Deontology is a theory which is often placed in opposition to utilitarianism, although in practice it is often combined with it. This is an ethical perspective based on the concept of rights and duties rather than consequences. Under this theory, an act may be ethically good because it exercises a right or carries out a duty even if it causes unhappiness or damages some other value or interest. Rights often need to be enshrined in law to have this sort of overriding effect. Unlike utilitarianism, where happiness is treated as a universal and incontrovertible value, rights must be socially constructed. One common way of deciding what rights should be protected is through Kant's famous dictum (2004) that you should do to others what you would wish them to do to you. This sort of social contract of rights, however, makes it difficult to give rights to non-human species or to the environment in general. Kant himself did not think that animals had rights but only that people should treat them well because otherwise we would coarsen our own natures.

However, a rights-based ethical theory has been extended to animals, most notably by Tom Regan (2004). This development of the theory raises difficult questions about the relative importance of rights of different species, particularly in cases of conflicts between the rights of humans and non-humans. In addition, one of the most important criticisms of a rights-based approach to the environment is that it only recognises rights of individuals. This means that it favours individuals over species, even in cases where a species might be in danger of extinction. Indications of this kind of approach would include phrases such as 'have the right to', 'duty to recognise' or 'equal rights'.

Virtue ethics is concerned with attaining *telos*, that is to say, being allowed to flourish naturally (Hill, Jr, 1983). Unlike utilitarianism and deontology, this tradition of ethics focuses on the motivation behind an act. In this school of thought, an act is ethical if it is done for the right reasons even though it turns out badly, so it encourages us to try to do our best even though we cannot always control or predict the consequences of our actions. In environmental terms, virtue ethics accommodates scientific, social and economic uncertainty, and it condemns unnecessary causing of harm such as suffering or waste. It allows us to make sacrifices as a matter of principle. However, virtue ethics also excludes doing the right thing for the wrong reason. It may, for example, exclude pest control being achieved as a type of sport. Indications of this kind of approach would include using words such as 'every species has the right to flourish', 'best judgment' and 'avoid waste or unnecessary harm'.

Biocentricsm, ecocentrism and deep ecology are schools of thought that have been developed as a radical alternative to the anthropocentric starting points of the Judeo-Christian tradition, utilitarianism, deontology and virtue ethics. Biocentrism, developed by Paul Taylor (1986), incorporates elements of the last three. This theory is based on the idea that we should have respect for other species and that human beings should not be privileged above all other species. However, equality of respect does not necessarily mean equality of outcome. Conflicts of interest are to be managed on the basis of the relative importance of those interests, but calculating this depends on the different kinds of capacities, needs and interests possessed by the different species. For example, human desire to develop and enjoy so-called 'civilised' pursuits may be taken into account when considering the conflict between humans and other species. Indications of such an approach would be the use of words such as 'respect' or 'all species should be treated as equal'.

Ecocentrism, sometimes called the land ethic, is broader than Taylor's focus on the equal value of all life. It is based on the famous aphorism of Aldo Leopold (1968, 224–25):

'A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.' This view promotes good ecological practices and a holistic approach (Callicott, 1989). However, its focus on species rather than individuals has led to the accusation that it is a form of 'eco-fascism' because it denies the need to preserve individuals if their death helps to promote the good of the majority of its own or another species (Regan, 2004, 362; Callicott, 1999). Signs of this approach would be an environmental law or policy which prohibited intervention to save individual animals (perhaps even humans) from death or injury if it were caused by natural ecological events or by other species. It would also be reflected in the 'wilderness' approach to nature where human intervention is not permitted.



Local festival celebrating the Carp harvest, INTERCAFE meeting, Saxony. Photo courtesy of **INTERCAFE.**

A more radical ecocentric approach is 'deep ecology' associated with the Norwegian environmentalist Arne Naess (1986). He distinguished between environmentalism that is 'deep', in the sense that it seeks to identify the fundamental root causes of environmental damage, and that which is 'shallow' in the sense that it seeks to solve environmental problems at the same time as maintaining normal human activity. Three of the basic principles of this approach are, first, that the well-being and flourishing of human and non-human life have value in themselves, independently of their usefulness to humans; second, that the richness and diversity of life forms are also values in themselves; and third, that humans have no right to reduce this richness and diversity except to satisfy vital needs. Deep ecology is an attempt to recognise intrinsic value in nature rather than making it dependent on human interests and desires.

These schools of ethical thought have their own distinct features but must confront very similar issues. For example, they have to all deal with the question of deciding who or what deserves ethical care, a question known as 'moral considerability' (Goodpaster, 1978). They must also be able to evaluate the relative importance of competing interests. For example, we all recognise the fundamental importance of life, health, the opportunity to reproduce, and the desire to look after our young. But we can also appreciate the value of opportunities to make life easier and more enjoyable, to have variety in diet, to pursue cultural practices, and so on. So the question is how these different types of interests should be balanced against each other (see section 10.3.2). Before exploring this question further, however, one important issue needs to be highlighted, namely the persistent privileging of human interests over the interests of other species.

It is possible to divide ethical theories into anthropocentric or non-anthropocentric views, but since very few ethical writers feel able to sacrifice the normal interests of humans to the needs of other species, it is arguable that they are all, at heart, anthropocentric (O'Neill, 1993). So, for example, it is rarely argued that a house should not be built on land because it would destroy the grass already growing there. In addition, the sort of characteristics that are usually seen as deserving moral

considerability, such as self-awareness, are themselves chosen by humans and are therefore inherently anthropocentric.

Indeed, this inherent human bias is a vitally important point in relation to 'values'. The value we place on the environment and other species is essentially 'instrumental'. That is to say, it reflects their utility to humans even if, for example, that utility is simply our pleasure in knowing that they exist. Although some writers argue that the environment has intrinsic value, meaning that it has value in its own right, it is still a judgment made by humans — only if that value existed in a world where no humans existed could it be said to be truly intrinsic. The inherent human bias helps to explain why we privilege certain species over others (such as Giant Pandas *Ailuropoda melanoleuca* and Bottlenose Dolphins *Tursiops truncatus*) and why we do not deal consistently with conflicts between individual animals, species and ecosystems. It also explains why we have difficulty in denying our own interests – such as economic or monetary gains, opportunity value and existence value.

10.3.2 Prioritising Competing Interests

Even after we have successfully identified the ethical values held by protagonists in a conflict, resolution of that conflict will depend on how we prioritise the competing interests. For the protagonists themselves, it is likely that the value that they hold as their starting point is a strongly held belief, for example that animals have rights or that humans are more important than other species. Where persuasion is not effective in changing this belief, there must be a choice. In Berlin's (2002) term, preferring one of several incommensurable beliefs will be a 'tragic choice' but we must sometimes accept the sacrifice of our own beliefs and interests (see also chapter 8).

Some writers have attempted to provide a framework in which such prioritisation (and therefore sacrifices) can be rationally explained (Van DeVeer, 1979). The most common way of classifying interests is to divide them into basic and non-basic interests. As highlighted earlier, basic interests include life, health, and freedom from pain, hunger and thirst. Non-basic interests include enjoying cultural or recreational activities. Of course, there will be dispute over the classification of interests, particularly those that fall towards the middle of the spectrum, such as the desire to reproduce or to enjoy a varied diet.

One example of how difficult it is to conduct this type of analysis can be seen when we think about the desire to reproduce. In some respects it is a basic interest to reproduce, for the sake of the species as well as the strongly held beliefs and desires of individuals. In other respects, reproduction is not necessary to our welfare since individuals can live without producing young and we commonly accept that the ability to reproduce can be, and often is, controlled. This is true in human society, but we also routinely deny animals under our control the opportunity to reproduce or to look after their own young until they reach independence. In practice, this is often treated as a non-basic interest of non-human species because of the frequency with which we control or deny it. Other examples are the eating of meat when vegetarianism would equally meet



Preparing to harvest a fish pond, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**



Selection of lagoon-reared fishes, INTERCAFE field trip, Po Delta, Italy. Photo courtesy of **INTERCAFE.**

our nutritional needs, or wearing fur for warmth or fashion. Despite these difficulties, however, ranking interests as basic or non-basic is a useful device for trying to clarify and justify our arguments about the relative interests at stake in any ethical dispute.

Another way in which we often prioritise interests is to prioritise or rank the species holding the interest. For example, the Judeo-Christian tradition of dominion has tended to assume that all human interests automatically over-ride those of other species. In response, writers like Singer (1995) on utilitarianism and Regan (2004) on rights have attempted to extend the protection of those ideas to all other sentient species, arguing that the suffering of animals should be ranked equally with the suffering of humans or so that animals have the same rights to life as do humans. This is not to say that the interests of animals will always prevail, although some would certainly argue that they should, but the main purpose is to ensure that human interests do not always automatically take precedence. Biocentrists and ecocentrists also posit an ethical world in which the human species has no particular position of privilege. They are all attempting to place ethical debates on a level playing field. Nonetheless, most of these approaches ultimately tend to favour human interests because they link the importance of an interest to the capacity of an individual animal to experience the enjoyment or loss of enjoyment of that interest. So human pleasure in cultural activities or anxiety about loss of future earnings may be ranked more highly than the right of an animal or bird to reproduce or to take food to survive.

Even if a neutral ranking of interests between humans and other species is difficult to achieve in practice, it might at least be possible to agree on certain baseline values that should be recognised and protected across all species. These are values that are commonly shared despite other differences of opinion. For example, it would seem likely that avoiding cruelty, in the sense of unnecessary suffering, would be a generally accepted principle of conduct. To be sure, even this

may not be easy to work out in practice, as illustrated in EU law which has had to be increasingly added to and refined in order to protect animal welfare. Current legislation requires certain types of treatment for animals under human control (such as agricultural animals being transported or slaughtered, or animals kept in zoos) and it sometimes prohibits certain types of hunting methods (such as automatic weapons for hunting birds, or leghold trapping of mammals). These are case-by-case provisions that have been able to be negotiated because there is sufficient consensus among the Member States. To date, however, there has been insufficient consensus to enact a legally effective general principle of animal welfare in EU law. It seems that some issues of animal welfare are still a matter of ethical choice peculiar to each Member State and its people. In some Member States, however, there may be significant public hostility to controlling species such as Cormorants unless it can be justified by clear and legitimate reasons, and only if it can be carried out by the most humane methods available. Certain acts, such as large-scale culling, may be completely unacceptable to some people regardless of the reason, while being perfectly rational to others holding opposing views.

10.4 Applying Ethical Perspectives to the Cormorant-Fisheries Conflict

As noted above, the purpose of this chapter is not to argue for a particular normative outcome to any dispute but rather to demonstrate how it might be possible to identify and characterise the values and interests that are embedded in the debate. Analysing the ethical values implicit in the Cormorant-fisheries conflict mirrors the narrative theory used in media analysis (see chapter 9). It also provides a powerful tool for understanding the arguments used by the proponents on each side of a complex debate. For example, the Judeo-Christian tradition of dominion is discernible in the language of exploitation that is used when rights in fisheries are asserted. This often appears to be the case in the pan-European media articles examined in chapter 9 for instance, where the impact on fish stocks of fisheries harvests and fisheries-related management of wetland habitats goes virtually unmentioned. The only impact of interest — and hence concern — is the effect of Cormorants on the exploitation of fish stocks, alleged or real. However, some of the local situations explored by **INTERCAFE** have also uncovered a view which is consistent with stewardship (e.g. Bohinj in Slovenia, Hanko Peninsula in Finland, and the Po Delta. See www.intercafeproject.net). Utilitarianism is also evident in arguments that balance the interests of Cormorants against those of humans and, occasionally, the welfare of fish. This is sometimes expressed in the use of economic arguments in favour of protecting fisheries against Cormorants, whether by culling Cormorants or avoiding the extra costs of protecting fisheries (Finland, Po Delta). There is no obvious utilitarian approach to the happiness of animals, although some concern has been expressed about the distastefulness of shooting Cormorants which may suggest some concern with suffering. In addition, it should be remembered that utilitarianism is an ethical perspective that depends heavily on whether the consequences of an action actually promotes happiness, but the consequences of an action will always be unpredictable without accurate knowledge or full investigation. Adopting utilitarianism as a basis for action therefore requires robust and honest use of science.

There is little evidence of rights-based approaches to animals, whether Cormorants or fish. However, the right of humans to fish commercially or recreationally is often asserted. Cormorants have been accused of interfering with human property rights over fish, as in the Finnish newspaper headline stating that *'Cormorant and fishermen fight for the same fishing grounds'* (see 9.3.2). Elsewhere, in the Danube Delta, Carss *et al*. (2009: 112) noted that *'observations by local people heighten the sense of competition between fish-eating birds and fishermen especially because fishermen's licenses usually permit fishing in lakes rather than channels'* [where fish density is higher and Cormorants have free access]'. In contrast, some hostile responses to Cormorant behaviour are expressed in negative rights-based language, namely that Cormorants have 'no right' to invade territory and exploit its fishery resources. The reason for this assertion is ambiguous — it is rarely or never expressed as a belief that Cormorants have no rights at all, but rather that they do not have these rights because they are foreign and novel. It is

therefore possible to suggest that Cormorants' rights to take fish would be recognised even by their strongest critics, provided it occurs in places where they are seen to be native and belonging. The value system being displayed in these criticisms is therefore consistent with the Judeo-Christian dominion-based approach to nature, but may incorporate a concept of contingent, or context-specific, rights to survive or engage in natural foraging behaviour.

Virtue ethics is, perhaps surprisingly, a constant theme in the positions of the various protagonists. All sides in the debate profess a desire to act in the right manner. Regardless of whether the protection of Cormorants or of fisheries is favoured, there seems to be a general acceptance that sacrifices must be made and that both Cormorants and fisheries must be given an opportunity to exist and flourish, albeit within limits. Interestingly, a virtue ethics type of argument is sometimes used to castigate Cormorants. For example that they 'needlessly' injure fish with their hooked beaks, particularly when they try to catch fish which turn out to be too big to swallow.

In contrast, biocentrism in the sense of respect for other species is only variably represented in the debate. Although many proponents have expressed admiration for the adaptability and skills of Cormorants, it appears that for some they are considered as outlaws rather than objects of respect. As shown in chapter 9 (section 9.3.2), Cormorants are often thought of as 'not belonging' and are considered to be impostors, outsiders or aliens. This is sometimes expressed in terms of their geographical location, so that Cormorants are only the subject of hostility when they 'invade' new territory. In this view, the fact that the birds are acting naturally when they expand their range, or feed where fish are most concentrated or accessible, is not any or sufficient justification for their actions. Additionally, the debate is not framed in terms of equal respect for different species irrespective of their different capacities but instead it differentiates between species on the basis of their level of capacities. Thus the conflict is often represented as existing between a species which has significant capacities (Cormorants) and another which has comparatively few capacities (fish). However, if we acknowledge the human aspect of the conflict we can see that protection of the fish is important to another species with particularly high capacities (humans) compared to Cormorants. Thus the balance of interests automatically shifts away from Cormorants to humans.

Holistic views of the environment are also variably represented in the debate. In some ways, it can be argued that the Habitats Directive (see chapter 7) is an attempt to develop a holistic approach to conservation through its emphasis on habitats rather than individual species. On the other hand, it partly determines the value of habitats by their ability to support specific target species. In addition, the Wild Birds Directive (see chapter 7) is seen by many as privileging some species of animals regardless of their impact on other species. This argument is made by those who feel that EU law protecting birds such as Cormorants ignores their impact on human livelihoods. In addition, however, ecologically holistic arguments are sometimes used. Thus some fisheries proponents argue that Cormorants should be controlled precisely because they are disproportionately harmful to the environment and to other species. For example, **INTERCAFE** heard that Cormorants have been accused by fisheries interests of endangering the ecological balance by over-exploiting rare fish species (e.g. in Slovenia) and taking food from other species such as the Kingfisher (*Alcedo atthis*) and Otter (*Lutra lutra*) which are considered to be more desirable (e.g. in the Czech



River Jordan, INTERCAFE field trip, Israel. Photo courtesy of **INTERCAFE.**



Republic). Similarly, in the UK Carss *et al*. (2009: 107) reported that some recreational anglers feared that *'other fish-eating birds will suffer as a result of the lack of small fish* [as a result of Cormorant predation] *or due to the 'aggression' of Cormorants'*.

One very strong counter-argument here, often made by ecological researchers, is that the environment that Cormorants are accused of harming is itself far from 'natural' and that Cormorants are actually a symptom of how degraded these systems are. The argument here (see also chapter 13 of van Eerden *et al*. 2012) is that the problem is caused, wholly or in part, by intensive fishing methods that are harmful to the natural environment or, at the very least, artificially create situations in which Cormorants are drawn to feed in particular areas. Indeed, the ecological research community generally holds the view that Cormorants are merely responding (both numerically and in their foraging site-choice) to human-induced changes in fish abundance that lead to improved foraging conditions for the birds across much of Europe (e.g. see van Eerden *et al*. 1995 and van Eerden *et al*. 2012). Nonetheless, there are popular media reports of Cormorants that use them as scapegoats for human activities like over-fishing, illegal fishing or hydrological mismanagement (e.g. chapter 9, section 9.3.2). Local people are well aware of these situations of degraded wetland systems and, whilst not all want to blame the Cormorants, it is perhaps easier to envisage reducing the effects of Cormorants locally rather than reducing many of the other more widespread and negative environmental effects (e.g. Carss *et al*. 2009).

Although there are differences in the schools of ethical thought surveyed here, it can be seen that anthropocentric interests are a consistent theme. This is particularly marked in the case of pro-fisheries arguments, but it also underlies some of the arguments in favour of protecting wild birds, including Cormorants, in the sense that these arguments rely upon the instrumental value of all birds to humans. In addition, although Cormorants are often assigned moral considerability, it is noticeable that the same is not necessarily true of fish. Instead, it is the human interest in fisheries that is the value being championed. This is exemplified in some of the media examples in chapter 9 where Cormorants are represented as stealing large amounts of fish from their rightful owners — fishermen and fish farmers. The instrumental value of fisheries (whether economic or recreational or cultural) is the predominant theme, whereas arguments in favour of protecting Cormorants tend to identify their instrumental ecological, aesthetic, cultural and existence value.

Proponents of protecting Cormorants are sometimes divided as to whether it is individuals or the species as a whole that ought to be protected. This has implications for the question of culling. Some of those who favour Cormorants deny that any of them should be killed, whereas others are prepared to accept limited culling in certain circumstances. Even those that advocate Cormorant culling appear to demonstrate concern for the species as a whole since they do not wish to drive Cormorants to extinction. Similarly, they may also be concerned about the survival of other species, such as fish or other birds. No-one seriously argues for elimination of Cormorants as a species, though some argue for culling to remove them entirely from particular geographical locations. On the whole, however, those advocating lethal control are not concerned about the fate of individual Cormorants. On the other hand, some of those who are anxious to protect fisheries may well feel that the taking of an individual fish by a Cormorant is unacceptable. **INTERCAFE** has heard numerous examples of this. Perhaps Cormorants compete directly with recreational anglers,

both wanting to catch the same individual fish at the same sites. It appears to be unacceptable for some that a Cormorant takes a single fish from a fish farm, or a juvenile fish destined for commercial or recreational harvest when it grows, or a fish of no commercial value which could have been consumed some time later as prey by a commercially exploited fish.

Some who support large-scale Cormorant control justify it on the grounds of protecting ecosystems, in the sense that they argue that Cormorants damage the local environment (several examples are given in chapter 9). However, this view is sometimes diluted — or even contradicted — by a desire to privilege fisheries over all aspects of the natural environment.

10.5 Conclusions

It should be apparent from this brief review that there is a wide variety of ethical views that may be taken about different aspects of Cormorant-fisheries conflicts. The views expressed by various protagonists in the conflicts may be explicit or implicit; when implicit, it may not always be easy to infer ethical positions merely from words and actions. Ethical positions become more complicated as different values are combined, compared, ranked and contextualised. What may be important in one situation may become less so when balanced against another value, or as circumstances change. Conversely, as the situation (or the balance of values) changes, what was unimportant in one situation can become important in another, and we have seen several examples of this in relation to Cormorants and fisheries. For instance when Carp pond fish farming moved from being essentially local subsistence production to part of a global commercial industry (associated with a move towards capitalism in several countries), State subsidies for stock losses (from whatever cause) were no longer available. Fish farmers had to account for their fish stocks and production levels in a competitive economy and so fish lost to Cormorant predation suddenly became an important concern. Similarly, as coastal fisheries in the eastern Baltic Sea became overfished and catches declined as a result (see Note 8 in Carss *et al*. 2009), Cormorant predation became the focus of complaints over these declining catches. In many other studies (e.g. Carss *et al*. 2009 and chapter 17) numerous, diverse changes have occurred in wetland environments to both commercial and recreational fisheries and, as fish have become scarcer, any loss of them to Cormorants has become more important. Very often the claim here is that Cormorant predation on fisheries is actually *'the last straw'* (see also 15.2 and 17.2) and this appears particularly so when fisheries are faced with changing environmental conditions as well as wider social and economic ones.

The dynamic and complex situations in which complaints about the effects of Cormorants on fisheries are found mean that it is not possible to produce a simple or single characterisation of the problem. Not surprisingly, therefore, the ethical perspectives adopted by protagonists on all sides are variable, not just because it is commonplace to hold different values and to prioritise them differently, but because each situation demands individual consideration of what values are relevant and most weighty. However, it is still valuable to identify the key interests being defended in each situation. Protagonists in human-wildlife conflicts can be asked to identify a clear position on quite basic questions. For example, whether humans are entitled to interfere with other species and their environment and, if so, on what grounds. Other questions include whether they favour protecting ecosystems, species or individual animals, or whether they believe that other species have rights and, if so, how they should be ranked between different species, including human interests. Without clarification of these basic issues, and the more complex problem of balancing incompatible or incommensurable values, no widely acceptable solution is likely to be found.

To be sure, none of these questions are easy to answer, and it is made more difficult by the problem of imperfect scientific knowledge and unavoidable uncertainty about the long-term consequences of our actions (see also chapter 8). If it were possible to achieve a more accurate picture of the values and interests represented by the full spectrum of protagonists, and to assist those people to reflect upon their own views, it would be easier to understand and ultimately find a path towards resolving the conflicts that arise over Cormorants and fisheries. There is evidence that stakeholders become frustrated about not being consulted or heard, and this is

essentially a feeling that their values are not being acknowledged (see chapter 5). This frustration makes it much more difficult to find a resolution for conflict. More fundamentally, any discussion in which the protagonists adopt their own ethical starting points without acknowledging the existence and legitimacy of others becomes stagnant, ill-tempered and futile. If important values are acknowledged by all protagonists, then all voices may be properly heard. Even though political institutions must eventually make a decision which may not be substantively agreeable for all, they can at least arrive at decisions which are based on transparency, respect for all views and procedural legitimacy.

Editorial note

The issues covered in this chapter have, in many cases, direct links to other issues discussed in Part Two. Overall, these four chapters have explored how various people (from legal institutions to local individuals) frame various arguments on Cormorant-fisheries issues. The media analysis of chapter 9 has shown that in some instances this debate is indeed an argument between two 'opposing sides'. However, other chapters have shown that these arguments (or frames, or values) are not necessarily oppositional but that each will cast a different perspective which very often depend on an individual's position, intention or circumstances. As discussed in this chapter, people's positions, intentions or circumstances combine or change and so too do their values. While resolution of many European Cormorant-fishery conflicts is still some way off, and the very dynamism of them appears to strongly rule out a generic 'one-stop' solution, an exploration and understanding of these different perspectives (from the legal to the local) is a necessary step in the right direction.

Also necessary is an examination of the relationship between science and successful wildlife management provided in Part One, alongside other important processes such as the practical incorporation of scientific contributions and other stakeholders' views into management plans. These also all provide essential perspectives on Cormorant-fishery conflicts. These perspectives are useful because of their ability to (i) allow us to better understand the current situation in many European Cormorant-fishery conflicts and, through this better understanding, to (ii) devise more effective processes for their resolution and management. The issues of better understanding current Cormorant-fishery conflicts and of building of an effective pan-European management process for them form the basis of Part Three of this publication.

References

Berlin, I. 2002. Liberty: Incorporating 'Four Essays on Liberty'. Oxford University Press, Oxford.

Carss, D N, Bell, S, and Marzano, M. 2009. Competing and co-existing with cormorants: ambiguity and change in European wetlands, In Heckler, S (editor) (pp.99–121) Landscape, Process and Power: re-evaluating traditional environmental knowledge. Oxford, Berghahn Books.

Callicott, J B. 1989. In Defence of the Land Ethic: Essays in Environmental Philosophy. State University of New York Press, Albany.

Callicott, J B. 1999. Holistic Environmental Ethics and the Problem of Ecofascism. In Beyond the Land Ethic: More Essays in Environmental Philosophy. State University of New York Press, Albany, NY.

Goodpaster, K. 1978. On Being Morally Considerable, Journal of Philosophy, 75, 308–25.

Hill, Jr, T. 1983. Ideals of Human Excellence and Preserving the Natural Environment. Environmental Ethics, 5, 211–24.

Kant, I. 2004. Critique of practical reason. (tr Abbott, T K) Dover, Mineola NY.

Leopold, A. 1968. A Sand County Almanac: and Sketches Here and There. Oxford University Press, Oxford.

Mill, J S. 1998. Utilitarianism. (edited by Crisp, R) Oxford University Press, Oxford.

Naess, A. 1986. The Deep Ecological Movement: Some Philosophical Aspects. Philosophical Inquiry 8, 10–31.

O'Neill, J. 1993. Ecology, Policy and Politics : Human Well-Being and the Natural World. Routledge, London.

Passmore, J. 1974. Man's Responsibility for Nature, Duckworth, London.

Regan, T. 2004. The Case for Animal Rights, 2nd edn. University of California Press, Berkeley.

Singer, P W. 1995. Animal Liberation, 2nd edition. Pimlico, London.

Taylor, P. 1986. Respect for Nature: A Theory of Environmental Ethics. Princeton University Press, Princeton NJ.

Van DeVeer, D. 1979. Inter-specific Justice. Inquiry 22, 55–79.

van Eerden, M R, Koffijberg, K, and Platteeuw, M. 1995. Riding on the crest of the wave: possibilities and limitations for a thriving population of migratory cormorants *Phalacrocorax carbo* in man-dominated weltands. Ardea 83: 1–9.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906698-07-2.

White, Jr, L. 1967. Historical Roots of our Ecologic Crisis. Science 155, 203–207.

11 INTRODUCTION TO CASES, CONTEXTS AND FURTHER THOUGHTS

Part Three: Case Studies, Suggested Reading, and Next Steps

David N Carss and Mariella Marzano

This part of **INTERCAFE's** exploration of essential social, cultural and legal perspectives on Cormorant-fisheries conflicts has a number of purposes. First it summarises **INTERCAFE's** Case Studies and other opportunities that the research network had to discuss conflict issues with local people and other stakeholders. In doing so it recognises and draws together many of the issues described in previous chapters. Ultimately, this exercise reveals a set of four specific (through not completely mutually exclusive) 'contextual themes' that recurred consistently in one form or another throughout the conflict situations explored by **INTERCAFE**. Second, suggested further reading and detailed commentaries are presented on a number of social, cultural and legal perspectives, consideration of which appears essential if Cormorant-fisheries conflicts are to be better understood and addressed. Finally, some reflections are offered on the **INTERCAFE** 'conflict management' process itself. While this is a summing-up exercise, importantly it also looks to possible future next steps in such Cormorant-fisheries conflict management processes.

INTERCAFE originally recognised the distrust between some of the main stakeholder groups involved, which was further compounded by the often disparate and uncoordinated nature of available sources of information. Given this, the examination of diverse conflict situations — and the associated meetings themselves as 'events' — went some way to both coordinating an exchange of information and allowing stakeholder groups equal voice to offer their experiences and opinions. The chapters in Part Three show clearly that Cormorant-fisheries conflicts are as much a matter of human interests as they are of biology.

Chapters 12–17 are an attempt to tease apart the interconnections and similarities (or striking differences) between various elements of the conflict situations **INTERCAFE** was able to explore in its Case Studies and other meetings with stakeholders. At first glance, these conflict situations appear to be extremely diverse, involving very different geographic locations, wetland habitat types, fisheries (both recreational and commercial), and stakeholder groups, for instance. However, our exploration reveals a number of commonly recurring key issues that seem to underlie most, if not all, of these conflict situations. A better understanding of these issues is thus likely to improve efforts towards (more useful) forms of conflict resolution and possible management action.

These chapters are founded on an understanding of the importance of social issues embedded in HWCs (e.g. Marshall *et al*., 2007) which are shown to be complex and multi-dimensional (e.g. Jamieson, 2008). They also explore issues of governance (e.g. Weiss & Thakur, 2006) and emphasises the concept of the 'frames' through which individuals and institutions see both relevant information and potential management options (e.g. Gardner, 2003).

Following a habitat/fishery-specific approach (see van Eerden *et al*., 2012), **chapter 12** introduces the 'Case Study' concept. The following chapters contain discussions and descriptions of (i) pond fish farming (**chapter 13**), (ii) coasts and open seas (**chapter 14**), (iii) deltas and large lagoons (**chapter 15**), and (iv) rivers and recreational fisheries (**chapter 16**). These descriptions are necessarily detailed so that aspects of the Cormorant-fisheries conflict can be recorded as comprehensively as possible. Nevertheless, within these four habitat/fishery types, a number of contextual perspectives were consistently apparent. These contexts are described in turn for each habitat/fishery under a series of headings: (1) environmental and social, (2) Cormorant numbers and problems, (3) legal/policy and economic issues, and (4) management measures. **Chapter 17** concludes by synthesising the main findings into a series of summaries with a number of bullet points for each.

Work for **chapter 18** began with the idea of developing a bibliography of Cormorant-related literature. However, the bibliography developed into a chapter that is perhaps more useful as it provides commentaries on the chosen literature. It reflects **INTERCAFE's** interdisciplinary approach to Cormorant-fishery conflicts by offering readers suggested reading on a range of essential social, cultural and legal perspectives which are frequently integrated with biological and ecological ones, where appropriate. Instead of a list of references, the chapter offers suggested reading (with commentaries) on a series of seven themes deemed relevant to European Cormorant interactions in their broadest sense. Here the reader is pointed to relevant literature on the relationships humans have with wetlands, the interactions between Cormorants and fish, and fisheries economics. These are followed by suggested reading on both human-wildlife conflicts and conflict management and then by suggestions for reading on the relationships between science, policy and society and on environmental law, ethics and governance.

Chapter 19 examines the Action's approach to Cormorant-fisheries conflicts in Europe and Israel. Here, as a form of self-reflection on the work of this network of researchers, **INTERCAFE's** interdisciplinary facilitator (in his role as a 'neutral outsider') offers a critical assessment of progress towards building an effective multi-national conflict management process for complex human:wildlife interactions. This chapter covers a number of topics, beginning with description and discussions of (i) conflict management and conflict analysis, (ii) designing a conflict management process, (iii) managing a conflict management process, and (iv) capacity building. Each of these is followed by detailed examination of **INTERCAFE's** contribution to the various issues. Importantly, this chapter also identifies key gaps in current understandings and processes, and it also begins to identify the next steps in the on-going endeavour to address Cormorant-fisheries conflicts across Europe and beyond.

The material presented in Part Three promotes links between the biological and social scientific communities, local stakeholders and policy advisors to better understand the role of socio-cultural issues in conflicts, their management within legal frameworks, and efforts towards their resolution. This is achieved through an in-depth examination of conflict situations, the identification of recurring themes, and through reflecting on **INTERCAFE's** approach.

References

Gardner, R. 2003. 'Process Frames'. Beyond Intractability. Conflict Information Consortium, University of Colorado, Boulder. Available at: http://www.beyondintractability.org/essay/process-frames

Jamieson, D. 2008. Ethics and the Environment: an introduction. Cambridge University Press, Cambridge.

Marshall, K, White, R, and Fischer, A. 2007. Conflicts between humans over wildlife management: on the diversity of stakeholder attitudes and implications for conflict management. Biodiversity Conservation, 16: 3129–3146.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906689-07-2.

Weiss, T G, and Thakur, R. 2006. The UN and Global Governance: an idea and its prospects. Indiana University Press, Bloomington.

12 EXPLORING DIFFERENT CONTEXTS WITHIN EUROPEAN CORMORANT-FISHERIES CONFLICTS USING A 'CASE STUDY' APPROACH

Mariella Marzano and David N Carss

This chapter explains **INTERCAFE's** Case Study concept used to focus on the 'real world' Cormorant-fishery conflict situations experienced by the Action's participants and local stakeholders. It also describes the methodological approach developed in an attempt to draw out the essential social, cultural and legal perspectives of these conflicts.

12.1 Introduction

Prior to developing the **INTERCAFE** research network, the REDCAFE Concerted Action showed that Cormorant-fisheries conflicts can be considered to be human:wildlife ones, human:human ones, or situated somewhere in between (see Carss, 2003: pp.160–163, Carss *et al*. 2009). REDCAFE's synthesis (Carss, 2003) showed that effective conflict management first necessitates identifying the true nature of such conflicts before looking to the most appropriate solutions. In this context, two key issues can be considered.

The first relates to interconnected scales. The wide geographic range of European Cormorant populations and their wintering migration patterns require investigation and monitoring at the continental scale (see chapters 6–8 of van Eerden *et al*. 2012). Similarly, Cormorant conservation legislation is defined at the EU-level, although it is implemented nationally or regionally (see chapter 7). On the other hand, conflicts with fisheries are usually regional or site-specific, and so effective management solutions will most likely require implementation at these finer geographic scales. However, due to the migratory behaviour of Cormorants, local management strategies could also affect birds at national or even continental scales. Ultimately, all these geographical scales from site-specific and local, through regional and national, to the EU-27 level and beyond, are interconnected. Furthermore, these interconnections relate both to the human dimension (e.g. EU-level conservation legislation, national or regional interpretations of it, the nature of site-specific conflicts and associated management actions) and to the wildlife dimension (e.g. Cormorants moving across the continent during migration or over-wintering periods, assembling in large numbers nationally or regionally to breed, and making site-specific choices of foraging grounds throughout the year). It is therefore necessary to keep one eye on the continental scale — as this is clearly a European issue — and the other on the site-specific level where conflicts occur and may be best managed (Carss & Marzano, 2005: Preface).

The second key issue relates to the Cormorant-fisheries conflict being a model for other conflicts. **INTERCAFE's** work built on the information and data synthesis provided by REDCAFE. It emphasised the value of pan-European research coordination by attempting to include the current and future needs of local stakeholders and policy makers. This further step is important not only because Cormorant-fisheries conflicts are a highly

relevant environmental issue across Europe but also because a clearer understanding of the processes and values they involve (both in terms of defining the conflict[s]) and devising and implementing mitigation measures to manage them) could act as a model for numerous other human:biodiversity conflicts across the continent. As discussed in chapter 7, most environmental legislation is geared around species (or habitat) conservation. Thus, relatively little help is available to those who consider themselves faced with an over-abundant species, or one which, at first sight at least, appears to directly threaten either their livelihood or their recreational pursuits.

As described and discussed in chapter 1, the major aim of **INTERCAFE's** Work Group Three ('Linking Science with Policy and Best Practice') was to promote links between the biological and social science communities, local stakeholders and policy advisors to better understand the role of socio-cultural issues in Cormorant-fisheries conflicts, their management within legal frameworks and efforts towards their management or resolution. A further challenge was to improve information exchange, dialogue, participation and trust between the stakeholders involved in such conflicts. Successful conflict management is known to be dependent on conflicting parties opening communication channels and developing networks of trust for effective collaboration and dialogue (e.g. Wondolleck & Yaffee, 2000). Thus, efforts to create the kinds of links mentioned above were made at every **INTERCAFE** meeting, each being planned as a learning experience for participants and invited stakeholders. It was originally planned that the Action's most intensive exploration of real-life situations 'on the ground' would occur through a necessarily limited number of so-called Case Studies in which **INTERCAFE** participants both learned of local situations and issues first-hand from invited experts and offered in return different national and international perspectives and experiences. However, as the Action evolved, this fomat proved popular and informative, and so it was adopted at several other meetings too.

12.1.1 The Case Study concept

Cormorant-fisheries conflicts are a truly pan-European issue being experienced by a variety of stakeholder groups working in a diverse range of aquatic habitats across the continent. An interdisciplinary approach involving the collaboration of biological and social scientific expertise, economic and political interest and practical local experience is now seen as vital to the development and successful implementation of practical Cormorant-fisheries conflict management strategies across Europe.

The REDCAFE Concerted Action offered an opportunity to apply recognised conflict management techniques to Cormorant-fisheries interactions on a pan-European level. These techniques were also applied to a specific Case Study, that of recreational angling in England (see Carss, 2003: 131–159). This Case Study was addressed in a workshop designed to give local and national stakeholders, and European biological and social scientists, the opportunity to share knowledge and experience. The workshop highlighted multiple stakeholder perspectives and facilitated a greater understanding of the inter-relationships between stakeholders. Above all, successful conflict management was shown to be dependent on conflicting parties opening communication channels and developing networks of trust for effective collaboration and dialogue. However, there is no formal approach to applying this process to the thousands of other conflict cases across Europe, nor is there clear, coordinated information transfer between all stakeholder groups and few, if any, policy-makers were included in current Cormorant-fisheries conflict management processes.

INTERCAFE's Case Studies were investigated through Workshops that concentrated on issues operating at different spatial scales. Local stakeholders provided key site-specific inputs showing the complexities of ecological, social, economic, and policy contexts, while input from other participants, particularly ecologists and decision-makers, enabled all to appreciate the specific Case Study in both national and international contexts. Thus, Case Study Workshops were planned with the hope of enabling all participants to take a 'holistic' view of specific representative situations.

12.2 Methodological approach

Three Case Studies were chosen to be representative of Cormorant-fisheries conflicts across Europe. After careful consideration, and following agreement from **INTERCAFE** participants, the three Case Study sites were selected to take into account various factors including geographic location, habitat types, stakeholder groups, fishery type, current and potential mitigation actions, and also the 'representativeness' of all these factors to other locations throughout Europe. Case Study locations were also chosen to reflect both the range of scales at which **INTERCAFE** was operating but also to explore the interactions between these scales. Case Study workshops were held in Israel, Italy and France (see Figure 12.1) and addressed the following themes:

(1) **ISRAEL** (2006) — *'Cormorant-fishery conflict management in the Hula Valley'*. This Case Study focussed on pond aquaculture systems at the **local-scale** in northern Israel and on how successful, locally-devised solutions might be transferred elsewhere.

(2) **ITALY** (2007) — *'Extensive aquaculture systems and relationships between stakeholder perspectives and different spatial scales and institutional levels'*. A **regional-scale** Case Study in the Po Delta, a large and complex wetland mosaic (covering three provinces, two regions and two regional parks) and focussing on how these institutions, administrations and their associated policies fit within the **national** context.

(3) **FRANCE** (2008) — *'The Management of Cormorant-Fisheries Conflicts in France and the Wider European Context'*. A **national-scale** overview of France and how regional-specific issues are incorporated into the national picture as well as how France operates (or seeks to) at the **international-scale** as a European Member State.

The major issues affecting stakeholders in these Case Study areas were investigated through the workshops by concentrating on factors operating at two spatial scales: (1) key, local **site-specific** situations, and (2) issues at broad geographical scales at both **national and international levels**.

Workshops were run over three days: two days involved presentations, primarily from local, regional or national stakeholders, with additional break-out sessions to discuss relevant themes. In addition, a day-long field trip allowed **INTERCAFE** participants and invited international experts to see at first-hand the local landscapes and fisheries and the problems they face. Trips also acted as a catalyst to encourage greater discussion, interaction and networking between all those taking part.

This working concept was adopted at several other meetings (see Figure 12.1) which were organised in a similar manner, with two out of three days spent listening and discussing local, regional and national problems surrounding Cormorant-fisheries interactions. These meetings were also themed around carefully-chosen relevant issues: (i) Bohinj, **SLOVENIA** (2006) – *'Angling and EU legislation'*, (ii)

Figure 12.1 Map of Europe and beyond showing locations of the three **INTERCAFE** Case Studies (large circles, west to east — Paris, Po Delta, Hula Valley) and of other meeting locations (small circles, north to south — Hanko Peninsula, Saxony, South Bohemia, Bohinj).





Extensive fish pond, INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE.**



Cormorants on archipelago islet, Baltic coast, INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE.**

Hanko Peninsula, **FINLAND** (2007) – *'What to do when the Cormorant comes'* and (iii) South Bohemia, **CZECH REPUBLIC** (2008) – *'Management practices in a complex habitat mosaic and at local, regional and national levels'*.

A meeting held in **SAXONY** (2005) focussed primarily on other work, but it included a field trip themed around *'Commercial Carp aquaculture'* highlighting a range of issues and problems facing Carp fish ponds in the Upper Lusatia region of Germany. Information from this meeting is therefore also included in this chapter. Similarly, other relevant ideas and information from discussions and presentations at other **INTERCAFE** meetings (see Preface for full list) are incorporated into this chapter, where appropriate.

Contextualising conflicts

As highlighted by Scott Jones in chapter 19, Cormorant-fisheries conflicts are not just about the birds preying on fish, nor are they easily solvable by focusing on this single interaction at a specific (e.g. pan-European) scale. He suggests that *'the inter-connectedness of the problems across ecological, social, political and geographical boundaries mean that problems and solutions may be quite complex, depending on the scale at which the conflict is defined'*. He also identifies the need for the re-framing of Cormorant-fisheries conflicts to address such issues as the underlying structural conflicts (e.g. those caused by forces external to the people in dispute), conflicts over process (e.g. the way different stakeholders address and try to solve problems), the role of different stakeholder groups, how they are represented (and represent themselves), and issues of legitimacy. At its simplest, re-framing can be seen as changing the way that one sees, experiences or perceives something. It is therefore important for this chapter to consider a number of key contexts from which Cormorant-fisheries conflicts are considered.

Detailed reports from these Case Study workshops and meetings are available on the **INTERCAFE** website (http://www.intercafe project.net). This chapter provides a synthesis of some key contextual themes that emerged. Although many of the contextual themes affecting Cormorant-fisheries conflicts are closely inter-woven and so difficult to consider separately, some of them have been teased apart to emphasise — and compare — those issues affecting different geographic locations and fishery types across Europe. In terms of **INTERCAFE's** exploration, the focus is on 4 themes:





Extensive lagoon system, INTERCAFE field trip, Po Delta.
Photo courtesy of **INTERCAFE.**



Sub-Alpine lake-river system, INTERCAFE field trip, Slovenia.
Photo courtesy of **INTERCAFE.**

1. Environmental and social contexts
2. Cormorants, numbers and associated problems
3. Legal/policy and economic contexts
4. Management measures

In respect to the economic theme, **INTERCAFE** (and REDCAFE before it, see section 6.5.4 of Carss, 2003, pp.153–4) found it difficult to assimilate rigorous economic information relating to such things as fish production and losses directly (or indirectly) attributable to Cormorants, but economic issues were also discussed in a broad sense during the **INTERCAFE** meetings and so are presented here.

In practice, all of the themes relate to one of four waterbody-fishery types:[87]

1. Pond fish farming
2. Coastal (open sea/shore) fishing waters
3. Delta (large lagoon) fisheries
4. Streams, small rivers and recreational fisheries

The same sets of information are not necessarily presented for each Case Study location (or country, or waterbody-fishery type). This is because some meeting discussions provided more detailed information

[87] These four types are identical to some of the 8 waterbody types described, from various ecological perspectives, in chapters 4 and 5 of van Eerden *et al*. 2012.

than others. Similarly, it was not always been possible to record 'the full story' of all the issues concerning Cormorants and fisheries in each location. This was because local people came to **INTERCAFE** meetings to talk, in the first instance at least, about their specific experiences of Cormorants and fish/fisheries and this was the primary information available. Nevertheless, this relatively intensive dialogue with local people in a variety of different situations highlighted some of the diverse and inter-related contexts within which Cormorant-fisheries conflicts are experienced and considered across Europe and beyond.

References

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265pp. http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Bell, S, and Marzano, M. 2009. Competing and coexisting with cormorants; ambiguity and change in European wetlands. In: Heckler, S (editor). Landscape, Process and Power: re-evaluating traditional environmental knowledge. Berghahn Books, Oxford, pp.99–121.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906698-07-2.

Wondolleck, J M, and Yaffee, S L. 2000. Making collaboration work: lessons from innovation in natural resource management, Island Press, Washington DC.

13 POND FISH FARMING

Mariella Marzano

This chapter uses **INTERCAFE's** Case Study concept and methodological approach (described in chapter 12) to draw out the essential social, cultural and legal perspectives for 'real world' Cormorant-fishery conflict situations experienced by **INTERCAFE** participants and local stakeholders. Here, a number of 'contextual themes' are used to explore conflict situations at pond fish farms, other waterbody-fishery types being examined elsewhere (chapters 14–16). A synthesis for the Case Study approach and the explorations described in chapters 13–16 is then provided in chapter 17.

Various forms of pond aquaculture were discussed at Case Study workshops in Israel, and France, and also at meetings in Saxony and the Czech Republic. A more detailed exploration of Cormorant-fisheries interactions at Carp pond fisheries is given in **INTERCAFE's** 'Cormorant-fisheries conflicts at Carp ponds in Europe and Israel — an overview' (Seiche *et al*. 2012).

13.1 Environmental and Social Contexts

Israeli fish production derives from: (i) inland aquaculture (19 tonnes per annum), (ii) marine aquaculture (3.3 tonnes), (iii) ornamental fish production (9.8 million US$ per annum), and (iv) Lake Kinneret fisheries (1.1 tonnes). Carps (*Cyprinidae*) and tilapia are the main cultured species, followed by mullets (*Mugilidae*), Chinese Carp (*Hypophthalmichthys molitrix*) and others. Production systems in inland aquaculture include conventional earth ponds, dual-purpose reservoirs utilised for both irrigation and fish culture, reservoir-dependent systems that re-circulate water from reservoirs to hard-bottomed intensive ponds, and closed water systems. Eighteen to 24 months are required to finalise a culture cycle from fry to market-sized fish. Fish growth is temperature-dependent and lasts for only 7–8 summer months. Hence, during the 4–5 winter months, marketable fish and fingerlings are stored in heavily stocked ponds. Out of the 50 million fingerlings that winter in fishponds, only 1.8 million are kept in the Hula Valley.

The Hula Valley is situated in the Upper Galilee Region of northern Israel and has a climate that varies from Mediterranean to 'semi-tropical'. Between 1951–58 Lake Hula and surrounding wetlands (approximately 6,000 ha) were drained for agricultural purposes. During this time, opposition from scientists and naturalists ensured that a small area (325 ha) of swampland was set aside in the south-west of the valley and, in 1963, this became Israel's first nature reserve. Although initially the drainage scheme was considered a great achievement, utilising the valley's resources proved difficult and it became clear that such massive habitat modification had adversely affected ecosystem health and wildlife diversity.

The deterioration of the Hula Valley wetlands, a result of industrial and agricultural development, habitat fragmentation and climatic changes, contributed to conflicts between long-distance migrating water birds and intensive fisheries and agriculture in the area. Moreover, the decline of the flora and fauna within the nature reserve was attributed both to the loss of valuable high-quality water from the nature reserve through leaking dykes and to the knock-on effects of agricultural inputs adjacent to the reserve. Initial efforts to rehabilitate the area were taken by the Israel Nature and Parks Authority (INPA) in 1971. Between 1990–1994, a 100 ha area located 2 km north of the reserve was re-flooded as part of a restoration programme to create Lake Agmon.

In the Case Study region, each fish farm in the Hula Valley is owned by a kibbutz. There are



Fish pond, INTERCAFE field trip, Hula Valley, Israel.
Photo courtesy of **INTERCAFE.**



Reservoir used for fish culture, INTERCAFE field trip, Hula Valley, Israel.
Photo courtesy of **INTERCAFE.**

about nine private owners and around 20 employees, with all the pond farm income coming from fish production. There are 70–80 ponds in the Valley, holding mostly Carp *Cyprinus carpio*, Silver Carp *Hypophthalmichthys molitrix*, Flathead Mullet *Mugil cephalus* and some Tilapia species. The Northern Galilee Agricultural Association (NGAA) organises the marketing by the fish farms as a collective, but the income goes to each kibbutz. In general, aquaculture in Israel continues to face problems over the availability of water, which is a scarce resource and therefore both valuable and expensive. Furthermore, concerns have been raised over pollution in Lake Kinneret — linked to nitrates from the drained area of the Hula Valley — invasive fish species, fish disease (an issue also raised in Saxony) and low water temperatures.

Aquaculture in the Hula Valley started in the late 1940s, and it can be an important element of a diversified suite of income generation for each kibbutz. In mainland Europe, however, another claim made by many traditional fish farming countries is that pond aquaculture is also important, in both cultural and biodiversity contexts. Although this may also apply to the Hula Valley, there is recognition that fish farming is a relatively young industry in Israel. The kibbutzim view fish farming as a money-making activity that is part of their industrial diversification, from milk, fowl, and field crop production to factory management. There seems to be little deep-set sentimentality for the fish ponds, and they would probably be closed and converted to something else as quickly as any failing branch of the kibbutz.

In contrast, as highlighted in Seiche *et al*. (2012), most of the fish ponds in Germany, Poland, France and the Czech Republic were constructed between the 12th and 16th centuries. They are considered a vital part of the cultural heritage in the regions where they occur, having been an essential part of the landscape and a source of livelihood, and a matter of regional identity and pride, for some 600–900 years.

Initially, pond construction involved sometimes massive habitat modification but centuries of naturalisation and management in Europe have turned these heavily-modified areas into a mosaic of interconnected, semi-natural wetlands. This man-made landscape has subsequently become both familiar to local people over generations and a regional symbol of the long history of aquaculture, water management and the skills associated with these activities that is easily recognisable and acknowledged by outsiders.



Furthermore, these wetland mosaics are visually highly attractive and aesthetically pleasing and so, coupled with tradition and history, the areas are highly regarded by tourists and visitors.

In addition, many local communities in these fish pond areas take great pride in them and voice a strong sense of stewardship towards them (for this concept in relation to ethical debates on environmental management, see chapter 10, section 10.3). These wetlands are the product of many generations of careful management and, as custodians of the ponds, fish farmers believe that they have a responsibility to continue this long tradition without which they believe that the ponds could fall into disrepair, many would become silted and disappear and the unique habitats be lost for ever. While essentially man-made landscapes, these pond areas have existed for so long and are managed in such a way that they have become semi-natural habitats. As such, they are often considered to be hotspots of aquatic biodiversity, supporting populations and communities of aquatic and riparian plants, reptiles, amphibians, fishes, birds and mammals that rely on them for their existence. The disappearance of these pond landscapes would quickly lead to the loss of these distinct oases of wetland biodiversity.

In relation to biodiversity and ecological issues, such wetland mosaics are also often considered to provide ecosystem services to the local areas in the form of flood prevention, water storage and maintainance of the water tables, and a variety of recreational and aesthetic pursuits that take place on, and in, them.

Even in countries where fish farming was developed in the first half of the 20th century, such as Hungary and Latvia, the farm ponds are still considered a significant part of the landscape. In these and many of the traditional fish farming areas across Europe, Cormorant-fisheries conflicts are thus very often framed in economic, biodiversity conservation, and cultural heritage terms.

Carp production has a 500-year tradition in Upper Lusatia, Saxony and it is presented by fish farmers (but also some local NGOs/ pond owners and the Ministry for Environment, see Seiche, 2003) as a good example of positive, sustainable human-nature interaction. As well as Carp, Tench *Tinca tinca*, Grass Carp *Ctenopharyngodon idella*, Silver Carp, Pike *Esox lucius*, Pikeperch *Sander lucioperca*, Catfish *Silurus glanis*, and Sturgeon *Acipenseridae* are also grown in ponds. Upper Lusatia is the centre of Carp production in Saxony and holds a large proportion of its fish ponds. Historically, fish ponds here have had a dual use, as sites of both fish production and of nature and landscape conservation. More recently, they have been supported by compensation payments for predator damage to fish stocks. Nevertheless, fish farmers face a dilemma over the density at which they should stock fish. In order to maximise production (and to be economically competitive, see 13.3 and also chapter 10 section 10.5), farmers wish to rear fish in large densities whereas lower fish densities are preferable for nature conservation purposes. There are also real concerns over poor water quality in some of the ponds which can lead to algal blooms, low nocturnal dissolved oxygen concentrations and fish deaths.

Around 500 people have full-time employment in fish-related or fish pond work in an area of 950 km^2 with 150,000 inhabitants in this part of Saxony. As an important element of local culture and history, the area hosts an annual harvest festival celebrating Carp and Carp production. The festival marks the opening of the fish harvest season, and it is an important marketing activity (in combination with angling and tourism) to promote a regional product as there is no export market. This festival also helps to anchor the cultural and economic base of Carp ponds and Carp farming in the minds of local people and visitors. However, there has been a noticeable change in dietary habits and trends

especially among young Germans many of whom are less keen on preparing and eating Carp than their parents, and this is associated to some extent with the improved availability of other species including Atlantic Salmon *(Salmo salar)* and many sea fish species. The market for Carp is declining.

Moreover, the population in this part of Germany is declining by 1,000–2,000 people annually, and local stakeholders emphasised the need to create greater life-opportunities for younger people so that they could stay in the area. Fish farmers stressed that they did not want to live on compensation payments and that something should be done to ensure the sustainability of the activity so that, as one said, it continues *'to be a dignified way of living for the local community'*.

In France, traditional fish ponds are also seen as an important part of the natural and cultural heritage. There are approximately 100 full-time fish farmers in France with around 50,000 private pond owners who rely, to some extent, on fish production. This is mainly Carp for export, Pike and Tench for local consumption, and more recently the production of Cyprinids for the re-stocking of rivers, lakes and private ponds. The emphasis now is on the role of fish ponds in maintaining biodiversity and wetland habitats. One French stakeholder at the **INTERCAFE** workshop in Paris stated: *'In Brenne we cannot resolve the problem while Cormorant population numbers are high in France. The number of fish farms is reducing, disappearing. The disappearance of a central activity* [is a problem]; *fish farming is a synergetic vocation. Fish farmers manage invasive species, so they help to maintain biodiversity'*.

French pond aquaculture supports the existence of wetland habitats, but fish farmers warned that without help in respect to managing Cormorants many pond farms would become economically unviable and they would be forced to transform these wetland landscapes for agricultural purposes in order to continue income generation. As one stakeholder pointed out: *'No fish, no ponds, no wetland habitats and no longer wetland biodiversity. Farming will take over'*. The main economic problems concern both the ongoing decline in the traditional consumption of Carp and competition with 'new' eastern European EU countries. These countries can export Carp to Germany or Pike to France without paying the old customs duty and also sell at production costs lower than those for the French pond farmers. French farmers have thus lost much of their market (except partially that for re-stocking rivers for anglers).

There are also concerns over the decline in water quality due to intensive maize agriculture, drought (and/or irrigation), and invasive species related to French fish pond systems. Climate change is also thought to cause more drought and warmer waters (as experienced in the summer of 2003). Invasive species are also a serious concern. For example, plants such as *Ludwigia* spp. cover the surface of ponds and cause the depletion of natural oxygen and associated declines in fish production. Animals



Harvesting Carp from a fish pond, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**

such as the red swamp crayfish (also known as the Louisiana crayfish *Procambarus clarkii*) and the Coypu (*Myocastor coypus*) cause damage to pond dams and machrophytes, and the American Bullfrog (*Rana catesbeiana*) reduces the natural biodiversity by replacing native species.

Fish pond construction in South Bohemia, Czech Republic began in the 10th century but the main fishpond systems were developed there in the 16th century. Periodically some ponds were destroyed — for example in the 17th century (during the 30 Years War) and in the





Harvesting Carp from a fish pond, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**

19th century, when ponds were converted to sugar beet culture. There are some 50,000 fish ponds in South Bohemia performing a variety of functions including food production, erosion control, water storage, energy provision, (e.g. small hydroelectric plants), recreation, and the preservation of biodiversity. Local stakeholders emphasised that fish farmers play a vital role in preserving these traditional landscapes and in ensuring the continued existence of this aspect of cultural heritage. For example, they consider that their role includes maintaining Carp as a food source and also continuing a traditional livelihood activity. Třeboňsko is a UNESCO World Heritage Site where *'the pond builders are presented as cultural heroes for constructing what has become a focal point in helping to define the culture* [and identity] *of southern Bohemia'* according to exhibits in the town's 'Man and Landscape' exhibition.

The environmental and cultural benefits of fish farming were also expounded by Latvian and Hungarian colleagues, who described the extensive methods of fish farming where the relatively low fish production (primarily Carp but also much smaller amounts of Pike, Tench, Silver Carp, Bighead Carp *Hypophthalmichthys nobilis*, Pike, Pikeperch, and European Catfish) is said to play a positive role in nature conservation. For example, such fish farming practices may recover and recycle agricultural wastes and use relatively low-quality resources in the production of animal protein. Here, as elsewhere throughout Europe, pond fish farm systems are considered to both play a useful role in integrating agricultural production, recycling wastes and by-products, and to contribute to biodiversity conservation at landscape level. Interestingly, whereas fish farmers do not want to abandon this traditional form of livelihood, there are increasing economic opportunities to be made from nature-based tourism.

Although not common, there appears to be an increasing trend within the pond farm industry to diversify. Such diversification was not through fish production but involves seeking financial opportunities through attracting tourists to pond farm regions. Here visitors can see for themselves the traditional skills of fish famers (though not necessarily understand their problems with Cormorants).

The central environmental contexts of many pond farms in Europe would thus appear to be their regional importance.



Fish pond museum display, INTERCAFE field trip, Czech Republic and *(inset)* 'Fishery Trebon' is the largest producer of freshwater fish in the Czech Republic and Europe. Photos courtesy of **INTERCAFE.**

Although man-made, centuries of careful management and semi-naturalisation have made these wetland mosics very attractive landscapes. Moreover, as complex wetland systems generally managed extensively, these pond farm regions contrast sharply with adjacent landscapes that are often intensively managed. The unusual character of pond systems makes them biodiversity hotspots of scientific/conservation benefit and of aesthetic/recreational value. As well-maintained, functioning wetland systems, these pond farm areas also benefit from a range of ecosystem services provided by such habitats, the most obvious being water storage and flood prevention. In many places this skillful habitat management and 'sustainable' form of fish production has a long history and is seen as being culturally important.

Indeed, in a social context, pond fish farming is often the centre of regional identity in these places. Similarly, as described in chapter 9 (section 9.6.2) in relation to fish farmers in the Czech Republic, local fishermen are often given considerable authority as a popular professional group maintaining a long tradition. However, this duty of stewardship appears to be threatened, not only by the presence of Cormorants but by the failing economics of fish — primarily Carp — production (see 13.3) and a related trend away from Carp as one of the main culinary species to other species that are now more available and cheaper than before.

In most regions or countries, pond farming is the main source of livelihood for some hundreds of fishermen — though some tens of thousands of private owners rely to some extent on pond fish production in France (but above all for hunting). These numbers are relatively small in comparison with other jobs, businesses and livelihood activities. Although locally very important, pond farming

is thus a minority occupation when viewed at a broader scale. In some areas there are also demographical problems as young people move away from pond farm regions to more prosperous towns and cities. Associated with this is the increasing problem of finding younger people to learn the skills and continue the jobs associated with pond farming. Given this suite of pressures, although there is potential for diversification into tourism or even eco-tourism businesses of some sort, pond farmers feel threatened. A traditional way of life may be lost — perhaps within a generation — if ponds are not maintained for fish production but are converted into more profitable agricultural land with all the likely associated losses in biodiversity and ecosystem services. However, this could mainly concern fish pond areas in rich agricultural land as in the Dombes Region in France, for example. The soil conditions of many of the other fish pond areas are of too poor quality to allow agriculture (e.g. Sologne and Brenne in France), or their high salt concentrations make them unsuitable (e.g. many Atlantic and Mediterranean marshes).

13.2 Cormorants, Numbers and Associated Problems

As with most Cormorant-fisheries conflicts, those at pond fish farms stem from the belief of many fisheries stakeholders that Cormorant predation levels (on income-generating fish species) are economically unsustainable (see Carss & Marzano, 2005, also chapter 9). For example, Cormorant predation at Carp ponds in Upper Lusatia, Saxony was considered a problem, and balancing fish farming and Cormorants in the area (there can be up to 4,000 birds during the autumn migration period) was considered to be a difficult. As one company owner stated *'This issue is never free of conflicts'*.

Israel's particular location at the junction of the European, African and Asian continents makes it a key flyway for hundreds of millions of migrating birds that pass through twice a year and over-winter there in large numbers. Some of the Cormorants that over-winter in the Hula Valley, the main location of the Israel Case Study, are believed to breed in the southern Ukraine (see also Nemtzov, 2008) and wintering numbers have increased in Israel from 59 individuals in 1975 to 25–30,000 birds by 2006. Their spatial distribution has also expanded from primarily the large water bodies in northern Israel to waters in all parts of the country, even those in desert areas. Moreover, Pygmy Cormorants (*Phalacrocorax pygmaeus*), a species native to Israel, are an increasing problem at Israeli fish ponds too. Israel has a dense human population co-existing alongside a high diversity of wildlife species that are protected by strict laws and experience low hunting pressure.

Thus, rising Cormorant populations and the numbers of birds roosting in high density fish-production sites are linked to excessive predation and economic damage. Moreover, efforts to scare birds away from pond farms contribute to increased manpower and monetary costs. However, as discussed in section 13.4, the Hula Valley situation offers an example of close local cooperation where an understanding of Cormorant behaviour has greatly reduced the problem of Cormorant predation at pond farms for several years, at least. Nevertheless, Israeli fish farmers look increasingly to Europe



Carp showing characteristic damage from Cormorant's beak, INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE.**



Fish pond museum display, INTERCAFE field trip, Czech Republic.
Photo courtesy of **INTERCAFE.**

for solutions and, more recently, to the Ukraine (see Nemtzov, 2008) to help address the problems caused by Cormorants visiting their country on migration.

The Czech Republic has several different water system types that are used by anglers and/or by commercial fisheries. Large rivers, small rivers and reservoirs are mostly stocked with fish species for angling purposes, whereas large and medium-sized fishponds originally constructed in the Middle Ages are used traditionally for Carp farming. Cormorants are present in parts of the Czech Republic throughout the year, although often in low numbers — some 200–350 pairs in 2001–2010, for example. The birds were rare migrants in the Czech Republic before the 1980s, but there was an increase in the occurrence of non-breeding birds in the 1970s and 1980s. The main Cormorant breeding area is now in the south of the country after birds began breeding in South Moravia in 1982. Here, there has been a decline in numbers breeding following the removal of dead trees used for breeding and roosting and a programme of shooting birds in the pre-and post-breeding periods.

Records of ringed birds shot in the Czech Republic show that the country is clearly an important area for Cormorants migrating from a number of different countries. Many of the birds shot here in spring and autumn, and to a lesser extent winter, were hatched in colonies in Sweden, Finland and Hungary; most of those shot in the summer breeding period or immediately after are from the Czech Republic itself. Since breeding began in the Czech Republic, Cormorants have dispersed more widely across the country, and numbers are believed to have increased (to perhaps some 10,000 individuals in winter) due both to strict protection and to improved environmental conditions, leading to bigger economic losses for fish farmers, with the most damage to 1-year+ Carp — fish in their second year of life.

A common argument used against Cormorants by fisheries stakeholders in the Czech Republic is that the birds are not native to the country and are ‘aliens’ or ‘outsiders’ (a common theme



Roosting cormorants, INTERCAFE field trip, Israel.
Photo courtesy of **INTERCAFE.**

throughout Europe, see chapter 9). According to one academic, who presented a sociological analysis at the **INTERCAFE** meeting in South Bohemia: *'These birds are protected animals but, at the same time, they are considered to be an economical pest for many fisheries. In the background of this conflict we can find different understandings of 'nature'. It is a fight between knowledge based on personal experience and knowledge based on abstract studies, a fight between the old, local world and the new, modern 'outside' world'*.

Although the fish most commonly consumed by Cormorants are not yet of marketable size, they are clearly the foundation of the fishery, and large losses are of great concern to fishermen, both in terms of direct losses to the fishery and as a 'warning of things to come'. Thus Czech fish farmers are concerned for their future as they look to other places in Europe that are now unable to produce a reliable supply of 1+fish. This is a problem that has been attributed by pond fish farmers across Europe to Cormorant predation both directly and indirectly. As a fish farmer explained during **INTERCAFE's** field trip, Czech fisheries stakeholders are worried that an inability to overcome the Cormorant problem in other parts of Europe will soon apply to them too. Pond farmers are thus working under the threat that fish production conditions will only worsen if Cormorant numbers are not addressed.

France is certainly one of the most important countries in Europe for migrating Cormorants, with approximately 100,000 birds visiting there each winter. Despite the French Case Study workshop being themed around a 'national overview', there was a clear stakeholder-driven emphasis on the 50,000 ha of fish ponds in the country. Those stakeholders attending the Paris meeting believed that pond fish farmers suffered most from Cormorant predation, as well as some upstream areas of rivers where fish densities are low. Estuaries, coasts, lakes, reservoirs and downstream areas of rivers were said to be virtually free of Cormorant-fishery conflicts. However lobbying pressure from anglers on the authorities induced a large shooting plan for wintering Cormorants in all types of waters (with over 30,000 birds shot each winter). Interestingly however, only about 8% of France's wintering Cormorant population occurs in the five main fish pond areas of the country, despite farmers maintaining that their fisheries suffer most from the birds.

As in the Czech Republic, Cormorant predation on relatively young Carp was considered to be the most important, as a source of direct losses to pond fish farms at least. However, in a clear example of the interrelatedness of the fish farming industry and other fisheries activities, the three million freshwater anglers in France can themselves impact on the country's fish farming activities and economics. Anglers are increasingly delaying the purchase of fish for re-stocking their waters until later in the year after the potential danger of Cormorant predation has passed and migrating birds have returned to their colonies. Thus, fish farmers are forced to store their stocks for longer before they are sold, which can lead to increased costs of husbandry and food as well as to problems with fish health. Administratively, 55 out of the 97 French *départements* consider that they have Cormorant problems of some sort. For the first time, birds are now present in France thoughout the year and some inland breeding colonies have now been established. One French fisheries representative told us that: *'Cormorants are considered by fishermen as dangerous predators. Cormorants eat lots of younger fish from repopulation. They inflict wounds on fish which lead to delayed death. Even if this is only considered as an aggravated factor, some fisheries cannot meet their expenditure. Some close'*. However, such Cormorant impacts have to be considered against a globally poor economic situation for fish pond aquaculture, competition with new EU Member States, and the consequences of nutrient enrichment and/or invasive species (see also 13.1).

During other **INTERCAFE** meetings, further presentations on Carp pond farming were given by participants from Hungary and Latvia. In Hungary breeding Cormorant numbers are said to have increased since the 1980s, with a more rapid increase since the 1990s. There are now an estimated 3,200 nesting pairs, which are boosted by an increasing number of migrating Cormorants. Most of the fish pond farms in Hungary — holding predominantly Common Carp — are located in protected areas (a similar situation to many other countries), and Cormorant predation here is again primarily on first or second year stock. Indirect losses through



Overwinterting cormorants INTERCAFE field trip, Israel.
Photo courtesy of **INTERCAFE.**



Drained fish pond after Carp harvest, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**

stress to fish are also attributed to the presence of Cormorants, and the birds are accused of directly destroying native biodiversity, particularly in nesting and roosting areas.

There are currently nearly 40 active fish farms in Latvia and, of 5,500 ha of fish ponds, around 1,000 ha are farmed by small-scale fish farmers (ponds of less than 1 ha) for local consumption and recreational angling. The remainder belong to six fish farms, located mainly in NATURA 2000 areas, which breed 90% of the total freshwater fish for market. It is at these large fish farms that Cormorants are thought to cause the most problems, through direct predation and indirect damage and distress to stocked fish. According to 2005 figures (Laboratory of Ornithology, state agency Nature Museum), approximately 4,000 migratory Cormorants were counted between May–August. Numbers peak between September–October, with the possibility that birds will stay and feed longer through November–December if the ponds are not covered by ice.

The central Cormorant issues in most European pond farming regions are thus associated with a trend towards increasing numbers of over-wintering or passage birds outside the breeding season. There is a general feeling therefore that these birds are 'outsiders', and this often leads to both the problem of too many birds and the desired solution of a reduction in their numbers being considered an international, European issue. In most regions there is also an associated trend towards birds remaining in an area throughout the year and often starting to establish breeding colonies. There are increasing numbers of 'home-grown' Cormorants, and problems are no longer confined to outside the breeding season but are occuring increasingly throughout the year. Similarly, Cormorants no longer appear in small numbers at reasonably predictable times and places, but are often present in relatively large numbers throughout a region or even an entire country. However, although this is the case in France, the total number of wintering birds here has stabilised since the end of the 1990s and even decreased by 13% in the national census of January 2009.

At Carp ponds the main Cormorant-related problem is the consumption of young Carp and an associated decline in fish yields at harvest. Associated, indirect



problems are related to increased stress levels in fish due to the presence of Cormorants and the increased mortality of others that are damaged through unsuccessful Cormorant attacks. In some cases there are other indirect economic consequences of Cormorant predation. As such, Cormorant presence and predation at the levels currently experienced are thought of as causing severe and direct financial losses to pond fish farming. In addition, valuable time and resources are spent on scaring and/or shooting Cormorants and trying to manage them locally. This is all being played out against a background whereby excessive, selective Cormorant predation on juvenile Carp — the foundation of the whole fishery — is considered to be severely threatening the industry at the European scale. For example, the Czech Republic has targetted markets in other European countries that claim that they are no longer able to supply a reliable source of young Carp, apparently as a result of shortages cause by Cormorant predation.



Overwintering Cormorant (born and ringed in Finland) shot at pond farm, INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE.**

13.3 Legal/Policy and Economic Contexts

Flexibility in the interpretation of international legal frameworks by different EU Member States and the balancing of Community regulatory powers and Member State discretion — for example over Article 9 of the Bird Directive relating to derogations — is discussed in chapter 7. The issues highlighted by stakeholders in relation to how they experience national and regional policy decisions in relation to Cormorants are identified and examined here. Inevitably, this exploration includes brief descriptions of management measures, but these are discussed in detail in section 13.4. However, the role of financial compensation for the damage caused by the Cormorants is identified as a key policy instrument that has alleviated the conflict in some areas.

Israel is party to AEWA (the African-Eurasian Waterbird Agreement) and to CMS (the Conservation of Migratory Species). In accordance with Israeli wildlife protection laws, Great Cormorants can roost safely during the entire winter when they are present in Israel. In the Hula Valley such roosts in nature reserves are adjacent to, or within easy flying distance of, up to eight kibbutz fish farms. Each kibbutz is issued 'depredation permits' to allow them to shoot up to six Cormorants per farm per day during the winter. Many fish farmers stated that they do not reach this quota

as the birds have become more difficult to target since shooting began. For fish farmers in the Hula Valley *'economic success would be to grow fish in winter time'*. Previously, fish farmers have avoided raising fish in the Hula Valley in winter partly, at least, due to the presence of large numbers of migratory Cormorants. However, though coordinated action, farmers have managed to reduce the number of Cormorants both roosting in the nature reserve and feeding on their fish ponds. Bird numbers are considered low enough now for the farmers to attempt to grow fish in the winter.



Harvesting Carp from a fish pond, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**

Great White Pelican *Pelecanus onocrotalus* and Cormorant migration periods coincide with the winter 'storage' period for fish stocks on farms. Fish growth is temperature-dependent and lasts only 7–8 months in Israel: during the 4–5 winter months, marketable fish and fingerlings (young-of-the-year fish) are thus stored in heavily-stocked ponds. Based on very conservative estimates, the annual direct economic loss to fish-growers, exceeds $5.1 million US repartitioned as follows: Direct Cormorant predation ($3 million), patrol and deterring equipment ($1.6 million), and summer predation by Pygmy Cormorants ($0.5 million). (Dan Mires, report to **INTERCAFE** Case Study).

Carp and Tilapia are the main cultured species. Indeed Carp is considered critical for the survival of these farms, which face additional competition from cheap imports of some species of fish. However, the future potential of eco-tourism revenue from bird watching was raised by some stakeholders, as the Hula Valley is home to around 380 species of birds during the migration season.

During discussions with fisheries stakeholders at the Saxony meeting, a range of issues were highlighted in addition to that of Cormorant predation at ponds. These included the difficulties faced by many as a result of the transition from a socialist system. For example, ponds are often leased from the State, as one participant said: *'there are quarrels about new contracts. Difficulties in buying our equipment from the State — we need our production to pay for these things'*.

Falling prices are another serious problem reported by the fish farmers in Upper Lusatia, coupled with increasing market competition from other countries. However, state compensation for predator damage can help alleviate some of the financial problems that fish farmers face in this region and, while not affecting the presence of Cormorants or any associated fish losses, they certainly seem to go some way to reducing the conflicts. Depending on the state budget, financial compensation can cover a maximum of 80% of total estimated fish losses. When **INTERCAFE** met in Saxony in 2005, compensation payments were said to vary annually but were in the range of 600–800,000 euro. In discussions, **INTERCAFE** noted that: *'Overall this system involves some €600,000 paid as compensation per annum throughout the region. The estimated losses of Carp due to Cormorant predation are thus reasonably well compensated, as the price per kg amounts to €5.25. The marketable price of 3+ Carp is about €1.79. Thus, compensation takes into account the future value of predated Carp of 1+ and 2+ cohorts as it is based on market prices.'*

However, the continuation of this financial support was not assured and there were concerns that businesses could collapse if it was reduced or withdrawn. It was thought that conflicts with Cormorants might well increase, although local fish farming companies can get permission to remove nests and eggs by flushing-out nests with high-pressure water sprays.

In South Bohemia, the Ministry of the Environment is responsible for environmental and nature conservation and the Ministry of Agriculture is in charge of fisheries and hunting policies. Overall, the Czech Republic has no comprehensive plan to deal with Cormorant-fishery conflicts. There are mitigation measures (e.g. laws about financial compensation payments), which are primarily undertaken by the Ministry of the Environment and regional conservation authorities, although it seems that legislation can be interpreted in different ways in different regions of the Czech Republic. Nevertheless, according to the law, financial compensation can be provided only in cases where damage is caused by animals that are listed as 'specially protected species' (Act No. 114/1992). There are around eight such species including Wolf *Canis lupus*, Otter *Lutra Lutra*, Brown Bear *Ursus arctos*, Lynx *Lynx lynx* and Great Cormorant. Not only is financial compensation limited to situations involving these particular species but claims have to conform to specifically listed types of damage (e.g. to fish stocks) before being eligible. Financial compensation is thus available for fish farms in cases where fish are stocked for economic purposes in such places as fish ponds, fish farms and fish hatcheries. Importantly, though, compensation is not paid for damage caused to fisheries in running waters. Recreational anglers do not receive state support in terms of financial compensation even though they may also stock fish.

In the Czech Republic, any request for financial compensation must be addressed to the Department of Nature Conservation of the Regional Government or the Landscape Protected Area/Nature Park Authorities. Furthermore, claims must be submitted no later than six months after the start of apparent damage. Compensation can also be paid for indirect damage (i.e. not only for those fish eaten by the birds), although all requests for compensation have to be confirmed through an expert review by biologists. To compensate for the direct consumption of fish by Cormorants, fish farmers across the Czech Republic receive around 1,000,000 Euro from the state each year. Financial compensation for damage to fish stocks is viewed by many as a positive feature but it clearly depends on the goodwill of the Government to make payments from the state budget. Much of this money goes to the larger fisheries that have the time to submit claims, have knowledge of the compensation law and of the bureaucracy connected with the procedures for securing the compensation. Furthermore, larger companies also find it easier to pay for the expert opinion required in the process of claiming compensation.

The amount of compensation paid in individual cases is not related to 'real' damage (i.e. rigorously quantified fish losses) but to the intensity of bird presence on the relevant water. It was noted by **INTERCAFE** that the estimated



Local festival celebrating the Carp harvest, INTERCAFE meeting, Saxony.
Photo courtesy of **INTERCAFE.**



Harvesting Carp from a fish pond, INTERCAFE field trip, Saxony.
Photo courtesy of **INTERCAFE.**

consumption of fish by Otters is probably roughly comparable with that of Cormorants (some 891tonnes and 940 tonnes, respectively — see section 11.7 of van Eerden *et al*. 2012), but that only about 150,000 Euro of compensation is paid for Otter damage. Stakeholders at the meeting suggested that the money received for Cormorant damage was 'enough', so they did not claim more for any additional fish losses to Otters. Smaller fish farm companies, often discouraged by the bureaucratic processes associated with compensation claims, can take matters into their own hands and may reduce Cormorant impacts illegally.

As elsewhere in Europe, any reduction of Cormorants numbers (i.e. by lethal control measures) is problematic in this region of the Czech Republic because the birds here are on a migration flyway and there is often a high turnover of them at roosting and feeding sites. Interestingly, at one fish pond visited by **INTERCAFE** during the field trip, we were told that compensation was originally (in 2000–01) proposed for damage from the indigenous population of around 200 Cormorants and that it was not available for damage caused by migrating birds (for which lethal control was allowed). Nevertheless, legislation change in 2002 allowed compensation to be paid for damage caused by Cormorants throughout the year.

Although financial compensation payments for Cormorant damage has increased in the Czech Republic since 2002, there is no political consensus over the way forward. During a break-out session at the Czech meeting, it was learned that the Ministry of Environment had previously proposed that Cormorants be excluded from the category of 'specially protected species' meaning they would be afforded the same protection as most other bird species. The request was rejected by the Ministry of Agriculture which argued that if Cormorants were excluded from the specially protected species list, then fish pond owners could not ask for, nor receive, financial compensation. The Ministry also believed that the shooting or numerical reduction of Cormorants would still be complicated due to the species' protection under the Birds Directive, regardless of its protection at the national level. Subsequently, the Ministry of Environment wanted to apply a new decree to enable the regulation of Cormorant numbers across wider areas and under wider conditions.

In Latvia and Hungary there are currently no compensatory measures in place, though many fisheries interests would like financial aid to be made available there. Such compensation would cover both the value of fish losses from Cormorant predation but also motivate fish farmers to continue with their ecologically-sensitive, extensive fish-husbandry methods which are said to encourage a healthy and diverse flora and fauna. The economic viability of fish farming in these countries was said to be under threat from (a) more profitable intensive fish breeding systems in other states, (b) increased competition globally, and (c) the costs of adhering to stringent national and European legislation on products, the environment and health. As one Latvian representative pointed out: *'Fishermen feel they suffer due to local and EU government'*. Fish farmers in Hungary also do not

receive any financial compensation as their national regulations do not cover Cormorant damage on fish farms. National environmental authorities also state that they do not have the physical or monetary resources to support such a compensation system.

Fish losses to Cormorants at pond farms in France were estimated by one stakeholder to be in the region of 20 million Euros per annum. There are a range of reasons for fish losses at ponds, but Cormorant predation and the handling of fish in September when the water is warmer were cited as important causes of loss. Fish pond production in France was claimed to have declined from 12,000 tonnes per year in 1990 to 8,000 tonnes in 2008. However, this decline is not really proven because there are no national statistics on production and the Ministry of Agriculture and Ministry of Environment 'roughly estimated' production in 1990 to be 8,000 tonnes. Real or not, Cormorant impacts were largely blamed for this decline, although the abandonment of ponds mainly due to European competition was also cited as an issue.

Cormorants are said to target two-summer Carp leading to an estimated 10–30% loss of stock. Some small producers now have to import small Carp from Eastern Europe but there are concerns that some of these countries cannot guarantee supply. A lack of profitability (because of Cormorant predation) was cited for the anticipated continued reduction in production to 4,000 tonnes over the next two years (2008–10). However, it was also noted that diversification provided the potential for increasing fish production. Although Carp is declining in popularity amongst customers, fish farmers in France have started to produce a range of other species including Black (Small-mouth) Bass *Micropterus dolomieu*, Sturgeons, Grass Carp, and Perch *Perca fluviatilis*. There were also claims that perceptions of the Cormorant 'problem' were actually preventing people from investing in fisheries.

There was some sense that the heavy bureaucracy of the French administration was a stumbling block to the coordination of Cormorant mitigation strategies, with the management focus being largely on shooting under an intensive and increasing programme which began in 1996. Up to 33,000 Cormorants were shot in France in the 2009–10 winter (and 31,000 in the 2007–08 winter) when the maximum allowable quota was 41,800 birds. While shooting was originally claimed to be both a measure to (i) reduce or stabilise Cormorant population levels and to (ii) protect fish farms and other fisheries at a local scale, only the second aim is admitted nowadays. This is because the national census showed that shooting had no effect on stabilising the Cormorant population. It is thought that this lack of effect is primarily due to natural, density-dependent factors mainly in natural waters where 92% of the birds are wintering. Both fish farmers and anglers are permitted to shoot Cormorants to protect their fisheries, and the national quota for shooting the birds is divided up between *départements*. Shooting quotas for each year are based on the numbers shot in the previous



Local festival celebrating the Carp harvest, INTERCAFE field trip, Saxony. Photo courtesy of **INTERCAFE.**

year. Each *département* must report on numbers shot to the Ministry of Environment in May, and new quotas are issued in September for the forthcoming winter.

However, stakeholders at the **INTERCAFE** meeting emphasised that shooting is prohibitively expensive and that Cormorants are not easy to target: *'It takes 70 minutes to shoot one Cormorant and time to get there and two cartridges. Thus it costs 120 Euros per Cormorant added to the loss of fish that we have suffered from predation'*. Most of the shooting had been undertaken by official organisations (the National Councils of Angling and the National Office of Hunting belonging to the Ministry of Environment). However these organisations decided to stop participating in shooting in 2008 (ONEMA, the French National Agency for Water and Aquatic Environments) and 2010 (ONCFS, the National Office for Hunting and Wildlife). Shooting is now undertaken mainly by anglers on a voluntary basis and, consequently, the actual cost of the programme is unknown.

Stakeholders also stated that Cormorant culling in France has not solved the problem and that there was little drive to receive compensation, although one representative emphasised the crises facing French fish farming: *'I can only tell you what is in my heart. There are 40,000 pond owners… compensation is not to put money in our pockets. It is to save our ecology, nature we have inherited. It is linked to the environment and we want to maintain our heritage. Cormorants are killing the economic support we have…'*

Calls for a pan-European Cormorant management plan are common among all fisheries stakeholders (and some **INTERCAFE** participants), particularly in states where migrating Cormorants are considered to be the primary problem. Many fisheries stakeholders in France voiced their frustration with current management measures and said there was an increasing urgency for new solutions: *'There is an army of Cormorants…In less than 5 years it will be too late for a European regulation plan'*. However, other than calls of the European Commission to 'do something', there has been little clarification, or common agreement, over what 'pan-European management' actually means, nor the legislative measures that it would entail.

13.4 Management Measures

Practical mitigation techniques and an extensive discussion of management measures in relation to reducing Cormorant problems at fisheries are available elsewhere (see The **INTERCAFE** Cormorant Management Toolbox: methods for reducing Cormorant problems at European fisheries by Russell *et al*. 2012). Below, there are examples of some of the discussions that took place at **INTERCAFE** meetings, provided in order to give specific context to some of these management issues.

As *'migrating birds know no boundaries'*[88] people often have to consider Cormorant management issues across a wide range of geographical scales. The Hula Valley example was originally presented in REDCAFE (see Carss, 2003: 141) as an example of a management success story and it is also discussed in detail in Russell *et al*. 2012 (see section 6.7). Collaboration between local stakeholders and scientists led to the development and implementation of a proactive programme for the reductions of both Cormorant-derived losses to fish stocks at pond farms and also to the numbers of birds shot there each winter. This programme was based on deterring Cormorants intensively from fish ponds and the birds' subsequent movement to other less sensitive foraging and roosting locations.

When asked which mitigation measures they used in the Hula Valley one fish farmer explained: *'Information, organisation, and timing! When the first Cormorants come to Israel we know. When we first started each of the farms fought between themselves. But we decided to work together, to pass information on-line — 'I'm scaring birds so be ready' We got it to work across the whole valley. We use walkie-talkies and things to keep in touch'*.

Essentially, this programme resulted from collaboration between biologists, fish farmers and NGOs. Through large-scale coordinated disturbance, Cormorants are scared from vulnerable fishponds to less sensitive, alternative foraging sites. As this programme developed, estimated fish losses, numbers of dead Cormorants and operating

[88] Slogan of the International Center for the study of Bird Migration at Latrun, Israel.



Migrating Cormorants. Photo courtesy of Shutterstock.

costs (e.g. staff time, ammunition) all declined (see also Carss, 2003, Marzano & Carss, 2006[89]).

In terms of the 'transferability' of such management measures, it is clear that flexible and adaptive management solutions to the influx of migrating birds have also been applied across a range of bird species in Israel, all relying on the provision of one or more alternative food sources. For example, 20,000 Cranes *Grus grus* over-winter in the Hula Valley and can cause considerable damage to winter crops. By providing alternative feeding and drinking sites in the Hula Valley, and by concentrating Cranes in a few fields, the conflict was reduced and the ecotourism potential of the Cranes increased. Similarly the provision of 'trash fish' (i.e. small fish of no commercial value) for migrating Great White Pelicans has reduced the pressure on fish farms (see also section 13.1). Israeli stakeholders recount how they transferred the strategy for Pelicans to Cormorants. Conflict with Pelicans began in the 1980s after the Hula Valley was re-flooded and the birds began to stop there to rest and feed on their winter migration to Africa. At first Pelicans were shot, but a representative of the Northern Galilee Agricultural Association described what happened next:

'During the late nineties, we tried to use an alternative feeding strategy for the Pelican, using non-commercial fish [wild spawned Redbelly Tilapia Tilapai zillii], *as suggested by the biologist of the Hula Reserve and it was helpful. The conflict with Cormorants seemed so different so we shot to kill, although it didn't solve the problem at all. In 2001 we decided to cooperate with the Hula Reserve team to avoid the killing of Cormorants and to shift to non-lethal deterrence of Cormorants…'*

In relation to the complex issue of practical Cormorant management at pond farms, factors that people agreed have worked well in the Hula Valley Case Study included:

- Establishing and building trust, and agreeing common goals.
- Building and maintaining effective communications, information exchange, coordination, monitoring and organisation among stakeholders.
- Increasing experience with scaring strategies has lowered costs as fishermen have become better and more efficient with timing and coordination of control measures.

What has been difficult to establish is any form of 'scaling up' of the Hula Valley success to regional and/or national levels. It was recognised that (a) effective communication and coordination of deterrents will not be easy in a larger area probably holding more diverse fisheries and habitat types, and (b) some stakeholders felt that moving the birds in such a management programme merely shifted the problem elsewhere. Indeed, discussions during the **INTERCAFE** Case Study highlighted that while directing Cormorants to Lake Kinneret through scaring them at fish farms had reduced the local problem and the conflict with the birds in the Hula Valley, fishermen in Bet She'an, south of Lake Kinneret, did not share in the success as they felt that the birds had merely moved to their location, thus raising the question: *'Where should the birds go?'*

The fish farmers of the Bet She'an Valley (an even more intensive fish-farming region than the Hula Valley) rely heavily on fish farming in winter and have little tolerance for Cormorants or Pelicans. A successful programme of cooperation reduced the conflict with the Pygmy Cormorant (Nemtzov, 2005). The conflict with Pelicans was solved by zero-tolerance for Pelican presence in the valley; they are immediately chased out and have largely learned to avoid the valley during migration. The challenge of preventing Great Cormorant depredation persists and has not

[89] Marzano, M, and Carss, D N (editors). 2006. Cormorant-fishery conflict management in the Hula Valley, Israel. **INTERCAFE** Case Study report: www.intercafeproject.net/workshops_reports/index.html).

been resolved to the extent of that in the Hula Valley.

In France shooting Cormorants is one of the main management measures used by fish farmers, with tens of thousands of birds being killed each winter. However, it became clear during the Case Study meeting in Paris that shooting is costly, both financially and in terms of manpower. Moreover, it was also stated that enthusiasm for the technique has waned in recent winters after 15 years of shooting, as quotas are getting harder to reach and no real fall in Cormorant numbers has been recorded. A government official explained why national quotas are not reached: '*… Cormorants are difficult to limit effectively. People get tired of doing this. They have to do it all the time. They have to do it every year*'. There was also a discussion over the effectiveness of shooting and the difficulties involved in assessing any effect, especially given the inherent difficulties in quantifying either fish stocks or the effects of Cormorant predation on them in France or any other country (for a full discussion on these difficulties, see chapter 9 of Carss *et al*. 2012).

Another argument put forward was speculation that additive Cormorant numbers from northern countries were now also moving into Spain to over-winter as a result of saturated winter food resources in France (and that France could no longer sustain an increasing wintering population anymore). Both these possibilities — a higher 'through-put' of birds passing through France on migration to/from Spain and possible increased competition between Cormorants in France for possible declining fish stocks there — suggest that removing birds by shooting could become increasingly ineffective in France: shot birds there would be quickly replaced by others either moving locally in search of winter foraging opportunities or on passage to/from the Iberian Peninsula.

This is an appropriate point to stop and go a little deeper into some of the information relevant to this debate over the wintering Cormorants in France. Loïc Marion, an avian ecologist in France has been involved in Cormorant issues there for many years. He considers that the reasoning outlined above (from discussions at the Case Study meeting) is partly inexact for two reasons.

First, between 1980 and 1997, French waterbodies were able to sustain most of the wintering Cormorants arriving from northern Europe, but this French wintering population was progressively levelling-off from 40,000 to 98,000 birds, with no more increase after 1998–2009. Nationally, the increasing competition between birds in France (supplemented by increasing numbers in the early years) is likely to have induced a progressive increase in further migration to the Spain for some birds. The Spanish wintering population thus increased from only a few birds to 70,000 nowadays. These 70,000 wintering birds in Spain travel rapidly through France to reach Spain. At the same time, some 98,000 other Cormorants stay in France (92% on large rivers, sea coasts, lakes, secondary upstream river sections, and 8% in the five main fish farms areas).



Wintering Common Cranes *Grus grus*, INTERCAFE field trip, Israel.
Photo courtesy of **INTERCAFE.**

Second, the stabilisation of the French wintering population is not proof of a decline in the national fish stock, only of an equilibrium between production and predation. A decline of the fish stock in France could be suspected only if the population of Cormorants decreased: because the birds were either suffering from starvation and increased mortality and/or flying onwards to Spain in higher proportions. The only indication of such possible starvation occurred in 2009, when the French wintering population first decreased by 13%. However, it would be necessary to verify that this decrease was not due to a reduction in the production of young Cormorants during the previous breeding in summer 2009 and/or to the increase in the



mortailty of birds that might have reached a threshold, exceeding the mean survival of the population. A cold wave also occurred in January 2009 and this could have increased both mortality on onward-migration due to led available food resources (as a result of ice cover) because the fall in numbers only occurred during this month (Marion, 2009).

As there is no study in France on fish stocks in natural areas (and even in fish ponds), a possible decline of fish stock is merely theoretical and impossible to prove. Thus, caution is necessary before mentioning a decline of the overall fish stock in France, even if fish farmers or anglers believe they are suffering from the effects of Cormorant predation.

More Cormorants are shot in France than in any other European country (see van Eerden *et al.* 2012 section 10.3 for further information). However, much of the job of shooting falls disproportionally on fish farmers, many of whom believe that it is not their role to try and solve the problem of Cormorants in France. They also feel that the problem is not given as much recognition by the authorities as it deserves, in contrast to carnivore conservation and management for species such as Bears and Wolves. As in other countries, many in France are looking to Europe for a solution to the Cormorant problem. However group discussions at the Paris meeting highlighted potential contradictions when looking to Europe to resolve national conflicts. On one hand, most of the Cormorants are migrants so it makes sense for French stakeholders to view the problem as one originating from beyond French borders. On the other, there does not appear to be an integrated approach across France (e.g. across regions, *départements*, *sectors*, ministries, etc.), and so people present at the meeting wondered whether Brussels could be expected to provide an integrated approach across Europe when this was not even being achieved at the national level.

Nevertheless, as a representative of the French Fish Farmers Association pointed out: *'People are more and more de-motivated to take action against the Cormorants as it is a seemingly endless problem, fish farming has become less productive and it is more difficult to see the direct benefits. Cormorants are also very clever, so it gets more and more difficult to approach and shoot them'*.

Furthermore, they also feel under pressure for the actions that they do take: *'Fishermen that shoot don't shoot out of pleasure. You can't eat them and the public don't like it but what can be done?'*

In France, fish farmers said they have tried a range of management measures and found them to be of limited use (however, Russell *et al*. 2012 report that many of these have been shown to be effective — at particular times of year at least — in other places). Non-lethal methods such as gas canons and blank shots are effective for only short periods as Cormorants quickly adapt or become habituated to these techniques. Similar conclusions on the short-term nature of noise-generating auditory deterrents were reported from many other countries — for example at some fish farms in Latvia, Cormorants even forage between blasts. Other potential Cormorant management solutions were discussed by the French stakeholders, including 'intensification' where fish production is concentrated at a smaller number of ponds. However, there were considered to be a number of drawbacks to such an approach. First, the fish would require supplementary feeding, which increases production costs. Second, intensification can lead to a reduction in fish quality and to an increased risk of disease and/or stress. Third, intensification has a greater environmental impact and it was claimed that the abandonment of some ponds could lead to a loss of biodiversity.

Given these concerns, fish farmers were clearly not in favour of intensification. Nevertheless, there



Netting stretched across ponds to protect fish from birds, INTERCAFE field trip, Israel. Photo courtesy of **INTERCAFE.**

have been some changes to fish farming practices in France in an attempt to reduce Cormorant predation. For instance, fish harvesting now takes place from September to mid-November in an attempt to avoid the peak wintering period for migrating Cormorants. Around 80% of the fish harvested at this time go to market while 20% are held over winter and stocked out in the ponds again in the following March. These 'over-wintering' fish are transferred to well-protected ponds before the Cormorants arrive but this affects production costs, with lower overall biomass produced and a fall in fish quality as a result of factors such as higher stocking densities, stress and risk of disease.

The French Ministry of Environment states that France does not have the technical capacity to control the damage caused by Cormorants and the country is looking towards a European strategy. One official pointed out: *'There is no European plan of management. It doesn't exist. Each country doesn't want to know the problems of other countries. We need to do things differently'*. However, stakeholders at the meeting did suggest that they wanted a specific upper limit for Cormorant nests, a good practice guide for managing Cormorants, and relevant guidance at the European level.

References

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169 pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265 pp. http://www.intercafeproject.net/pdf/ REDCAFE SummaryandNationalOverview.pdf

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J (editors). 2012. The INTERCAFE Field Manual — research methods for Cormorants, fishes, and the interactions between them. COST Action 645 Final Report II. ISBN 978-1-906698-08-9.

Marion, L. 2009. Recensement national des Grands cormorans hivernant en France durant l'hiver 2008-09. Ministère de l'Ecologie, de l'Energie, du Développement durable et de la Mer, MNHN et Université de Rennes, SESLG: 38p.

Nemtzov, S C. 2005. Relocation of pygmy cormorants *Phalacrocorax pygmeus* using scare tactics to reduce conflict with fish farmers in the Bet She'an Valley, Israel. Conservation Evidence 2: 4–6. Available at: http://www.conservationevidence.com/individual-study/2134

Nemtzov, S C. 2008. Israel-Ukraine cooperation for experimental management of a shared overabundant population of Great Cormorants (*Phalacrocorax carbo*). Proceedings of the 23rd Vertebrate Pest Conference (Timm, R M, and Madon, M B, Editors), published at University of California, Davis, pp.108–112.

Russell, I R, Broughton, B, Keller, T, and Carss, D N. 2012. The INTERCAFE Cormorant Management Toolbox: methods for reducing Cormorant problems at European Fisheries. COST Action 635 Final Report III. ISBN 978-1-906698-09-6.

Seiche, K, Gerdeaux, D, Gwiazda, R, Lévai, F, Musil, P, Nemenonoks, O, Strod, T, and Carss, D N. 2012. Cormorant-fisheries conflicts in Carp pond areas in Europe and Israel — an INTERCAFE overview. COST Action 635 Final Report V. ISBN 978-1-906698-10-2.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906698-07-2.

14 COASTAL (OPEN SEA) FISHING WATERS (BALTIC)

Mariella Marzano

This chapter uses **INTERCAFE's** Case Study concept and methodological approach (described in chapter 12) to draw out the essential social, cultural and legal perspectives for 'real world' Cormorant-fishery conflict situations experienced by **INTERCAFE** participants and local stakeholders. Here, a number of 'contextual themes' are used to explore conflict situations at coastal waters and on open seas, other waterbody-fishery types being examined elsewhere (chapters 13, 15–16). A synthesis for the Case Study approach and the explorations described in chapters 13–16 is then provided in chapter 17.

Coastal fisheries were primarily discussed at the **INTERCAFE** meeting at the Hanko Peninsula, Finland. However, these fisheries were also considered at the meeting in Gdansk, Poland (and to some extent at the Po Delta meeting in Italy, see chapter 15). Finland was chosen for an **INTERCAFE** meeting because, unlike many other situations covered by the Action, Cormorants were considered a relatively new issue there and the development of a breeding population was another new phenomenon. Despite relatively low numbers of Cormorants breeding in Finland, the population is increasing at around 50% a year. Although problems with the birds do not yet appear to be of the scale experienced in some other regions of Europe, the Finnish government has already devised a national Cormorant Management Plan in an attempt to address the issue sooner rather than later.

14.1 Environmental and Social Contexts

Many of the discussions with Finnish stakeholders were focussed on environmental concerns, particularly in relation to the state of the Baltic Sea. The Baltic covers 415 km^2 and has an average depth of no more than 50 m. This water, particularly near the sea bed, may take anywhere between 5–40 years to exchange completely due to the narrow constrictions to the west at the Skagerrak (between northern Denmark and southern Norway) and the Kattegat (between south-west Sweden and eastern Denmark) which link the Baltic to the Atlantic via the North Sea. Unlike many traditional 'oceanic' seas, the Baltic is characterised by great differences in salinity. Indeed, in some regions the water is essentially fresh and, hence, the Baltic holds a unique and highly diverse community of fish species.

However, being enclosed and shallow, the Baltic is highly vulnerable to environmental changes, which include variations in the periodic influx of salt water, changes in the quantity and quality (e.g. nutrient status) of freshwater run-off from more than 200 rivers entering the sea, and continued relatively heavy fishing effort. As one Finnish expert pointed out at the **INTERCAFE** meeting: *'… whenever we find problematic or unexpected developments in the Baltic Sea, we can almost without exception pinpoint human action behind it… It has been a major realisation to the human populations around the Baltic Sea that the whole sea can be affected by their actions. It has been a major shock to realise the sea has a long memory'.*

Nutrient loads to the Baltic Sea have increased over the past century, leading to increased algae blooms, decreased water transparency and reduced oxygen in deeper areas. However, there are efforts to improve the environment, including increasing water transparency. Decreasing



Cormorant roost on Baltic coast, INTERCAFE field trip, Poland.
Photo courtesy of **INTERCAFE.**

salinity in the Baltic since the 1970s is the apparent result of fewer major intrusions of salt water in recent decades, whilst the system is predicted to become even less saline because of increased freshwater run-off (as a result of increased rainfall in the catchment — a consequence of climate change). Such changes in salinity levels have a clear impact on dominant fish species in the Baltic in relation to both their feeding (e.g. Herring *Clupea harengus membras*) and reproductive ecology (e.g. Cod *Gadus morhua*).

Total fish catches in the Baltic Sea have increased tenfold since the early 20th century and, as one Finnish stakeholder pointed out, the amount of nutrients taken from the Baltic by fisheries is thus substantial. Although fish stocks were not regarded as being 'over-fished' in Finnish coastal areas, commercial fishermen there do suffer from changes in water quality and heavy metals in the food chain. The issue of biological monitoring was raised at the **INTERCAFE** meeting and, in contrast to stocks of internationally-managed offshore fish species — which were believed to be well assessed, shallow-water, coastal fish stocks are poorly documented and understood.

Useful information on the local fisheries' perceptions of the relationship between their activities, the Baltic environment and Cormorants there emerged from the **INTERCAFE** meeting in Poland in 2005[90] where a representative of a regional group of Danish fishermen pointed out that they were experiencing great problems with Cormorants in the Baltic. It appeared that in some regions there were hardly any fish left to catch and, without the fish, the natural balance near the coast was said to have broken down. The whole area in Kattegat (with adjoining inlets) had been invaded by a species of crab, especially in areas where the sea was rather salty. By 2005 there were no fish but immense numbers of crabs that eat everything on the sea bed — worms, shellfish, mussels, spawn, etc. — prey that were once the diet of fish. The natural balance had been completely spoiled in this territory and it was felt that nobody from the responsible authorities in Denmark was interested in this problem nor appeared prepared to listen. This '*Cormorant influence*'[91] was giving the fishermen in the north of Denmark the *'death blow'* because the area had high water quality and was free of pollution. In 1996, the Minister of Fisheries informed the Danish Parliament that the Cormorants in the 1990's

[90] See pp.28–30 of Marzano, M, and Carss, D N (editors). 2005. Cormorant ecology, commercial fishing and stakeholder interaction. INTERCAFE meeting report, Gdansk, Poland, April 2005.

[91] Scientific evidence suggests such changes are unlikely to have been the result of Cormorant influence. Möllmann *et al*. (2008) have shown for the Baltic that climate-induced changes in hydrography have recently caused an ecosystem 'regime shift', the most pronounced changes in the ecosystem occurring at the zooplankton and fish trophic levels. In the zooplankton, species dominance changed as a result of reduced salinities and increased temperatures. The change in hydrography also affected the reproductive success of the major fish species, resulting in a change in dominance from the piscivorous Cod to the planktivorous Sprat *Sprattus sprattus*. Furthermore, Frank *et al*. (2005) found very similar major changes associated with overfishing, where collapse of Cod stocks led to an abundance of small fishes, crabs and shrimps in the environment — a phenomenon also noted by INTERCAFE's fishermens' representative from Denmark.



Inshore fishing boat, Baltic coast, INTERCAFE field trip, Poland. Photo courtesy of **INTERCAFE.**



Baltic Coast, INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE.**

in the Belts — Oresund and the Western Baltic — consumed up to 20% of the population of small Cod. Further, he stated this could have consequences for the total population of small Cod. Other fish species were also considered to be under heavy influence of the Cormorant: in 1996, the Zoological Institute at the University of Copenhagen investigated how many ensnared fish were damaged by Cormorants in pound nets. It appeared that up to 50% of Cod, Herring, and Garfish *Belone belone* had been spoiled by Cormorants, and for Eel it amounted to 20%. Most damaged fish die shortly after attack and damage is experienced on all natural coasts near Cormorant colonies and night roosts, within the accepted 50 km foraging radius of the birds.

During **INTERCAFE's** work there were similar reports from fisheries representatives of serious reductions in Cod stocks off the coasts of northern Germany. However, there are instances of overfishing in the Baltic resulting in unsustainable pressure on fish stocks, which were shown to be declining in Estonian waters (e.g. Vetemaa *et al*. 2000). Such declines highlighted potential conflict with Cormorants and, in certain regions, fishermen now believe that the birds are to blame for declining catches (e.g. Eschbaum *et al*. 2003). More recently, Vetemaa *et al*. (2010) present data which they suggest shows that the establishment of a Cormorant colony could have seriously damaged or even prevented normal functioning of historically important spawning grounds for Perch and Roach *Rutilus rutilus* in an Estonian estuary, thus affecting fish recruitment to adjacent areas.

It was clear from the meeting in Finland that coastal commercial fishermen are concerned about Cormorants and the potential impact of increasing numbers of birds. One fisheries representative noted that young people do not want to become commercial fishermen (see also comments from Saxony in relation to pond fish farming, section 13.1) as this means of livelihood already faces problems with catch quotas and restrictions, a ban on drift nets, and threats from seals and Cormorants.

Conversely, it was noted that as a conspicuous feature of the landscape, Cormorants are not always viewed negatively, as one local noted: *'it is a great bird to watch and on migration it forms big flocks and migrates in great numbers. The return of the Cormorant to Finnish nature*





Cormorants disturbed from a day-roost on the Baltic coast, INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE.**

is spectacular…'. Officially, Cormorants belong to the Finnish fauna and are thus not considered an invasive species. However, **INTERCAFE** learned that Cormorants were often considered an 'alien' species in many places. For example, this issue was raised in connection with Czech Carp ponds (section 13.2) and with lagoons in the Po Delta (chapter 15) as well as being a common theme throughout Europe (see chapter 9). The issue of Cormorants 'invading' new territory is also raised in section 10.4 of chapter 10. Without hard scientific evidence of significant disturbance to nature or to the livelihoods of fishermen, some Finnish stakeholders felt that the Cormorant should not be persecuted, as one stated: *'The fact that a few people don't like Cormorants is not enough to deviate from the basic norms of conservation'*.

14.2 Cormorants, Numbers and Associated Problems

Hanko Peninsula is located on the south-westerly tip of Finland. Immediately offshore lie over 85,000 islands — some no more than bare rocks — that form the inner and outer archipelagos of the Archipelago Sea, with the Gulf of Finland to the east and the Gulf of Bothnia to the north. Within the last decade some of these islands have become colonised by breeding Cormorants, starting in 1996 with 10 pairs. By summer 2007 there were an estimated 8,900 tree-nesting and ground-nesting pairs in 29 colonies (with additional, unknown, numbers of 'floating' birds, non-breeders, and fledged young). Updated figures are available on the SYKE (Finnish Environment Institute) website (http://www.syke.fi/en-US — and search for 'cormorant'). Although Cormorant colonies are currently confined to the outer archipelago, one local fisheries representative (Chairman of the local fisheries region) noted that, on fledging, the birds tended to move into the inner archipelago. These birds will apparently stay here until the first frosts and then migrate around October/November before arriving back again in spring. Currently, breeding only occurs in the outer archipelago regions of Finnish waters, a situation similar to that in Swedish waters when Cormorants began colonisation there. However, in the last ten years there have been a number of colonies established on freshwater lakes in the Swedish interior, and there are genuine concerns that the same will happen in Finland, particularly in the warmer, southern regions.

Small-scale coastal fishing mostly takes place in the same areas where Cormorants are abundant, and Cormorants have been listed



Breeeding cormorant in colony on Baltic coast, INTERCAFE field trip, Poland. Photo courtesy of **INTERCAFE.**

by fishermen as one future threat to their fisheries: *'At present the Cormorant problem is a nuisance but the real anxiety is that it is certain to get worse'*. In this regard, Finnish fisheries' stakeholders highlighted a range of concerns, including (1) the effects of Cormorant predation on the fisheries themselves as the birds tear and damage gill nets and also injure fish caught in them leaving the fish unmarketable, and (2) the impacts of Cormorant colonies on other bird species, trees and waters around the islands. Local landowners who rent out their summer cottages on the islands where the birds congregate also believe they suffer as their visiting guests are exposed to the sight, smell and sound of Cormorants, with a consequential reduction in aesthetic and recreational value. As in many places visited by **INTERCAFE**, some of the Finnish stakeholders felt that there were simply too many Cormorants: *'Cormorants are not bad as such; all organisms have their place in the ecosystem. But, when Cormorants become too numerous in the wrong place, they become pests and have to be removed'*. Cormorants are not the only predator affecting fisheries though, and the rise in Goosander *Mergus merganser* numbers was also raised at the **INTERCAFE** meeting. Grey Seal predation also has a significant impact on coastal fisheries according to local fishermen, taking fish from the nets and also injuring others and damaging nets in the process. Fishermen also maintain that, as with Cormorants in other places, the presence of foraging seals can change the behaviour (and hence the 'catchability') of fish. At a Baltic coastal fishery in Poland (Carss & Marzano, 2005: (265–66), a number of fish species were considered to be taken by Cormorants (Eel, Flounder, Pikeperch, Brown [migratory 'sea'] Trout and Atlantic Salmon).

14.3 Legal/Policy and Economic Contexts

Unlicensed killing or disturbance of Cormorants is against Finnish national law, although apparently it does occur with some regularity. At the time of the **INTERCAFE** meeting, Finnish authorities had not given legal permission for any Cormorants to be killed. Fisheries representatives — particularly for the minority Swedish-speaking coastal fishermen — told **INTERCAFE** that they felt the authorities did not listen or care about their concerns. As one fisheries representative pointed out: *'The damage done locally by Cormorants must be considered from the perspective of the local people affected, not from the point of view of the bureaucrat of the central government'*. There were suggestions that the Finnish authorities were withholding information from people. Some felt that extrapolating year-round Cormorant numbers from counts of pairs in the breeding season was misleading. The authorities only provide the numbers of breeding birds so the numbers of young and non-breeding birds are not given. However, it has been explained that no resources were currently available for the task of counting Cormorants outside the breeding season. Such counts are notoriously difficult (see chapter 2 of Carss *et al*. 2012), and extrapolating a total non-breeding population estimate with reasonable accuracy is genuinely problematic for researchers.



Evidence of long nautical and fishing traditions on the Baltic coast, INTERCAFE meeting, Finland. Photo courtesy of **INTERCAFE.**

Another factor to consider in Finland (and much of Scandinavia, including Sweden) is ownership rights. Ownership of waters within 10 nautical miles of the coast is attached to specific property and land adjacent to the water. Sometimes people pool their fishing rights, into joint areas which can consist of up to 100 individual sectors. In the case of these joint areas, all those people included in such a pooling scheme have access to the whole area in its entirety. As highlighted by Pekka Salmi at the meeting,[92] the formal fisheries governance system in Finland is a combination of local decision-making by the water owners and a top-down management system dictated by the state. In fact, the 'decision-maker' is commonly a collective, a shareholders' association, which jointly controls the interests of individual owners in fishery matters. In addition to fishery associations, there are also a large number of waters managed solely by individual owners. These could be individual people, townships or companies, for instance. Water owners are responsible for managing their property through the granting of fishing licences, stocking fish and regulating the fishery according to national and international rules. This owner-based fisheries management system in coastal regions (and inland areas) is about 100 years old but it has been modified subsequently to include rights of use by non-water owners, for instance. Fishermen thus often have to go through lengthy negotiations with water owners to secure themselves access to good fishing grounds but **INTERCAFE** heard that problems can arise in waters where there is a fragmented (or multiple) ownership structure. If seals, for example, become a problem in such waters it can be very difficult for fishermen to quickly arrange an alternative large fishery area where seals are absent or at least not so prevelant. Even



Baltic coast boat trip, INTERCAFE field trip, Poland.
Photo courtesy of **INTERCAFE.**

[92] See section 4.4 (The formal fisheries governance system in Finland) in Marzano & Carss (2007: 39) What to do when the cormorant comes. INTERCAFE meeting report, Hanko, Finland, April 2007.

though there was no clear statement that the same would be true if the fish predators were Cormorants, this is certainly a possibility. These discussions of the traditional ownership system within which fishermen operate illustrate some of the demonstrable legislative and policy constraints that they face.

INTERCAFE was told how, since the mid-1970s, there has been a diversification within the economy of the archipelago. Agriculture and fishing have continued to lose strength while the service sector has been growing. **INTERCAFE** was given an example from the Uusimaa region of Finland where most of the coastal professional fishermen are part-time, deriving their income from agriculture, forestry, aquaculture and tourism which can include guided fishing, sight-seeing tours, or cabin renting. In this region there are 117 fishermen who derive more than 30% of their income from fisheries and 132 who derive less than this from fishing. Trawls, gillnets, trap nets and fykenets are the most common fishing gear used by professional fishermen along the 150 km coastline of the Uusimaa Region. The main target species for the fishery are Herring, Sprat *Sprattus sprattus*, Pikeperch, Perch, Pike, Atlantic Salmon, and Whitefish *Coregonus* sp.. Other fish species of economic importance are Burbot Lota lota, Flounder *Platichthys flesus* and Smelt *Osmerus eperlanus*. Herring and Sprat are the most important species for trawling, while Pikeperch, Perch and Pike are mostly caught by gillnets.

Financial compensation schemes apparently only operate for predation losses at fish farms but not for angling waters or coastal seas. However, it is possible for commercial fisheries to insure their fishing gear against any damage caused by predators (presumably seals and, to a lesser extent, Cormorants).

14.4 Management Measures

At the Hanko meeting, there was little, or no, information given on the legal management measures being taken against Cormorants in relation to Finnish coastal fisheries but there were several reports of illegal activities at colonies. By 2009, 'some sabotage' was recorded at up to one-third of Finnish colonies — usually involving nest-destruction at ground-breeding colonies and at this time SYKE — the Finnish Environment Institute — reported (2009):[93]

'Of the destroyed nests, some 2,000 were located in the Archipelago Sea. According to the interpretation of surveyors, people had destroyed cormorant nests within 13 municipalities (Pernaja, Inkoo, Raasepori, Kemiönsaari, Länsi-Turunmaa, Naantali, Masku, Kustavi, Luvia, Pori, Kristiinankaupunki, Korsnäs and Mustasaari). Most cases have been reported to the police. The compensation price of a nest with eggs or nestlings is 235 euro which is also the price of an adult Cormorant.'

As well as documenting persecution, this article also



Hearing local experiences of Baltic coastal Cormorants, INTERCAFE field trip, Finland.
Photo courtesy of **INTERCAFE.**

mentions both the 'compensation price' (presumably the fine to be paid if convicted) for the destruction of an active nest of an adult Cormorant and the fact that the police are involved in investigating these incidents.

In Finland, a Management Plan for Cormorant problems was published in October 2005. It was initiated by the Ministry of the Environment, and negotiated with representatives from the Finnish Game and Fisheries Research Institute, the Finnish Environment Institute and organisations representing fisheries, agro/forestry producers and landowners. According to Kilpi & Lehikoinen (2007)[94] the Plan

[93] Article entitled 'Nesting cormorant population grew by one quarter since last year' available on SYKE website (http://www.ymparisto.fi/default.asp?node=5297&lan=EN).

[94] See section 2.8 (Cormorants in Finland — insights after the management plan or another perspective?) in Marzano & Carss (2007: 17–20) What to do when the cormorant comes. INTERCAFE meeting report, Hanko, Finland, April 2007.

suggests, that the following actions should be taken:

1. A clear set of criteria for assessing serious damage at all spatial scales should be formulated.
2. A way for compensating the losses due to serious damage should be found.
3. Pro-active measures should be developed to minimise losses for fisheries (including gear).
4. Legislation should be changed so that measures to reduce the Cormorant population can be taken if (documented) need arises (move to Bird Directive Annex II).

The Management Plan for Finland also clearly stated that more information was needed to firmly root the (tentative) actions against Cormorants in quantitative data on birds, fish and the interactions between them. Whether Cormorant predation is the cause of declining fish catches, or merely an associated symptom of other environmental issues affecting the Finnish coastal fishery, a strong message from fisheries stakeholders was that they wanted Cormorants to be listed as a huntable species. They felt that Cormorants should be treated not as a pest species to be destroyed but as a resource to be exploited. Here, they pointed to the growth of a small-scale, but growing, market for exclusive seal-skin products. Fishermen were now allowed to take limited numbers of seals under license, thus giving them some flexibility in the management of these predators and a potentially lucrative market for their skins. However, no such high-value (or even low-value!) product had yet been put forward for Cormorants apart, perhaps, from using them as a source of food. This seems to have limited appeal, being undertaken on any scale only in Norway where some 10,000 birds are hunted legally for food each year (see chapter 10 of van Eerden *et al*. 2012). **INTERCAFE** also collected some cookery recipes for Cormorants (see Nils Røv's section[95] in Carss & Marzano 2006).

INTERCAFE's discussions with local stakeholders in Finland highlighted that they felt that the government should put more resources into collaboration, compensation and research. They stated that there should be agreement on both the gaps in knowledge and the next steps — the way forward. For example, both the bird and fisheries representatives felt better discussions and transparency on the issue of compensation payments would be helpful. The idea that data collection should involve all interested parties was also supported. The national management plan appeared to be a good first step to addressing concerns over Cormorants but many felt it should be regularly revised and that this process now needed to be more inclusive. Specifically, the plan should have more input from those that are most affected by Cormorant issues 'on the ground', and this appeared to include better local fisheries and community representation and also more Swedish-speaking participants. For instance, over 40% of the Hanko population speak Swedish as a first language.



Baltic coast, INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE.**

[95] See section 7.2.1 (How to prepare cormorants for food) in Carss & Marzano (2006: 57–59) Angling and EU legislation. INTERCAFE meeting report, Bohinj, Slovenia, October 2006.

References

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265pp. http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, and Parz-Gollner, R, and Trauttmansdorff, J. 2012. The INTERCAFE Field Manual: research methods for Cormorants, fishes, and the interactions between them. COST 635 Final Report II, ISBN 978-1-906698-08-9.

Eschbaum, R, Veber, T, Vetemaa, M, and Saat, T. 2003. Do cormorants and fishermen compete for fish resources in the Väinameri (Eastern Baltic) area? In: Cowx, I.G. (ed) Interactions Between Fish and Birds: implications for management. Fishing News Books, pp.72–83.

Frank, K T, Petrie, B, Choi, J S, and Leggett, W C. 2005. Trophic cascades in a formerly Cod-dominated ecosystem. SCIENCE Vol 308 (10 June 2005): 1621–23.

Möllmann, C, Müller-Karulis, B, Kornilovs, G, and St John, M A. 2008. Effects of climate and overfishing on zooplankton dynamics and ecosystem structure: regime shifts, trophic cascade, and feeback loops in a simple ecosystem. ICES Journal of Marine Science, 65: 302–310.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906698-07-2.

Vetemaa, M, Eschbaum, R, Aps, R, and Saat, T. 2000. Collapse of political and economical system as a cause for instability in fisheries sector: an Estonian Case. Proceedings of the IIFET 2000 International Conference, Microbehaviour and Macroresults. Oregon State University, Corvall, USA. Available at http://www.orst.edu/Dept/IIFET/2000/papers/vetemaa.pdf

Vetemaa, M, Eschbaum, R, Albert, A, Saks, L, Verliin, A, Jürgens, K, Kesler, M, Hubel, K, Hannesson, R, and Saat, T. 2010. Changes in fish stocks in an Estonian estuary; overfishing by cormorants? ICES Journal of Marine Science 67 (9): 1972–1979.

15 DELTA AND LARGE LAGOON FISHERIES

Mariella Marzano

This chapter uses **INTERCAFE's** Case Study concept and methodological approach (described in chapter 12) to draw out the essential social, cultural and legal perspectives for 'real world' Cormorant-fishery conflict situations experienced by **INTERCAFE** participants and local stakeholders. Here, a number of 'contextual themes' are used to explore conflict situations at delta and large lagoon fisheries, other waterbody-fishery types being examined elsewhere (chapters 13–14, 16). A synthesis for the Case Study approach and the explorations described in chapters 13–16 is then provided in chapter 17.

The Po Delta region, including the historical and current estuarine territories, is bounded by the towns of Ravenna and Rosolina and it was chosen as being generally representative of extensive, large lagoon fisheries in the Mediterranean. During the Po Delta Case Study meeting a recurring theme emerged, one that has surfaced in several **INTERCAFE** meetings and also during the **REDCAFE** Concerted Action. This theme is whether or not Cormorants are in some ways a symbol of a changing world and the difficult and complex co-existence of the multiple uses operating within Europe's remaining wetland habitats. In Italy, the Po Delta supports a variety of activities such as *vallicoltura*, commercial and recreational fishing, shellfish culture and collection, wildfowl hunting, industry (e.g. chemical production, gas extraction) and tourism. Conflict management is also complicated by the fact that the Delta covers three provinces (Rovigo in Vento region, Ravenna and Ferrara in Emilia-Romagna region), each with different operative and administrative duties. Furthermore, the area covers two regions each with very different





Wildfowl hunting: a valuable activity in many wetlands.
Photos courtesy of Shutterstock.

regional regulation. Finally, the area covers two regional parks (Northern and Southern Po Delta) each, again, having its own regulation and administrative duties.

15.1 Environmental and Social Contexts

The Po Delta Case Study meeting held in Albarella, Italy, gave **INTERCAFE** and invited participants the opportunity to explore the implications of managing differing, and sometimes conflicting, water uses and associated demands in a landscape described as a 'wetland continuum'. The Po Delta is a mosaic of over 38,000 ha of wetlands, including examples of all the typical estuarine habitats — coastal bays, brackish lagoons, freshwater marshes, canals, river branches and mouths. The area stretches along the coastal belt lying from the River Adige to wetlands north of the town of Ravenna, including both the present Rovigo district and Veneto region and that of the historical river delta (Emilia-Romagna). Within the Delta lies the Parco del Delta del Po, a protected area that encompasses a variety of habitats and is predominantly considered 'a park shaped by water'. The whole Delta area is the result of modifications by people who have managed the area since the Middle Ages to gain land for agriculture, to manage rivers to reduce excess flooding and/or siltation, and to limit effects on the lagoon of Venice. The course of the river mouth has been managed several times to move the discharge far from sensitive areas, such as the harbour of Venice.



Po Delta from the air. Photo courtesy of Shutterstock.

The Parco del Delta del Po[96] also contains important historical sites and has been placed on the World Heritage list.The Po Delta is portrayed as a dynamic, living landscape, rich in cultural heritage, and **INTERCAFE** learned how the landscape has exerted its influence on the people of the Po Delta over the centuries with the lagoons and marshes acting like 'living boundaries' that divided communities, thus contributing to many lost opportunities. As a local expert at the **INTERCAFE** meeting pointed out:

'The areas of the Po Delta suffered many blows throughout history and now has some of the lowest levels of Human Development Indices in Italy… Even if delta areas are very rich in biodiversity and the land-water (salt and fresh) interconnection offers a richness of opportunities, the local population has never been able to 'catch numbers of chances' and local

[96] Further details at http://www.parks.it/parco.delta.po.er/Epar.html

development was always managed by external forces'.

Until the recent past, however, the estuarine environment was more a cause of poverty than a land of opportunities. Heavy flooding events recurrently affected the economy of the whole territory, and even after the Second World War the Delta area suffered from DDT pesticide pollution, large land reclamation projects and endemic malaria, and the salty soils offered poor agricultural production. Only relatively recently have industrial settlements and the progressive development of summer tourism and shellfish aquaculture offered Delta inhabitants any good opportunities to improve their standards of living.



Extensive coastal lagoon, INTERCAFE field trip, Po Delta, Italy.
Photo courtesy of **INTERCAFE.**

The focus of the Po Delta Case Study was primarily on *vallicoltura*, a traditional form of extensive aquaculture typically carried out along the North Adriatic coast (for further details see Ardizzone *et al*. 1988). A *valle* (plural — *valli*) is an 'embanked lagoon' where the levels and inputs of fresh, brackish or salt water are artificially maintained via a system of sluices and pumps. The *valli* system operates by taking into account both seasonal changes in climatic conditions in relation to such things as water temperature and salinity, and biological phases of the fishes' life-cycles regarding their breeding, growth and over-wintering periods.

In practice, lagoons are generally re-stocked naturally with juvenile fish of many species that are born in the sea but migrate onshore (often in spring) to feed and grow in the lagoons. Special channels and/or sluices are used to 'direct' the migrating fishes into the lagoon systems. Some individuals may reach marketable size within one growing season while others are often held in 'winter basins' and allowed to feed and grow in the lagoon for more than one season. This form of extensive fish culture has a long history, dating back to Roman times. In the autumn, mature adult fishes congregate in the lagoons and begin to make their migration back out towards the sea, presumably attracted by the higher saline conditions in the approaching sea water. These adult fish are again 'directed' through narrow channels where they can be harvested relatively easily.

The most commonly farmed species here include Eel, Mullets, European Sea Bass, Gilthead Sea Bream *Sparus auratus*, and Big-scaled Sand Smelt *Atherina boyeri*. In a similar situation to most Mediterranean lagoons (e.g. in Spain, France, Greece), most of the *valli* are privately owned and used primarily for fish farming and wildfowl hunting.

Exploitation of other environmental resources in the area has had a detrimental effect on *vallicoltura*. For example, extraction of ground water and natural gas from the seabed, land reclamation and a decrease in the amount of sediment brought by rivers has led to subsidence in many ponds and subsequent increases in the salinity of river and ground waters (in some ways this phenomenon is similar to the large-scale water quality and salinity issues affecting the Baltic Sea, see 14.1). However, **INTERCAFE** heard that these problems have been recognised and are now being addressed. Nevertheless, because lagoons are artificially enclosed and below sea level, also as a result of human activity, they can only survive if they are used and

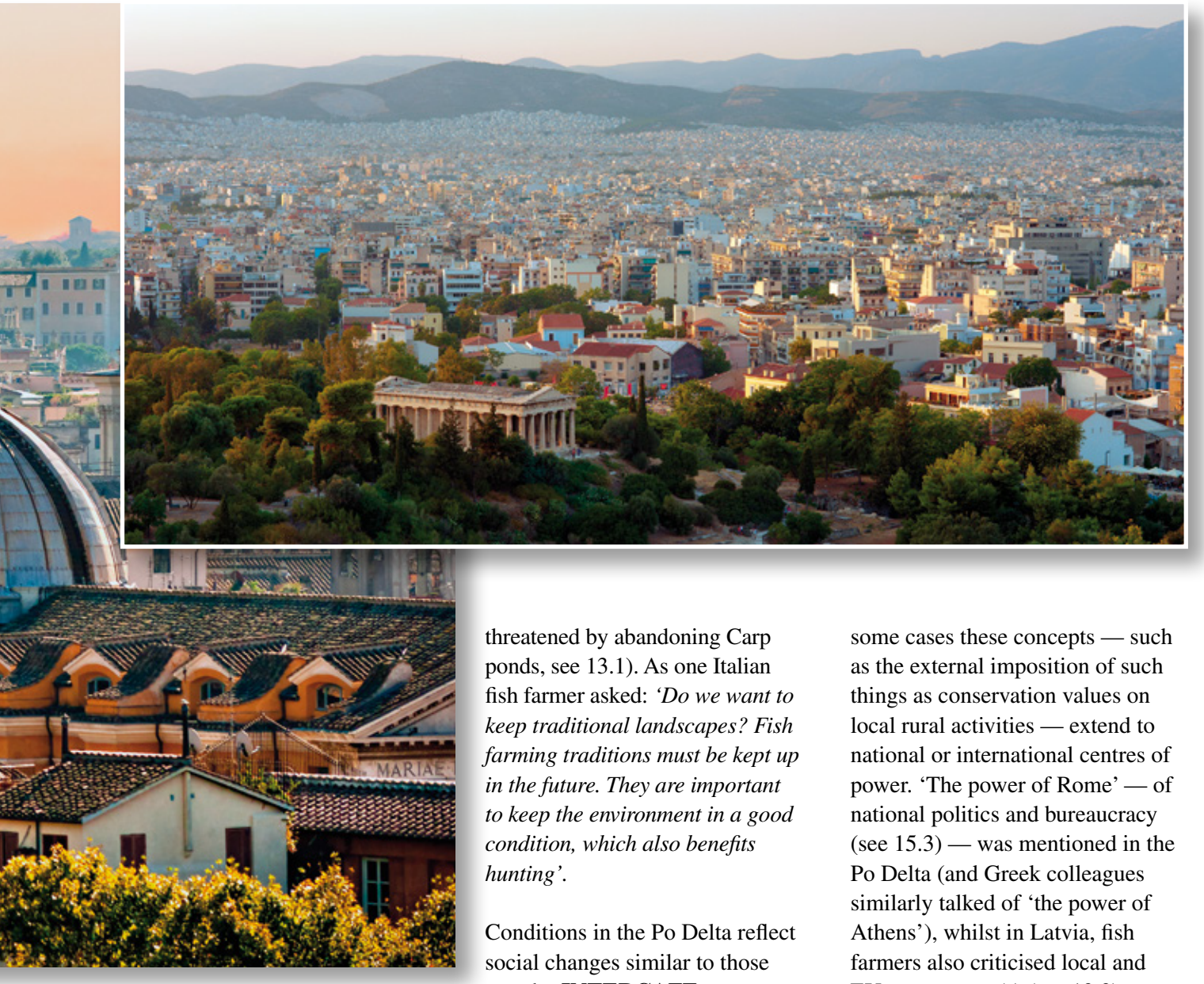


Many stakeholders complained of the 'power' of Rome *(above)* or Athens *(far right)*. Photos courtesy of Shutterstock.

maintained through continuing human intervention. This is similar to the maintenance of extensive Carp fish ponds in central Europe, see 13.1). Natural evaporation means that freshwater needs to be introduced to the *valli* to counteract the increasing salinity. The lack of currents, or running water inflows or outflows, means that stagnation and eutrophication (nutrient enrichment) must be prevented, usually by stirring the water to increase its oxygen concentrations.

Agriculture is the main activity in areas surrounding the wetlands and it also influences the quantity and quality of water through abstraction for irrigation and nutrient enrichment, for example.

As in most Mediterranean lagoons (e.g. those in north Greece), fish farming in much of the Po Delta area is based on traditional methods that are at least 1,000 years old. However, it has become a marginal activity for many people, despite being one of the most environmentally sustainable economic activities in the area. Interestingly, this 'marginalisation' (in terms of economic profitability, the development of markets and a skilled form of long-term employment for the next generation of fishermen) has been highlighted elsewhere and for other fishery-types. For instance, it was noted in several Carp pond farming regions that markets for Carp were declining and that fewer young people wanted



to learn the skills and continue the profession (see 13.1 and also section 3.4 of Seiche *et al*. 2012). Similarly, Finnish fishermen in Hanko noted that commercial fishing was no longer seen by some as a full-time career. In the Po Delta, abandoning *vallicoltura* would mean stopping all the management of the enclosed lagoons, leading to the progressive closure of internal canals and basins (through siltation) or openings to the sea which would cause extensive flooding and a dramatic loss of biodiversity (similar to the situation threatened by abandoning Carp ponds, see 13.1). As one Italian fish farmer asked: *'Do we want to keep traditional landscapes? Fish farming traditions must be kept up in the future. They are important to keep the environment in a good condition, which also benefits hunting'*.

Conditions in the Po Delta reflect social changes similar to those seen by **INTERCAFE** across much of Europe. Several of these are encapsulated in the issue of marginalisation discussed earlier. Similarly, ideas about conservation in the Po Delta are seen by some as being a 'city' issue imposed on rural communities by a sector of the well-educated, urban population who might have unrealistic and/or impractical concepts of nature and wilderness environments and who certainly do not have to make a living from the countryside or feel the 'social weight' of maintaining and passing-on traditional skills and livelihoods to future generations. In some cases these concepts — such as the external imposition of such things as conservation values on local rural activities — extend to national or international centres of power. 'The power of Rome' — of national politics and bureaucracy (see 15.3) — was mentioned in the Po Delta (and Greek colleagues similarly talked of 'the power of Athens'), whilst in Latvia, fish farmers also criticised local and EU government(s) (see 13.3). Moreover, Finnish stakeholders argued that Cormorant damage to their fish should be considered from the local perspective and not from that of a bureaucrat of the central government (see 14.3).

There also seemed to be something of a private/public divide apparent among Po Delta stakeholders. Here, many fish farmers see themselves as, in effect, carrying out an unpaid public service by maintaining a special and valued cultural practice that benefits tourism and wider appreciation



Grilling lagoon-reared fish, INTERCAFE field trip, Po Delta, Italy.
Photo courtesy of **INTERCAFE.**

of the region. This was especially true in the northern Delta (Veneto), where many inhabitants have their own income from natural resources (i.e. shellfish collection, fishing and agriculture). They are not against the Parco del Delta del Po designation of the area but many sometimes see it as an ensemble of strict rules and obligations rather than a way to protect and regulate the territory. Again, this feeling was similar to that of French and Czech fish pond farmers. Although these issues have a specific flavour and expression in the Po Delta, there are similar issues commonly occurring across Europe, not only for fishing communities but also for rural communities in general.

15.2 Cormorants, Numbers and Associated Problems

The Po Delta is at the centre of two important flyways (east and west of the Alps) for migrating birds and 70–100,000 birds winter there each year (Baccetti *et al.* 2002). The increase in Cormorant numbers has been twenty-fold over the last two decades, following breeding successes and the spread of the breeding range in central and northern Europe. In the 1960s–70s birds recorded in the Po Delta had migrated primarily from Denmark, Germany and south Sweden but the areas of origin have now expanded across a wide geographical area from The Netherlands in the west to Croatia in the east, and up to the Russian White Sea in the far north, although the majority come from the Baltic states. Before the late-1970s, there were only sporadic sightings of individuals and small groups during the migration periods but now Italy hosts 15% of the over-wintering Cormorant population from what is essentially central and western Europe, and 1% of the breeding birds.

The local distribution of Cormorants in the Po Delta changes during the year. In winter the birds are more or less equally distributed throughout the whole Delta, whereas during the spring and summer they are more numerous in the southern part due to the proximity of the largest Italian colony. There are therefore two peaks in Cormorant



Part of the delta from the air, INTERCAFE field trip, Po Delta, Italy.
Photo courtesy of **INTERCAFE.**

numbers during the year, the first during late autumn when there is an influx of Cormorants from central and northern Europe, and the second in mid-summer when locally-produced young fledge and stay in the colony before dispersal. As in Israel's Hula Valley (and in several other countries in the species' range), Pygmy Cormorants (*P. pygmaeus*) have also increased substantially in the Po Delta. This species is generally of less conservation concern than it was in the latter 1990s, since which time numbers have increased by some 300–700% (see BirdLife International species description[97]). There are genuine worries over both (i) increasing numbers of this additional fish-eating predator, and (ii) potential disturbance and/or mortality of this species through actions taken against Great Cormorants.



Learning about lagoon-based valle fish culture, INTERCAFE field trip, Po Delta, Italy. Photo courtesy of **INTERCAFE.**

Like many other extensive fisheries (e.g. Carp pond farms or fish-wintering channels in the estuarine system of Porto Lagos in north Greece), the lagoons and *valli* of the Po Delta consist mainly of wide, open basins and are therefore likely to be more vulnerable to Cormorant predation than some more intensive, artificial waters. Seasonal changes in water temperature and salinity, and shifts in fish behaviour during the year, influence the availability and accessibility of both different prey species and sizes to Cormorants in the *valli*. Resulting concerns are widespread among the fisheries. As one stakeholder pointed out: *'The birds themselves are very mobile and are potentially destructive — they are like an army in our undefended lagoons'*. The primary concern is the rising number of over-wintering birds feeding on fish in the *valli*. According to the fishermen, Cormorant predation is 'excessive', causing economic damage, and the growing efforts to scare birds away are contributing to increasing time and monetary costs. Furthermore, these Cormorant control efforts are a potential source of disturbance for the other waterbirds in the region, including many important quarry species of interest to hunters. An example was given from Rovigo:

'Cormorants use the valli *most during the autumn (in particular October and November) — the period during which all the fishes swim into the channels ….. to be harvested. From December the fish are harvested or stocked for the winter in defended channels* [smaller, deeper basins called peschiere], *so Cormorants start to use other habitats, such as the Po river branches and lagoons… During the morning, flocks of Cormorants move around a lot to find the places in the* valli *that are not disturbed by human presence. This mobility consequently makes it very difficult to defend the open lakes of the* valli *from the flocks… Another problem is that hunters do not want to disturb Cormorants in the roosting and feeding places of the ducks and so Cormorants can always find undisturbed places inside the* valli*'.*

Although several participants at the Case Study meeting noted that both the Great Cormorant and the Pygmy Cormorant were very important waterbird species, it was clear that predation levels are considered to be a problem. One fisheries representative stated: *'Cormorants…have produced*

[97] Available at: http://www.birdlife.org/datazone/speciesfactsheet.php?id=3666

social tension here. Fishermen are nervous, they have invested to improve their productivity and then it is damaged by this bird'. There was a sense that the increasing presence of Cormorants was considered to be 'the last straw' by many fish farmers given all the other difficulties that have concurrently arisen in recent decades such as a drop in the market price of fish, competition from imported products, increased labour and energy costs. Moreover, the Great Cormorants in the Po Delta were considered by some to be an alien species and were also seen as a highly efficient 'fisherman' coming there from abroad, forcing local fishermen to declare: *'We don't know how to eliminate what for us is this Cormorant calamity'*.

15.3 Legal/Policy and Economic Contexts

Vallicoltura-produced fish, reared extensively in good environmental conditions, are considered a high-quality product which can be sold for good prices. However, as well as Cormorant predation and changing environmental conditions, coastal lagoon fish farmers in the Po Delta region now face declining fish prices from intensive aquaculture businesses (e.g. marine fish farming using cages) and the importation of low-cost fish from abroad (e.g. Croatia and Greece). Interestingly, this was also the case for lagoon farmers in northern Greece and for many freshwater-based Carp pond farmers, see 13.3). Italian fish farmers reported that the economic impacts of Cormorant predation on fish in *valli* may be very high, and the effects may last for years depending on fish growth rates. Moreover, most Cormorant control methods cannot be employed because of the large water surface areas involved. Some people are abandoning *valli* aquaculture completely; others are maintaining it only as a tradition, and most of the fishermen survive on money earned from hunting activities. Overall, there has been a general shift from traditional aquaculture to waterfowl hunting and — at least in publically owned *valli* and lagoons — to conservation- and biodiversity-based tourism. These changes bring both opportunities and concerns. For example, hunting and tourism bring revenue, but hunting has to be limited to minimise disturbance, and increasing tourist numbers could bring potential negative consequences for the region's environment.

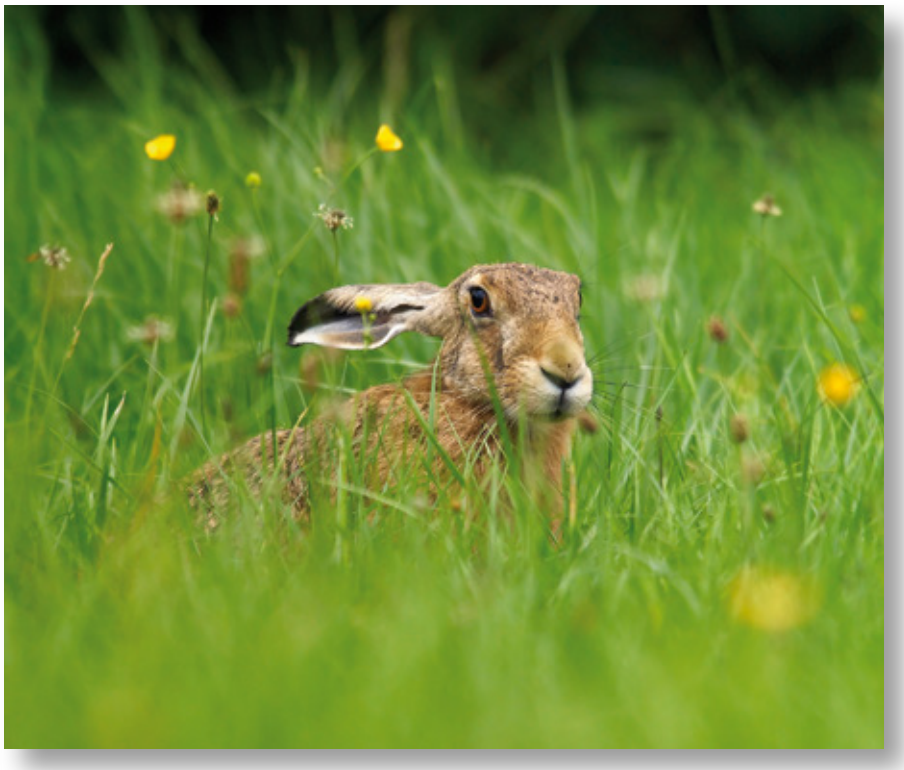


Unlike some other countries that have lagoon fisheries, such as Greece, there is a financial compensation scheme for damage caused by protected species, based on an assessment of what damage has occurred. However, funds for compensation are finite and are



Lagoon-based *valli* fish culture, INTERCAFE field trip, Po Delta, Italy.
Photo courtesy of **INTERCAFE.**





Compensation funds are often available for damage caused by protected mammals such as Wild Boar *Sus scrofa* (left) and Hare *Lepus europaeus* (right). Photos courtesy of Shutterstock.

divided amongst cases of damage caused by all protected species (including mammals such as Wild Boar *Sus scrofa* and Hare *Lepus europaeus*), so any reimbursement to fishermen does not cover the full economic cost of losses to Cormorant predation. There appears to be little integrated planning between the relevant provinces in the Po Delta region, and one of the key frustrations is the fact that — for a long time — distant authorities, for example in Rome or at province/district level, did not understand the local situation or what is required to effectively implement policies when the local context was so variable.

The *valli* are considered a separate world, with complex laws and mechanisms, and it seems to fish farmers that politicians are not interested in understanding this.

Conservation legislation, national park designation and other related initiatives appear to offer limited, or no, financial incentives. In the opinion of many of the people **INTERCAFE** met, these initiatives only restrict people's activities without enabling effective dialogue about alternative solutions. Almost all local people at the Case Study meeting concluded that national law is not capable of managing the Cormorant problem, given current arrangements and structures. A common theme was the need for public-funded support for traditional fisheries.

15.4 Management Measures

Many management difficulties in the Po Delta are the result of the large scale of the region, the multitude of owners that are involved in the conflict, the fact that they do not cooperate with each other but compete for markets for their fish and for reimbursement. The protection status that covers Cormorants but especially wetlands and other waterbirds through the Wild Dirds directive and Natura 2000 designation is seen as another difficulty. Although the Pygmy Cormorant is another element of the environment (as it is in for example Greece, Bulgaria, Romania and Israel), it is not significant in most places within the Po Delta because this species mainly uses different feeding areas to those of Great Cormorants.

INTERCAFE was given several examples of regional efforts to control Cormorants in the Delta area (see below). However, a strong message heard on several occasions was that there is little



Protecting the banks of a fishery channel from bird (e.g. heron) predation, INTERCAFE meeting, Po Delta, Italy. Photo courtesy of **INTERCAFE.**

integration between regions, and little or no guidance on how to prepare plans for managing Cormorant problems. Moreover, the administrative structure is quite complicated and planning has to fit into the hierarchy of national, regional, and provincial levels of administration. It was felt that the whole decision-making process takes too much time and is not able to provide a prompt solution when it is needed. It was stressed that most management plans are generally prepared for a single species but in the Parco del Delta del Po, for example, there is need for more integrated management planning (see chapter 5, section 5.9 for a broader discussion of this theme). This would include several relevant aspects and issues such as lethal Cormorant control, hunting for other species, general environmental protection, financial compensation for damage to fish stocks and due regard to specific land uses. There is currently no national management plan for Cormorants in Italy but many stakeholders could not see any real advantage in having a management plan on any higher level than exists today at district or regional levels.

INTERCAFE was told by local participants that measures used against Cormorants include scare guns, removal of nesting places, horizontal nets, scarecrows and shooting to kill. Shooting is considered to be the best method but it cannot be undertaken 24 hours a day, so nets to exclude birds are considered to be a good backup when they can be set up, whereas scarecrows and cannons are considered effective for only a few days. Several examples were also provided of regional management strategies. For instance, a new regional law has been approved in the Friulu Venezia Giulia region which aims to prevent serious damage to fisheries by Cormorants. Authorisation to kill Cormorants has to be granted by the region to a specific management body which would include relevant authorities



Learning about lagoon-based *valli* fish culture, INTERCAFE meeting, Po Delta, Italy. Photo courtesy of **INTERCAFE.**

within Provinces or protected areas but not within the fisheries sector. Furthermore, Cormorant control can only be carried out by certified hunters or people from environmental offices.

In 1992, fish farmers in Ravenna were provided with nets and air cannons as a means of non-lethal Cormorant control, and from 1995 a plan for shooting Cormorants was drawn up. At that time only named hunters who had attended a training course were allowed to kill birds, and then only in fish farming areas outside the Po Delta Park and between September to March. In Rovigo, a regional law allows the district to control Cormorants after the preparation of a management plan which places no limitation on either the number of birds that can be killed nor the time of year that such actions can be undertaken. The district plan has four different parts: (1) monitoring Cormorant numbers every 15 days both during daytime and at all the night roosts, (2) dietary studies, (3) dissuasion (scaring) at the main night roost, and (4) passive and active defence of the most vulnerable sites inside the *valli*, which involves the use of fences and cables over the channels where fish are kept in winter. This system prevents Cormorant flocks from fishing where fish are stocked in large quantities in narrow channels over winter. To make the system more efficient, and to reinforce these passive actions, the owners of the *valli* are also allowed to shoot Cormorants there. Most of these birds are killed close to the passive defences because shooting inside the big *valli* lakes is difficult and can frighten the wild ducks there. Most of the Cormorants are shot in autumn or after the hunting season and, as also reported from France, the aim of shooting is to reduce damage, not necessarily to reduce the overall population density of Cormorants.

Though necessary, management measures are considered problematic in the Po Delta. Passive defences (e.g. physical barriers like cables and nets) can only be used in some places as many of the lagoons are too large to be covered. Similarly, 'active' defence (e.g. killing birds) is difficult because shooting is expensive, time consuming and labour intensive. Shooting opportunities are also considered to be limited by the legal status of the Cormorant (a protected species) and by the lack of adequate public financial resources. Moreover, hunters are not really interested in shooting Cormorants but are the only people allowed to do it, and shooting Cormorants within the *valli* exacerbates the problems of disturbance to other birds and the possible negative effects on hunting. Many participants at the Po Delta Case Study meeting ultimately felt that the EU should support solving the Cormorant problem: *'…but it doesn't seem to be doing so'*. Interestingly, at the time of writing, it was reported that the Ravenna district and the Emilia-Romagna region had been ordered by the Civil Judge to pay 'a huge amount' of money to some fish farms as compensation for fish-eating bird predation that occurred from the early 1980s to the early 1990s.

References

Ardizzone, G D, Cataudella, S, and Rossi R. 1988. Management of coastal lagoon fisheries and aquaculture in Italy. FAO Fisheries Technical Paper 293: 1–103.

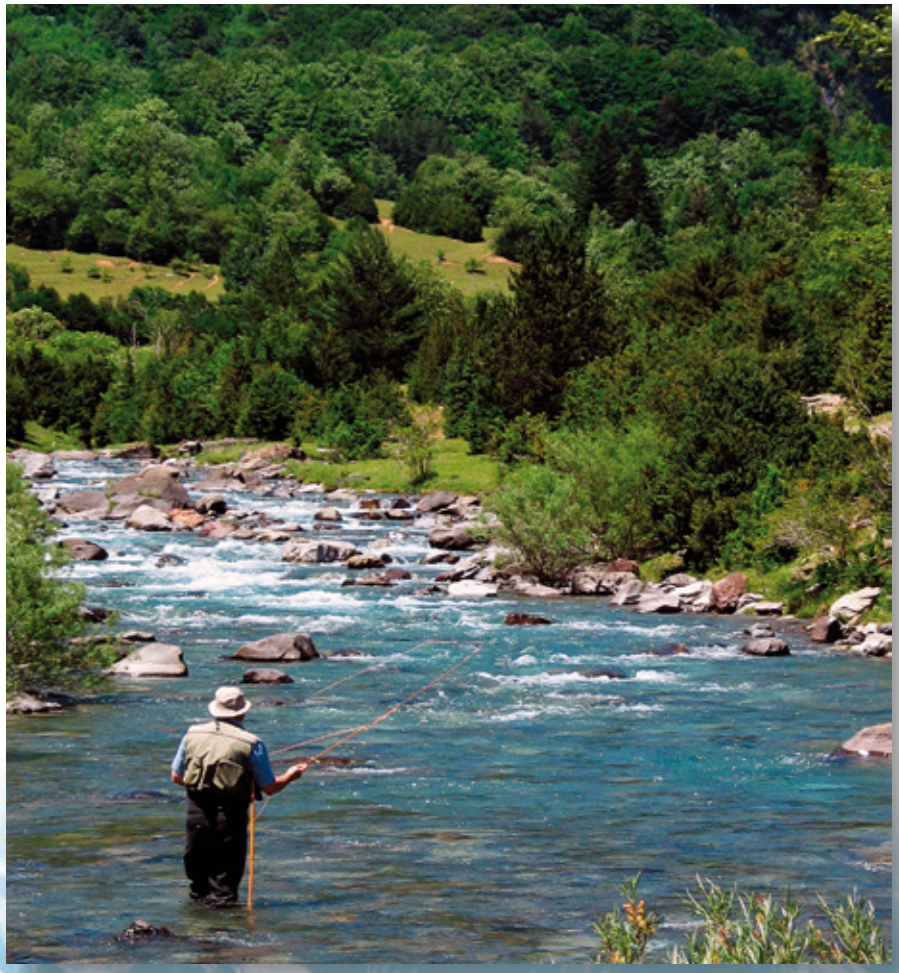
Baccetti, N, Dall'Antonia, P, Magangnoli, P, Melega, L, Serra, L, Soldatini, C, and Zenatello M. 2002. Risultati dei censimenti degli uccelli acquatici svernanti in Italia: distribuzione, stima e trend delle popolazioni nel 1991–2000. Biol. Cons. Fauna, 111: 1–240.

Seiche, K, Gerdeaux, D, Gwiazda, R, Lévai, F, Musil, P, Nemenonoks, O, Strod, T, and Carss, D N. 2012. Cormorant-fisheries conflicts in Carp pond areas in Europe and Israel — an INTERCAFE overview. COST Action 635 Final Report V. ISBN 978-1-906698-10-2.

16 RIVERS AND RECREATIONAL FISHERIES

Mariella Marzano

This chapter uses **INTERCAFE's** Case Study concept and methodological approach (described in chapter 12) to draw out the essential social, cultural and legal perspectives for 'real world' Cormorant-fishery conflict situations experienced by **INTERCAFE** participants and local stakeholders. Here, a number of 'contextual themes' are used to explore conflict situations at rivers and recreational fisheries, other waterbody-fishery types being examined elsewhere (chapters 13–15). A synthesis for the Case Study approach and the explorations described in chapters 13–16 is then provided in chapter 17.



Sub-Alpine angling river, Slovenia. Photo courtesy of Shutterstock.

The **INTERCAFE** meeting at Bohinj, Slovenia, provided a platform for learning about river habitats, fish diversity and conservation, and fisheries management, as well as the economic value of recreational angling to this area. Slovenia is situated in both the southern part of Central Europe and in the northern part of the Mediterranean, and the proximity of the sea also influences the country's climate. Many of the fish species in Slovenia are of high conservation status and their protection — and that of their habitats — is taken very seriously. The issue of fish stocking was an important theme running throughout this meeting. Coupled with this, the relatively recent arrival of Cormorants (another protected species) has led to considerable discussion on the impacts of these birds on fish stocks, particularly in habitats considered by many to be pristine in relation to most other European waters. Indeed, the situation could be described as: *'Protected Cormorants foraging on protected rivers and feeding on protected fish'*.

The issues of Cormorant presence, and consequent fish predation, were also discussed during **INTERCAFE** meetings in relation to river habitats in both Austria and Wallonia in Belgium, and key issues from these countries are also included in this chapter.

16.1 Environmental and Social Contexts

The fish communities in Slovenia are diverse, with over 90 species (see section 5.6 of van Eerden *et al*. 2012 for further information on general ecology, fish communities and the role of cormorants here; also see section 11.5 of the same publication for further information on pertinent ecological aspects at the local level). Several of Slovenia's fish are native to the country and a major challenge highlighted by many of the local stakeholders was to improve the conservation of aquatic habitats. Although many of the rivers and fish communities in Slovenia are considered to be in excellent condition, there are a number of environmental issues affecting them. These include the presence of exotic non-native species such as Rainbow Trout *Onchorhynchus mykiss* and other potentially expanding species such as the American Signal Crayfish *Pacifastacus leniusculus*.[98]

Rainbow Trout are deliberately stocked in some Slovenian waters for angling purposes. Native fish species caught in many stretches of rivers usually have to be returned to the water by anglers, in so called 'catch-and-release' stretches, but Rainbow Trout may be taken for the table. However, there are many places where this species is not wanted because there is evidence that they interact negatively with native Grayling *Thymallus thymallus* when introduced to the same waters.

Other environmental impacts on many Slovenian rivers (apparently 60% of them will not reach 'good ecological status' by the Water Framework Directive deadline of 2015) include general pollution, gravel extraction, and the presence of numerous hydroelectric dams (including very small ones on fragile tributary streams) which prevent the movement of fish and can disrupt natural river-flow regimes and substrate (e.g. rock and gravel) movement. However, gravel extraction is limited to periods when it is considered to have least effect on spawning fish (i.e. 15 January–15 March, after Brown Trout spawn and before Grayling do so, and from 15 September to the end of



Fish hatchery in sub-Alpine catchment, INTERCAFE field trip, Slovenia.
Photo courtesy of **INTERCAFE.**



Fishing trophies at local angling club, INTERCAFE field trip, Slovenia.
Photo courtesy of **INTERCAFE.**

[98] Interestingly, this alien species was also mentioned to be threatening to French fish ponds at INTERCAFE's Paris meeting — where it was considered by some to be a much bigger threat than Cormorants to these fisheries.



Learning about Marble Trout *Salmo marmoratus* ecology and conservation, INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**

October). Other issues of concern include habitat degradation and water extraction for irrigation. There have also been changes caused by the canalisation of rivers as well as the impacts of increased forestry and declining agricultural areas on the sedimentation, hydrology and temperatures of rivers (thought to have become warmer in the last 20 years as a result of climate change). One local Slovenian representative observed: *'We have a strong winter Cormorant population on morphologically changed rivers. Cormorants benefit from changes of river morphology.'*

In Austria too, the regional distribution of Cormorant roosting sites for example mirrors to a great extent environmental changes such as habitat fragmentation that have occurred on many rivers. Here, Cormorants tend to concentrate along the bigger, often dammed, river systems. Fish migration and movements along main river channels into tributaries is made more difficult by barriers such as hydroelectric dams, and smaller rivers are also compartmentalised through man-made barriers, apparently increasing the ease with which Cormorants can feed.

The use of stocking to enhance fish populations was a key theme running through **INTERCAFE's** Bohinj meeting in Slovenia and one that is clearly complex and requiring further attention. Over the whole of the country, many native species are stocked but, despite this, catches of them have steadily declined over the last 20+ years (1986–2009). In some rivers, these declines were said to have reached alarmingly high levels. Interestingly, fish catches are the only data available to demonstrate such long-term changes, as inventories based on electrofishing samples have not been systematic and do not show trends. For example, in the River Krka, fish catch, fishing effort and stocking data show that (i) Grayling catches have declined steadily since the late 1980s, despite the fact that stocking of this species has been consistently higher (by 1–1.5 orders of magnitude), (ii) despite massive stocking of Nase *Chondostoma nasus*, the population in the river as assessed by catches is now extremely low indeed, and (iii) intensive and increasing stocking seems to have had no effect on declining fish catches of either Danubian Roach *Chalcalbrunus chalcoides* or Brown Trout, where catches are falling in proportion to the amount of angling effort.

Fish stocking in Slovenia is done according to five-year programmes which fishing clubs are obliged to present to the state authorities. At the time of writing (2011), programmes are now devised by the Fishery Research Institute in collaboration with fishing clubs. At the meeting in 2007 it was explained that a permit from the Slovenian government is required before any stocking can take place, and some 200,000 Marble Trout and 400,000 Grayling are stocked annually in Slovenian rivers. The release of Marble Trout is restricted to the small numbers of rivers where it is a native species, all of them flowing into the Adriatic Sea.

During the meeting and field trip in Slovenia, **INTERCAFE** was told that the release of Marble Trout and Grayling (fry and fingerlings) takes place in the Soča River and its tributaries between June and July. The two species are bred separately, initially using wild (but not necessarily local) fish but now with the hatchery's own brood stock which are screened for geneotype and phenotype, kept for one year and then released. Genetic testing is used so that managers can release appropriate strains in an effort to re-establish the 'pure' genetic stock of

native fish. A lot of consideration has been given to genetics and *'doing the right thing'* to create self-sustaining, pure Marble Trout populations. The situation is improving year on year, but there is a 20-year horizon to achieve these goals.

Rainbow Trout are still stocked and the potential impacts of their introduction are being investigated. One example concerns spawning site competition between Grayling and Rainbow Trout, although there seem to be no major concerns that Marble Trout are similarly affected. The stocking of Brown Trout has been banned since 1996 because it hybridises with the Marble Trout. Hybrids were found to dominate to the extent that only small populations of the genetically pure Marble Trout were found, after much effort, in some remote upper parts of tributaries of the Soča River. The re-population programme was initiated from this small, pure stock.

However, despite such concerns, there is fishery management pressure to stock Rainbow Trout. This is mainly done to protect native fish species — if an angler catches a Rainbow Trout, he or she has not caught a Brown Trout, Marble Trout or a Grayling. Furthermore, catches of Brown Trout and Grayling are declining dramatically all over Slovenia despite massive stocking programmes. In such circumstances, Rainbow Trout is the Salmonid species that fishing clubs can best offer to anglers.

Slovenian stakeholders at the **INTERCAFE** meeting linked the arrival of Cormorants in the area with declines in both fish catches and the sale of angling permits there. The Tomlin Angling Club noted how: *'Year after year, the number of sold fishing permits declined, reaching an absolute minimum of 2,662 in 2004. The catch of Grayling also declined, from 2,064 in 1997 to an unbelievable 66 in 2004!'*.

However, it was also recognised that if fewer people are going fishing then fewer fish are likely to be caught, and catches of some species may also possibly have changed over recent years because anglers are now targeting different species. Similarly, if reputation spreads that the angling is not good at a certain fishery (or river system/stretch), it is very likely that fewer anglers will go there to fish, therefore also influencing both fishing effort and catches for that fishery.

16.2 Cormorants, Numbers and Associated Problems

Great Cormorants do not, as yet, breed in Slovenia, so the birds are winter-only visitors which arrive in the autumn (October — November) and leave in spring (April — March). They are considered by many to be immigrants that originate from outside the country: *'Many Cormorants come here from elsewhere, for example Hungary especially in November'*. Again, this is a theme which has been observed elsewhere (see also 13.2 for Carp ponds, 14.2 for coastal fisheries and 15.2 for lagoons).

Most Cormorant winter roosts in Slovenia are situated close to the big rivers. In 2007 some 18 permanent night roosts were known in the country or on the Slovenian-Croatian or Slovenian-Italian borders, with 20 others appearing to be used only periodically. However, because of the relatively small distances involved, birds from these roosts can also exploit smaller rivers and tributaries in which Brown Trout and Grayling occur. Slovenian anglers are particularly concerned about the impacts of Cormorants on these small, clear rivers.

Representatives from three fisheries clubs discussed their Cormorant



Recreational anglers, INTERCAFE field trip, Slovenia.
Photo courtesy of **INTERCAFE.**

experiences with **INTERCAFE** participants. Members of the Fishing Club Bohinj first started to observe Cormorants along their rivers in 1990. The Club believed that Cormorants, which are present in the area from October to April in flocks of between 100–240 birds, are causing major declines of Grayling and Brown Trout in the River Sava Bohinjka. The Tomlin Angling Society manages the rivers of the upper Soča valley. They describe how the first 'serious' fish-eating birds to arrive in the late 1980s were gulls (*Larus* spp.) and Grey Herons (*Ardea cinerea*) followed by Cormorants in 1998: *'The first flock of Cormorants in the Soča valley was observed in February 1998. The fishing season in 1997 was excellent with a record 6,000 fishing permits sold to tourist fishermen. Very soon, flocks of 50–100 Cormorants were observed foraging in the Soča river'.*



Novo Mesto riverside, Slovenia. Photo courtesy of Shutterstock.

Along the River Krka, a 94 km long tributary of the River Sava in the south-eastern part of Slovenia, the Fishing Club Novo Mesto noted the arrival of the first Cormorants during the winter 1991–1992. Over the next four years numbers increased with a peak of about 500 birds reportedly counted on the river every day during the 1996–1997 winter. From 1997 onwards there have usually been between 130–400 birds on the river per day during the winter months, depending on climatic conditions.

This is a phenomenon also reported in other pre-Alpine systems (see section 13.2 of van Eerden *et al.* 2012). It seems that during times of extensive frost, the slower-flowing and still waters at lower altitudes freeze and so some Cormorants, at least, move to upland waters, especially fast-flowing streams that do not freeze. Cormorants usually arrive at the River Krka early in the morning from the River Sava or from fish ponds in Croatia, which are located some 15–20 km away close to the Slovenian-Croatian border, returning to their roosts late in the afternoon. Since the arrival of Cormorants, the fishing club has seen a rapid decrease of fish populations, particularly those of Nase and Grayling. Sport fishing catch data collected by the Fisheries Research Institute of Slovenia do show a decrease in catches of Nase but this has been attributed largely to the location of large dams, although Cormorant predation is also thought to be a factor.

Although the numbers of Cormorants wintering in Slovenia are relatively small compared to other European countries, with between 2,500–4,000 birds, the degree of damage caused to fish on particular rivers and tributaries is said to be high. With these Cormorant problems come associated economic impacts, and one example given of this at the **INTERCAFE** meeting was the sharp fall in the numbers of angling permits/licenses sold. Another argument put forward at the meeting was that there was little reliable information on the impact of Cormorants on fish populations, whereas others felt



that without immediate action to reduce Cormorants and their impacts, some fish populations were in danger of decreasing rapidly. As one angler pointed out: *'We need 5–10 years to get the story — but by then it will be too late'.*

Grayling was thought to be the fish species most vulnerable to Cormorant predation in Slovenia because it is relatively easy for the birds to forage on the stretches of rivers that support these fish. Elsewhere, Grayling are considered particularly vulnerable to Cormorant predation at spawning time, when they congregate in large numbers and may be restricted in their distribution, aggregating in the most suitable spawning areas — which, themselves, may be additionally limited by hydrological changes resulting from river obstructions such as dams.

On the other hand, Marble Trout were considered to be far less vulnerable to Cormorant predation because they populate narrow, fast flowing and overgrown river stretches, which are generally unsuitable and/or inaccessible to foraging birds. Nevertheless, Marble Trout populations are also decreasing in the region, raising the question of what factors might actually be influencing fish survival. For instance, at some times the streams of the Soča River catchment become roaring torrents carrying rocks, pebbles and sand downstream. Such extreme events will obviously damage and kill fish (and alter habitats) and so may severely damage fish populations.

As in Slovenia, Cormorant numbers in Austria are dependent on local and regional climatic conditions and to the associated migration and movement of the birds around Europe. Many of the Cormorants in Austria are winter visitors, the number of which have been increasing since the mid-1980s to a maximum of around 4,000-4,500 birds each year. Associated with



Grayling *Thymallus thymallus*. Photo courtesy of Shutterstock.



INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**

this increase in wintering birds, new roost sites have been established and, while these are primarily located on migratory routes along large river systems, the birds are also speading out to form roosts on smaller rivers. Unlike the current position in Slovenia there is also a breeding population of Cormorants in Austria. Here, birds first started to breed in 2001, and by 2005 two colonies (containing approximately 90–100 pairs) had become established. In common with private anglers everywhere who pay for their fishing licences, those in Austria also expect to enjoy good fish catches. They are most concerned about increasing Cormorant numbers and their potential impact on highly-prized Trout and Grayling stocks in Austrian pre-Alpine streams and rivers. Their concern centres on the removal of these species preferentially from fish communities, altering their age-class distribution (often by preying on the larger individuals), and thus reducing the reproductive capacity of the fish and their overall standing crop.

Belgium lies at the crossroads between the major breeding and wintering grounds of the north-west European *sinensis* Great Cormorant population, and it is on a major migratory flyway (e.g. Paquet *et al*. 2003). However, a wintering population of Cormorants did not become established in the country until 1991, following the general increase in European numbers. Since then the numbers of Cormorants counted in Belgium in mid-winter have increased regularly, with a peak of 9,000 individuals recorded in 2003, followed by a slight decline. Cormorants have also started breeding in Belgium and the number of breeding pairs has increased by 10% every year since 1992, and 1,500 pairs were recorded by 2006. Within Belgium, most of the Cormorant-fisheries conflicts occur in the region of Wallonia because there is a relatively higher density of wintering Cormorants here and human fishing activities are also more common and diverse. For example, on slow-flowing rivers (including the large River Meuse) angling activities concentrate largely on Cyprinid (the Carp family) species and Perch, whereas the fast-flowing rivers in the Ardennes have better water quality, and angling there focuses on Grayling and Salmonid species such as Brown Trout. Although Cormorant predation on small river systems in the Ardennes is considered to be the main problem because its impact on the fragile natural trout and Grayling populations there, Cormorant impacts on these small river ecosystems have not been thoroughly studied. There is also some small-scale, Cyprinid fish farming in Wallonia but, although Cormorants are locally considered a threat at some farms, the main Cormorant issue appears to be related to recreational angling on rivers.

At first, in 1977, wintering Cormorants were only observed within Belgium on the River Meuse but they have subsequently expanded their distribution to all other types of waters. Indeed, it is these wintering birds that are considered to cause most of the problems at Belgian fisheries in comparison with the smaller breeding population which is largely confined to private or protected areas in the west of the region.

16.3 Legal/Policy and Economic Contexts

Slovenia has a good international reputation for the quality of its angling. Economically, angling tourism is a very important source of revenue in the country, and it

also extends the tourism season, filling a gap in the months between the main summer holiday period and that of winter sports. Indeed, Sullivan *et al*. (2003) focussing on the river Soca and Idrijca catchments in Slovenia, stress the importance of angling for some regional economies that have scarce resources apart from tourism. Here, angling brought over 2.3 million euro to the region annually, a significant sum in this rather remote, rural location.

In Austria, angling is also considered important, and estimates indicate that there are around 400,000 people (perhaps some 5% of the population) who are interested in the sport to some degree.

In the Wallonia region of Belgium, recreational angling is actually declining in popularity but it is still a socially important pastime with around 75,000 permits sold every year (less than 3% of the 3.3 million inhabitants).

In Slovenia **INTERCAFE** learnt about the costs of mitigation against Cormorant impacts. For example, the Fishing Club Bohinj has now joined forces with Fishing Club Bled and the Fisheries Research Institute to reduce the costs of Cormorant management activities from 30,000 euro per year to 24,000 euro (see also 16.4). However, the legality of mitigation efforts such as shooting is contentious and was discussed at length. One angling representative said: *'The Cormorant is still rather highly protected — and we only have permission to shoot 154 birds a year in the whole of Slovenia. But, what about the protection of our fish?'*. Despite the contention, two presentations at the meeting focussed on legal institutions and instruments in EC law and the regulatory framework of the Habitats and Wild Birds Directive, showing that the authorities take their legal responsibilities seriously in relation to management actions.

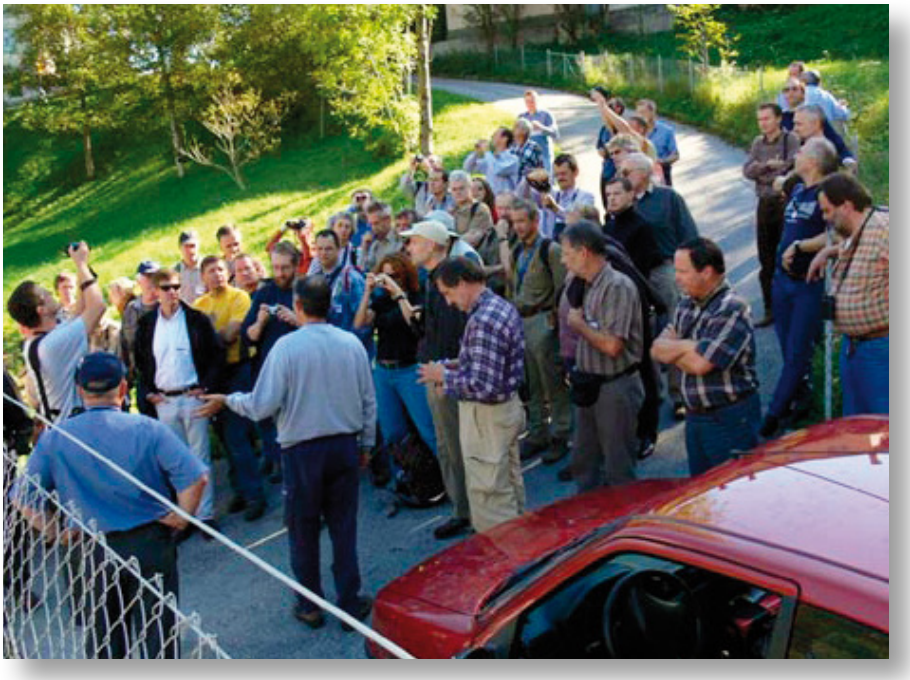
In practice, the number of birds that can be shot is allocated regionally according to the distribution of fish species of important conservation value and, in the short-term, is also based on areas thought to currently hold 5% of the wintering population. This number is an apparently arbitrary proportion: many see it as a political 'fix' and fisheries stakeholders consider it to be too low. In addition, there is a perception that those stakeholders who have more influence with the Ministry are given a higher shooting quota than others. As has been reported elsewhere (for instance in the Po Delta and the Finnish coast at Hanko, see sections 15.4 and 14.4, respectively), only recognised hunters are allowed to shoot Cormorants. This creates problems as the birds are not eaten nor are they a recognised trophy, so there is often little motivation to spend time shooting them. This appears to be a very common situation across Europe.

There were also complaints from some stakeholders about the lack of organisation in relation to shooting activities, which anglers felt they should be allowed to undertake themselves or which at least should be coordinated at a national level. A familiar argument heard in Slovenia was that Cormorants should in fact be managed at the EU level (see also 15.3 for similar comments in the Po Delta).

In Austria the aim of regulations in relation to Cormorant management is to protect native Brown Trout and Grayling, although shooting birds is area- and time-restricted. There is no single national strategy



INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**



Visiting a fish hatchery, INTERCAFE field trip, Slovenia.
Photo courtesy of **INTERCAFE.**

for Cormorant management in Austria because fishing, hunting and nature conservation laws are delegated to provincial governments, of which there are nine. Thus, each province can have different options and solutions for dealing with Cormorants, the numbers and distribution of which also differ in each province and at different times throughout the winter. Overall, some 400–450 Cormorants are killed outside the breeding season annually in Austria (see chapter 10 in van Eerden *et al.* 2012).

Belgium is also a federal country comprising three regions — Flanders, Wallonia and Brussels — each having different environmental legislative systems. In these countries, the federal structure and the regional and temporal differences and changes in Cormorant activity appear to preclude the development of any nationwide Cormorant management plans. On the other hand, these regionally-specific Cormorant pressures suggest that national plans might not necessarily be either required or more effective than the current situation.

16.4 Management Measures

An important message to come from **INTERCAFE's** Slovenia meeting — and one that echoed the comments heard many times before — is that Cormorants are adding to the number of pressures that fisheries are already facing. As one angler pointed out: *'The question is how other threats are topping up. You have to come to the Cormorant problem — in between you have to manage other problems too'*. The main fisheries management objectives were clearly to protect and enhance vulnerable and economically valuable stocks of Grayling and Marble Trout. Catch-and-release angling is practised by approximately 70% of anglers, who use barbless hooks as a measure to limit impact on stocks and to manage them responsibly. Most of the management undertaken on rivers is done by angling groups, supported by licence income, and there is no financial support available from the government.

Stakeholders who attended the meeting were keen to demonstrate and discuss the range of activities they undertook to manage Cormorants. They also expressed pride in breeding fish and restoring the populations of some fish species, practices considered to be an important management measure: *'We don't aim to fill the river — but our policy is to change the structure of the fish stock — thus to have a flexible approach to stocking coupled with flexible control of fishing (e.g. minimum landing sizes that apply)'*.

INTERCAFE was told by the Tomlin Fishing Society that since 2004 all members were required to spend a day during the Cormorant season counting birds and scaring any seen foraging on their stretches of river. Rivers under their jurisdiction had been divided into different zones, according to the severity of *'Cormorant infestation'*. The Club also used gas cannons alongside fish spawning grounds to scare off Cormorants, action that has seemingly worked as no birds have been reported in these specific areas recently. However, anglers also emphasised that it is important to have the continued collaboration of hunters for measures to be effective in the long-term. Another

measure adopted has been the breeding of larger fish for stocking in an attempt to make them less vulnerable to Cormorant predation. However, it was noted that space for these larger fish is limited at fish farms and, as elsewhere (e.g. fish ponds, see section 13.4), there are additional husbandry and food costs associated with this practice.

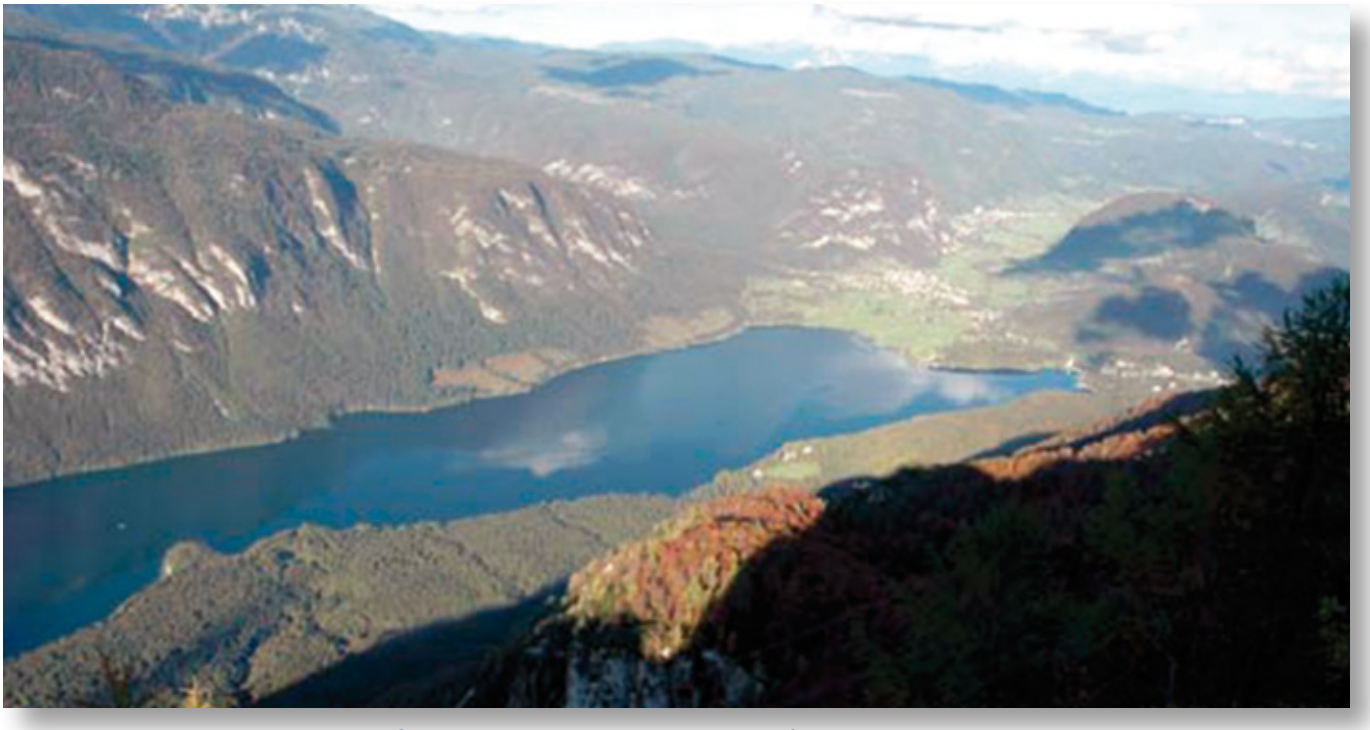
Other organisations such as the Fishing Club Bohinj, Fishing Club Bled and the Fisheries Research Institute (Zavod za Ribištvo) have now collaborated to lower Cormorant management costs and to coordinate scaring efforts in well-defined primary and secondary locations. They also cooperate with the hunting association, as only qualified hunters are allowed to shoot. The Fishing Club Novo Mesto has found that scaring and shooting activities are most effective against Cormorants in certain locations on the upper Krka river, where it runs through a relatively narrow valley. Gas cannons were considered by some of the stakeholders to be effective in scaring Cormorants but this was not true for Grey Herons *Ardea cinerea* which prey on Marble Trout in small nursery streams. Acoustic flares were also successful in some areas.

Nevertheless, anglers emphasised the need for greater action and identified the 'Swiss model' (see section 6.11 of Russell *et al*. 2012 for details of the Swiss national plan) as a potential way forward. They wanted to be allowed to shoot more Cormorants but the Slovenian government considered there was currently little or no evidence of any impact of the birds on fisheries. The Slovenian government does provide advice on management and has also been involved in the preparation of a long-term action plan. This action plan is claimed to support the conservation of endangered fish species where Cormorants are considered an important contributor to reductions in fish populations, and also the appropriate, selective and effective protection of property from Cormorants. However, it also supports the maintenance of favourable conservation status for waterbirds and their habitats. For Cormorants, this means at wintering and migration sites. The Ministry for the Environment and Spatial Planning supports a number of proposals to establish monitoring schemes for Cormorants, coordinating the protection of endangered fish species in open waters and a better analysis of current Cormorant and fish data to identify where mitigation efforts should to be concentrated. However, in practice little appears to have been done.

In Austria, monitoring Cormorant numbers has shown that intensive shooting effort along certain river sections can result in displacement and a shift in Cormorant activity. For example, flocks can split into smaller groups, with additional roosts being established in more inaccessible locations. This change in roost distribution as a consequence of shooting programmes was also recorded in the Czech Republic and across France. In Wallonia limited financial compensation and permits for shooting are provided to fish farmers, who are currently less in conflict with Cormorants than are their angling counterparts. An example of changing atitudes was provided from the River Meuse, where conflicts were prevalent in the early 1990s when wintering Cormorant numbers peaked at 5,300 birds. Although numbers have declined subsequently here to some 3,500 birds, a recent proposal for the shooting of birds across the



Learning about techniques for scaring Cormorants from sub-Alpine rivers, INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**



Sub-Alpine catchment, INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE.**

Wallonia region suggested that the birds should in fact be tolerated on this river. This greater tolerance might well be explained by the combination of a Cormorant diet study and a Roach and Common Bream *Abramis brama* stock assessment, which seemed to suggest that there had been no decline in fish stocks. In contrast, shooting Cormorants is not allowed in what are considered to be natural areas such as in the Ardennes, albeit that angling clubs are lobbying for this management measure to protect vulnerable fish with high economic value in small rivers.

References

Paquet, J-Y, Dermien, F, Lacroix, P, Lucas, P, and Pourignaux, F. 2003. Year-to-year site-fidelity of wintering and migrating great Cormorants (*Phalacrocorax carbo*) in the Belgian Meuse valley. Volelwelt 124, Suppl.: 53–60.

Russell, I R, Broughton, B, Keller, T, and Carss, D N. 2012. The INTERCAFE Cormorant Management Toolbox: methods for reducing Cormorant problems at European Fisheries. COST Action 635 Final Report III. ISBN 978-1-906698-09-6.

Sullivan, C, Jesensek, B, Jesensek, D, and Zuza, A. 2003. An assessment of the impotance of sports fishing in the Soca and Idrijca basins, Slovenia. Project report to Tour du Valat. CEH Wallingford, UK, pp.32.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906698-07-2.

17 CASE STUDIES: a synthesis

Mariella Marzano and David N Carss

Using concepts and approaches described in chapter 12, a number of 'contextual themes' were used to explore Cormorant-fishery conflicts at different waterbody-fishery types across Europe and Israel. This chapter is a synthesis of the Case Study approach and the explorations described earlier (chapters 13–16) which aimed to draw out the essential social, cultural and legal perspectives for 'real world' conflict situations experienced by **INTERCAFE** participants and local stakeholders.

Four different 'contexts' were explored for each of the four waterbody-fishery types examined in this chapter. These were: (1) environmental and social, (2) Cormorants, numbers and associated problems, (3) legal/policy and economic, and (4) management measures. Although they can be described in isolation, these contexts are sometimes interwoven and so are not mutually exclusive. In this synthesis, each of the four contexts identified within European Cormorant-fisheries conflicts is discussed and, for each, the situations within different waterbody fishery-types are compared and contrasted.

17.1 Environmental and Social Contexts

Consistently across all Case Studies, people had strong economic ties (either as sources of income generation for commercial fisheries or as sources of expenditure for anglers) to 'their' fisheries and the wetland systems that support them. As well as an important source of income for some, it was clear that people also made stong links between fisheries and both biodiversity maintenance and conservation and cultural heritage. In Case Study areas, these often traditional fisheries were considered to be under numerous threats (including that from Great Cormorants see 17.2) which manifested themselves in complex, inter-related environmental and social contexts.

To those that make a living from, or spend their recreation time in, the habitats discussed here, these places are undoubtedly valued as being special. This was often the case for Carp fish pond regions because of the paucity of other wetlands in Israel, or because of the very long-term aesthetic value of these places in France, Saxony, the Czech Republic and other countries across Europe such as Latvia and Hungary. It was also true for the commercial fishing grounds in the Baltic with their unique archipelagos off the Finnish coast, for the extensive coastal lagoon fishery systems in the Mediterranean regions of Italy and north Greece, and for recreational anglers on the pre-Alpine rivers in Slovenia and Austria whose pristine nature and natural fish communities were highly-prized, or rivers elsewhere (such as in Belgium) where these aquatic habitats are often the most natural environments that many people there can visit.

Furthermore, many of the fisheries that were explored as part of the **INTERCAFE** Action were operating within wider areas considered to be biodiversity hotspots and were often accorded considerable legislative protection (e.g. Natura 2000 designation). Thus, from a social perspective, it became evident that there were concerns in the Po Delta, for instance, over the levels of bureaucracy that local fishermen had to deal with in areas with high environmental protection. More generally it was notable that many participants expressed concerns

about bureaucracy. Usually, this was considered to come from 'elsewhere', for instance Rome, Athens (see 15.1) or Brussels and affected what local people could and could not do, and this is further discussed below (see 17.3).

Another environmental aspect of human relationships with these wetland environments was the feeling of many that the activities undertaken in them — be they fish culture or fish harvest either for profit or pleasure — were traditional and part of a system that had remained largely unchanged for generations. This was clearly the case for many extensive Carp pond and coastal lagoon areas where the systems of fish culture were first developed many hundreds, sometimes more than a thousand, years ago. In some ways it was also true for commercial coastal fisheries where **INTERCAFE** (and REDCAFE before it) heard from fishermen in Denmark, the Netherlands, Poland, northern Germany and Finland that fishing is 'in the blood' of many and has been a traditional family occupation for several generations. It could also even be true for many recreational anglers who use traditional methods and skills to catch fish and who also 'use' angling as a means of recreation in some of the last natural environments available to them.

However, anglers, fish farmers and commercial fishermen in all the Case Study areas and beyond were well-aware that these environments are very often far from being unspoilt. Not withstanding that much of their concern is focussed on Cormorants (see 17.2), there was a very general acknowledgement that these birds were only one of a suite of issues affecting fisheries. Associated with this, a number of worries surfaced regarding the viability of fisheries and what might happen if they were discontinued. One indication of this was the declining market for Carp — as a result of changing dietary habits in many eastern countries in particular, and of cheaper imports to western countries from these same eastern ones. Consistent concerns were voiced that, should fisheries disappear for whatever reason, there would also be resulting threats both to the biodiversity in terms of genetically pure natural fish stocks or pristine habitats for instance, and to the ecosystem services that these habitats support. Clearly the very high aesthetic value, and tourism potential of many of these wetland environments would also be seriously threatened if fisheries disappeared.

Carp pond farmers in France, Saxony and the Czech Republic were concerned over declines in water quality and Finnish coastal fishermen were concerned with major ecosystem changes in the Baltic Sea. These included such issues as nutrient inputs, rising temperature, changes in salinity, and pollution levels, all of which (seperately and in combination) are known to change the ecology of fish species in their system. Several of these concerns (i.e. nutrients, salinity and pollution), and their ultimate effects on fish populations, were also of great concern to others — the lagoon fishermen in the Po Delta for instance. Similarly in the pre-Alpine rivers of Slovenia, anglers were deeply worried by the effects of increasing water temperature, changes in water flow and sedimentation (often the result of water and/or gravel abstraction and adjacent land uses like agriculture and forestry for instance). These issues, along with



Recreational angling is a common traditional pastime.
Photo courtesy of Shutterstock.



Man-made barriers can seriously affect fish behaviour and movement in rivers. Photo courtesy of Shutterstock.

those of high fish stocking rates and the presence of obstructions and barriers (often in the form of hydo-electric dams, even across small tributaries) were all thought to affect the ecology and natural movement of riverine fishes and, in many cases, perhaps make them more vulnerable to Cormorant predation.

It was also evident that fishermen in many Case Study areas — including pond farmers in Saxony and the Czech Republic, lagoon fishermen in Italy and northern Greece, and coastal Baltic fishermen in Finland — were worried for the future of their way of life and often for their livelihoods. In all these cases fears were expressed that young people no longer wanted to enter the fisheries profession and that traditional skills and occupations might soon be lost. In turn, fears were voiced that the wetland habitats managed, maintained, and conserved as a consequence of these fisheries might also be lost.

Given what many feel is at stake — unprofitable fisheries leading to abandonment and associated economic hardship and wetland habitat decline and loss — it is perhaps not surprising at all that concerns and feelings can run so high. Closely linked to this, it was noticable that there was a strong ethos of responsibility and custodianship among fishermen. In several cases (lagoons in the Po Delta and fish ponds in France and the Czech Republic, for example) many fishermen felt that they were carrying out an unpaid public service in maintaining their fisheries and associated habitats. Similarly, these pond and lagoon fishermen, as well as coastal fishermen in several places, linking themselves to their long-traditional occupation, felt a heavy responsibility to not abandon it. Although there was general consensus that something had to be done to ensure the sustainability of the fisheries in question, there was also a strong feeling (voiced in Saxony and elsewhere) that initiatives like the payment of financial compensation was not the sole answer, as fishermen did not want to make a living through such payments. Here, and in the Po Delta, there were strong calls for some form of publicly-funded support for traditional fisheries as some sort of cultural 'service'.

17.2 Cormorant Numbers and Associated Problems

As well as acknowledging that many other issues are negatively affecting the viability of both the commercial and the

recreational fisheries explored by **INTERCAFE** (see 17.1), one key issue was undoubtedly also the belief of many people that levels of Cormorant presence and predation were now making these fisheries economically unsustainable.

Great Cormorant numbers had increased significantly in all Case Study areas and other countries explored here — in Israel's Hula Valley, Italy's Po Delta, France, Slovenia, Finland, the Czech Republic, Saxony in Germany, nothern Greece, Austria, Belgium, Latvia and Hungary — as they have almost everywhere else across Europe (e.g. see reviews in Carss, 2003, Carss & Marzano, 2005). In many places, such as Israel, Italy, France, Slovenia, and the Czech Republic, Cormorants were not actually resident but visited, often in large numbers, outside the breeding season — during the autumn and spring migations and/or over the winter. Moreover, in several of these places such as the Po Delta, the Finnish coast, Belgium and Austria, the birds have relatively recently also started to establish breeding populations.

The issue of high fish density, and therefore a site's attractiveness to Cormorants, showed itself most clearly in three consistent situations. This consistency almost certainly makes these situations highly predictable to the birds. First, fish are sometimes held in unnaturally high densities in Carp ponds (e.g. Israel's Hula Valley, France, the Czech Republic, Saxony in Germany, Latvia and Hungary) and in coastal lagoon fisheries (e.g. Italy's Po Delta, and nothern Greece). Stocked fish, which are often naïve, having been hatched and grown artificially in hatcheries, may also be released in very high numbers at specific places.

Second, fish are sometimes forced to congregate in relatively high densities on river systems, both naturally and otherwise. For example, man-made barriers such as hydro-electric dams across rivers in Slovenia often restricted the natural movement of fish which may congregate near them, unable to pass through. Fish may also congregate naturally on river systems — for example during spawning time — and such aggregations are associated with specific habitat types (e.g. gravel of the optimum size for spawning). Water flow regimes in rivers can be affected by the barriers commonly placed across them. Ultimately, changes in water flow can affect the number, size and location of microhabitats such as spawning gravels within the river channel. Their resulting scarcity sometimes forces adult fish to congregate in fewer places at even higher densities than under normal breeding conditions. In Slovenia (and presumably elsewhere) other river 'microhabitats' were said to make some sections less vulnerable to Cormorant predation. For example tree-lined river banks often made it difficult for foraging birds to gain access to the water in comparison to those sections without trees.

Third, these attractive situations for Cormoramts often occur in autumn and over the winter period. Therefore, in many places across Europe the period of maximum fish vulnerability is also the period when Cormorants arrive in large numbers from places often very long distances away. This relationship is not fully understood but it is arguable that it is not a result of chance: it is quite possible that it is precisely because fish are predictably vulnerable in these locations that they are visited regularly by the birds. That many problems occur at fisheries at this time of year is also linked to the fact that many of the foraging waters used by Cormorants for the rest of the year become unavailable to them at this time because of ice cover. There must be a very strong pressure on the birds to migrate seasonally, both between north-eastern regions and south-western ones, and between slow-flowing lowland waters and fast-flowing ones at higher altitudes (see chapter 8 of van Eerden *et al*. 2012 for details).

In most cases, the problems caused by Cormorants in these locations and at specific times of year is obvious — they eat large quantities of fish and are thus thought to reduce man's harvests or catches. Furthermore, both wide-scale and site-specific management options (see also 17.4) invariably come with additional costs, which can be high and further reduce the profitability and viability of fisheries. For example, keeping Carp for longer periods under protected conditions to avoid the times of peak Cormorant numbers, or growing them to larger sizes so they are less attractive prey for the birds (as was reported in the Czech Republic and France, see 17.4), often require considerable additional husbandry and food costs.

Problems and the consequent potential solutions are, of course, acknowledged to be more nuanced than this. The presence of Cormorants in some waters is

thought to affect fish behaviour, again making them less easy for fishermen to catch. Fish may also escape from Cormorants but be wounded, thereby increasing their disease risk and mortality. Similarly, coastal fishermen in Finland and elsewhere (e.g. Denmark) report high incidence of Cormorant damage to fish ensnared in their nets[99] leading to reduced landings. In the Baltic Sea, Cormorants were said to cause problems to local people through their presence on offshore archipelagos and on coasts where their guano (which has a 'powerful' odour and can alter the characteristics of vegetation on some islets) and noise are perceived as unwanted intrusions in the landscape. In many conflict situations, perceptions were clearly important. For example in Slovenia it was thought that the belief that Cormorant predation or the birds' mere presence was having a negative effect on a particular fishery often meant that people decided to fish somehere else. As a result, and regardless of the actual level of bird presence/predation, this could result in reduced angling effort and a fall in the numbers of fishing licences sold, with knock-on, adverse economic consequences.

Another issue related to peoples' perceptions of Cormorants involves the changes in bird numbers mentioned earlier. These often result in the birds being considered over abundant, and changes in their geographic distribution as well as the fact that birds move between breeding and over-wintering areas often leads to the birds being considered 'outsiders' or 'aliens'. This was the case in Finland, the Po Delta, the Czech Republic and Slovenia. In these and other countries visited by Cormorants on migration or during the winter period, attempts to reduce local bird numbers (e.g. through shooting) were often said to be ineffective. This was because of the 'turnover' of birds, shot individuals soon being replaced by others at these times/places when birds were particularly mobile. Consequently, there is also a strong view that Cormorant conflicts should be addressed at a European-wide scale (see 17.3), and in some countries (eg. France) there is strong pressure to adopt large-scale programmes to reduce bird numbers.

Again, there was a shared feeling amongst many fisheries interests (e.g. in Carp pond areas and the Po Delta, see 17.1) that if fisheries were abandoned, then wetland habitats would suffer and associated biodiversity would be be lost. A message heard in both Slovenia and the Po Delta was that the added pressure of Cormorant presence and predation would ultimately be 'the last straw' for many fisheries.

17.3 Legal/Policy and Economic Contexts

There are calls to address the Cormorant issue and manage the birds at the pan-European level. This was a message from Carp pond regions in France, Hungary and Latvia, from coastal lagoon fisheries in the Po Delta, and from recreational fisheries in Slovenia (see also 17.2). One suggestion, voiced in the Czech Republic and Finland, was that Cormorants should not be afforded special protection but be placed on the list of 'huntable' species.

However, many issues were also raised by stakeholders in relation to how they experience more local policy descisions in relation to Cormorants. One message was very obvious — that legislation is interpreted in different ways in different places (for further details of the diversity of legal management actions taken across Europe see chapter 10 of van Eerden *et al*. 2012). Associated with this were feelings of a 'heavy sense of bureaucracy' (e.g. France) and a 'heavy administrative structure' (e.g. the Po Delta). In the latter case, there are federal, regional and provincial administrations operating. In Belgium, management issues were said to be complicated by the fact that the country was administered as three regions, and in Austria the country's nine provincial governments each apparently had different opinions and solutions for Cormorant problems. The complex traditional ownership rights that exist in Finnish coastal communities were also discussed. Coupled with these administrative complexities came the feeling that the authorities often do not seem to listen or care about fishermen (e.g. in relation to Finnish coastal fisheries). Such feelings may well contribute to the 'marginalisation' (see 15.1) increasingly associated with many fisheries in **INTERCAFE** Case Study areas and beyond.

[99] Interestingly, this case of fish trapped in static nets could also be seen as an instance where fish 'vulnerability' and also 'spatial predictability' are increased — making many coastal fisheries yet another attractive situation for foraging Cormorants.

Clearly, the issue of Cormorant conflicts merits economic consideration, whether it be fish production or harvest costs, fish sales at market, or angling licence and tackle sales, costs of fish thought to have been lost to fisheries as a result of predation, and the costs of any management measures undertaken to try to reduce such losses. In **INTERCAFE's** Case study areas, fish were (a) reared extensively or 'sustainably',[100] (b) wild and caught commercially,[101] or (c) wild strains in 'prisitine' or natural habitats that were caught recreationally[102] or at least not in artificial habitats.[103] As such, the fish involved were considered to be high value products and any loss to Cormorants was cause for concern for **INTERCAFE** and others (e.g. see Carss, 2003: 153–4) have found it difficult to obtain quantitative information on the likely financial costs of fish consumed by Cormorants. Nevertheless, such losses are generally considered to be high, and estimates of $5.1 million per year were cited in Israel and 20 million euro per year in France.

The costs of any management actions taken against Cormorants are also difficult to obtain but at the Angling Club level in Slovenia, such actions were calculated to cost some 20–30,000 euro per year. Although figures were not provided, Finnish coastal fishermen mentioned that insurance could be obtained for their fishing gear. Although this facility offered the prospect of payment to defer the cost incurred as a result of damaging Cormorant activity, an insurance premium payment still represented an additional expense to fishermen. Before their coordinated management programme began in Israel's Hula Valley, the shooting of Cormorants was considered a significant expense,[104] and in France people were starting to consider that shooting birds was becoming prohibitively expensive.

Perhaps one of the clearest relationships that emerged between legal/policy issues and economic factors involved the payment of financial compensation (see also section 8.3 of Seiche *et al*. 2012 and chapter 5 of Russell *et al*. 2012). Indeed, in Saxony and the Czech Republic, the payment of financial compensation was reported to be a key policy instrument that had alleviated Cormorant conflicts in Carp fish pond areas, and the same was said in the Po Delta in relation to lagoon fisheries. Explicit values paid in compensation were rarely revealed but it was discovered that annual compensation payments made in Saxony were some 6–800,000 euro per year and those in the Czech Republic around 1,000,000 euro per year. For this fishery sector, the critical species is Carp, and the economics of Carp aquaculture in Israel, Saxony, France (and coastal lagoon fisheries in the Po Delta) are increasingly threatened by cheap imported fish (see 17.1).

Although the amounts being paid annually were not inconsiderable sums, many stakeholders had serious concerns about this policy both within countries and between them. In Saxony, such financial support was not assured and could, in practice, be withdrawn by the government. In the Po Delta, compensation funds were finite and so had to be divided between several environmental sectors (and not specifically for Cormorant issues) and across numerous sites. Fisheries in both the Po Delta and Saxony did not therefore receive full economic renumeration for their alleged losses as a result of Cormorant predation. Fisheries stakeholders highlighted that they were not compensated for the real costs of their losses to Cormorants but it was clear that such losses were seldom, if ever, rigorously calculated (see chapter 8 of Seiche *et al*. 2012). In Saxony, the complicated process for making claims for financial compensation was highlighted, the system being considered by some to be too bureaucratic (see above, and also 17.1 in relation to working within a conservation designation area). In the Czech Republic compensation was said to be weighted towards the larger and hence more powerful fish farm businesses. In contrast, smaller fish farm businesses with their lower economies of scale had less access to the financial compensation scheme.

An additional issue — and one that underlines the diversity in the way legislation and policy

[100] For example Carp ponds in Italy's Po Delta, northern Greece, France, the Czech Republic, Saxony, Latvia and Hungary.
[101] For example Finland and other coastal Baltic fisheries.
[102] For example Slovenia and Austria.
[103] For example Belgium.
[104] Practically, in Israel and elsewhere (e.g. the Czech Republic), Cormorants become harder to shoot (as they quickly become even more wary of humans) as a shooting programme progresses — as a result farmers here began to cordinate their actions with considerable success (see 13.4).

are implemented — is that there is considerable variation in how, and under what circumstances, compensation is paid. Some fisheries may be compensated for Cormorant-induced financial losses whereas others may not, even within the same country. Similarly, some countries (e.g. Slovenia, where all costs are borne by angling clubs) have no mechanism for paying financial compensation to fisheries albeit that it is commonly used in others.

Although the subject was not explored fully, there was a suggestion that — from an economic point of view at least — several fisheries did have the potential to diversify, often into so-called 'ecotourism' activities. Examples were given in relation to pond farms in Israel and France and from the Finnish coastal fishery. Likewise, in the Po Delta there was an economic shift from traditional fish farming and waterfowl hunting towards conservation and biodiversity-based tourism.



Hunter with a shot Cormorant. Photo courtesy of Paolo Volponi.

17.4 Management Measures

The context under consideration here involves management measures taken by people to reduce or eliminate Cormorant problems at their fisheries (for a complete synthesis see Russell *et al*. 2012). However, a vital component of this issue in Case Study areas — and everywhere else across Europe and beyond — is the need to think across a wide range of geographical scales.

Perhaps the most intuitive 'solution' to the problem of excessive numbers of Cormorants is to kill birds (for discussion on lethal techniques and the philosophy behind using them see section 5.4 of Russell *et al*. 2012). More over-wintering Cormorants are shot in France than in any other country — at least 20–30,000 per winter since 1997 — but here and also in the Po Delta shooting is very costly and time consuming. In France, enthusiasm for shooting is now apparently waning, perhaps largely because Cormorant numbers do not seem to be declining as a result of this programme. Another important issue associated with shooting Cormorants is that in many places (including the Finnish coast, Slovenian rivers and the Po Delta) actions have to be undertaken by certified hunters who have little, or no, interest in killing these birds. In Finland, however, attempts are being made to generate interest in utilising Cormorants in some way in order to generate a market for their carcases and so encourage hunters to harvest them.

On a more site-specific level, one recurring theme was the problem of protecting relatively large bodies of water from Cormorants. Many Carp ponds and coastal lagoons are too large for the majority of protective techniques to work. There was a paucity of information on what techniques had been tried and under what conditions, raising the possibility that some of these techniques might yet work if deployed correctly in a timely fashion.

In Carp pond regions, some site-specific management practices had been successful. These generally focussed on the times and locations where fish were most vulnerable to Cormorant predation and involved either altering the time of fish harvest to avoid the main period of bird migration in the autumn or offering more protection to over-wintering fish held in high densities in relatively small ponds. Similarly, fish grown for re-stocking (of angling

waters primarily) can be kept for longer, allowed to attain larger sizes and be less vulnerable to predation before being released, as in France and Slovenia. These practices inevitably increased production costs, however, and so were not necessarily considered 'easy' solutions.

The Israeli example in the Hula Valley of coordinating site-specific management techniques over a relatively large area was perhaps the best example of a collaborative approach to Cormorant management. Here, proactive management was organised through a dedicated, coordinated programme incorporating different types of knowledge, including scientific understanding of the birds' biology and local understanding of the problems the birds caused. This was in contrast to other places where there was little evidence of integrated management (e.g. across provinces and districts in lagoon fisheries of the Po Delta, see 17.3) or complaints of a lack of organisation for shooting programmes. It was interesting that in Slovenia, fishing clubs were collaborating with each other, and with hunters and the Fisheries Research Instuitute on aspects of Cormorant and fisheries management.

The apparent failure of many site-specific management measures that are known to have been successful in some places and at some times, and the general lack of any regional-level coordination of action, raises the issue of 'technology transfer' (see 8.4 of Seiche *et al*. 2012 for detailed discussion). There are examples of the transfer of wildlife management technology between species (e.g. Crane *Grus grus*, White Pelican *Pelecanus onocrotalus* and Cormorants) in Israel but there were not really examples of transfer between regions or countries for Cormorants. In this context there were clearly issues with 'scaling-up' solutions from one location to others (or from a small area to a larger one). Perhaps, this might reflect the fact that many fisheries owners and fishermen considered that management actions from elsewhere would not work for them.

Despite these problems with management measures — or perhaps because of them — many people considered that national management plans were needed to address the Cormorant issue. In Finland, for instance, implicit in the development of a national management plan was the requirement to consider 'the bigger picture'. Furthermore, consideration of the process of developing and implementing the Finnish plan showed the value of monitoring any resulting actions, updating the plan if and when necessary and, perhaps most importantly, of involving all the relevant people in this process. However, there was a strong feeling expressed most firmly in Finland and Italy that, even if management actions were being considered on a relatively large scale, the local perspective was still considered vital. Indeed, recreational fishermen in Belgium felt that local solutions and collaborations were actually working well and that there was no need for a national management plan.

Once again, perhaps the most important theme here is the need to consider Cormorant management measures across a wide range of geographical scales. In practice, the scale at which management is proposed or would work is likely to vary considerably depending on such things as fishery type and the precise nature and extent of the specific Cormorant problem. Nevertheless, there were frequent claims that site-specific actions did not work (in the longer-term at least) albeit that there was little evidence of fisheries collaborating over larger areas in proactive, integrated management programmes. There was a strong suggestion that fisheries managers needed to be flexible when considering their management options but also that Cormorant problems and potential solutions were often very similar in different places and fishery types. In relation to the issue of scale, and obviously linked to the migratory habits of the birds,[105] there were strong beliefs that Cormorants had to be managed 'here' as they were damaging 'our' fisheries but that action should be at a trans-continental level because it was 'their' birds and the associated conservation legislation came from distant policy-makers 'there'.

Concluding Remarks

INTERCAFE's Case Study approach (see 12. 1.1), which applied similar methodologies across many different places and fishery types, was clearly helpful in determining and exploring several of the key issues affecting Cormorant-fisheries conflicts across Europe. Moving beyond the issues of quantifying the actual

[105] But perhaps also a general, 'local' feeling that Cormorant problems were not caused by any actions undertaken at the local level but that circumstances or someone elsewhere was to blame — an effective solution should therefore be provided by people elsewhere.

damage done to fisheries by these birds (see chapter 9 of Carss *et al*. 2012 for a detailed discussion), this area of **INTERCAFE's** work highlighted the importance of many other issues within so-called Cormorant-fishery conflicts. This chapter has explored several of these environmental, social, legal/policy, economic, and management contexts, and it is clear that they are very important to understanding conflicts and potential solutions because they recur so frequently. This idea of recurring issues is further explored — in a much broader sense — in the following chapter (18).

17.5 Contextual summary

Below, the contextural explorations described in this chapter are summarised as succinctly as possible. However, in doing so, many of the important details are inevitably lost. Readers are therefore urged to refer back to the relevant sections of this chapter for detailed background and discussion.

17.5.1 Environmental and Social Contexts

- People very often have close ties to 'their' fisheries and supporting wetlands: these places are often highly-prized and valued as being 'special'.
- There is an understanding that fisheries are linked to both biodiversity maintenance and conservation, and often to cultural heritage. Many fishermen and fishing communities hold strong feelings of responsibility and custodianship towards their fisheries and also to the environments that support them.
- Many fisheries are considered traditional — part of a system that has remained largely unchanged for generations and, to many, fishing is not just an occupation or a recreational pursuit; it is 'in the blood'.
- Fisheries often operate in wider areas which are considered to be biodiversity 'hotspots' and afforded considerable conservation legislation. Some people believe that there should be publically-funded support for traditional commercial fisheries because they provide a regional and national cultural 'service'.
- There is an awareness that Cormorants are only one of a suite of issues affecting fisheries. Other issues include nutrient enrichment, rising temperatures, pollution, changes in water flow, sedimentation, habitat modification and river impoundment.
- There are fears that fisheries are becoming unviable and that younger people no longer want to enter the profession and/or learn the skills necessary to maintain them. In many places, there are worries that if fisheries cease then there will be associated losses to biodiversity and ecosytem services.

17.5.2 Cormorant Numbers and Associated Problems

- Cormorant numbers have increased significantly almost everywhere across Europe, and there is a strong belief that levels of Cormorant presence and predation are now making many commercial and recreational fisheries unsustainable.
- Cormorants in abundance eat large quantities of fish and so are thought by some stakeholders to reduce man's harvest or catches at specific fisheries. Cormorants can also affect fish behaviour making them harder for people to catch, damage fish they are unable to capture and/or swallow, and take fish ensnared in fishing gear (increasing fish mortality and reducing fish harvest, respectively).
- At some sites the presence of breeding Cormorants, or often of roosting birds, and the accompanying guano and noise are considered an unwanted intrusion in local landscapes.
- Many fisheries (e.g. fish ponds, especially during harvest) hold fish at very high densities and fish often aggregate naturally in large numbers (e.g. at spawning time) or in response to modified habitats (e.g. hydro-electric dams). Such situations are undoubtedly attractive to Cormorants.
- Such sites are usually predictable in time and space, and so many fisheries of high commercial and recreational value to people are consistently vulnerable to Cormorant predation, at least at some times of year.
- Many fisheries experience their greatest problems with Cormorants during the autumn and spring migrations and/or over the winter. Increasing bird numbers and their widespread movements mean that Cormorants are commonly considered to be 'over-abundant' and/or 'outsiders' and 'aliens'.

17.5.3 Legal/Policy and Economic Contexts

- The mobility of Cormorants means there is often a high 'turnover' of birds at particular fisheries, with removed birds being replaced quickly by others. Coupled with the birds' seasonal movements across the European continent, this means many people believe that Cormorant conflicts should be addressed at a European-wide scale. Some also believe that Cormorants should not be afforded special protection but be placed on the list of huntable species.
- Current protective legislation, the EU's Wild Birds Directive, is interpreted in different ways in different places throughout Europe, and this sometimes varies even within a single Member State. With this, and other relevant legislation, many fisheries feel a 'heavy sense of bureaucracy' and consider that they face a 'heavy administrative structure'.
- Fish stocks in all fisheries are considered high value products and so any loss of them to Cormorants is considered an important economic issue. It is difficult to obtain quantative information on the likely economic value of fish lost to Cormorants but on a national level it has been estimated at several hundreds of thousands, or even millions, of euros per year in some countries.
- Information on the financial cost of management actions taken against Cormorants is also difficult to obtain, albeit that some fisheries may spend tens of thousands of euros per year on Cormorant management.
- One of the clearest relationships between legal/policy issues and economic factors involves the payment of financial compensation to fisheries for losses caused (or allegedly caused) by Cormorants, which can be up to one million euros per year in some countries.
- Financial compensation is not available in all countries or for all circumstances and, where it is paid, many fisheries believe it does not cover the 'real' cost of their losses, which are actually seldom, if ever, calculated rigorously.
- Some fisheries have the potential to diversify — from an economic point of view at least — and in some places there are economic shifts from such activities as traditional fish farming and waterfowl hunting towards conservation and ecotourism.

17.5.4 Management Measures

- The most intuitive management 'solution' to the problem of excessive numbers of Cormorants for many people is to kill them but shooting is very costly and time-consuming. However, current long-term intensive shooting programmes (at regional and national scales) do not appear to have reduced Cormorant numbers overall, and many hunters have little, or no, interest in shooting this species.
- Protecting relatively large waterbodies (e.g. Carp ponds, lagoons and other coastal fisheries) from Cormorants is problematic and there is a strong feeling that most site-specific actions do not work, in the longer term at least.
- Nevertheless, some site-specific management practices are successful if they are focussed on the times and locations when fish are most vulnerable to Cormorant predation.
- Perhaps the best example of collaborative Cormorant management action comes from the Hula Valley in Israel. Here, a dedicated, co-ordinated programme — incorporating scientific understanding of the Cormorant biology and local understanding of the problems caused by the birds — was developed and was successful over several years in fish farm pond areas.
- Although national management plans are relatively common, some Member States think they are unnecessary for their situations. Others feel that international pan-European action is needed urgently.
- The apparent failure of many site-specific management actions and the lack of regional-level coordination action suggest there are problems with both technology transfer and scaling-up from one location to another.
- It is important to think across a wide range of geographic scales when considering the application and likely effectiveness of Cormorant management measures. Similarly, almost all management involves some financial outlay which will influence both the choice and duration of any actions undertaken.

References

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169 pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265 pp. http://www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Parz-Gollner, R, and Trauttmansdorff, J. 2012. The INTERCAFE Field Manual: research methods for Cormorants, fishes, and the interactions between them. COST 635 Final Report II, ISBN 978-1-906698-08-9.

Russell, I R, Broughton, B, Keller, T, and Carss, D N. 2012. The INTERCAFE Cormorant Management Toolbox: methods for reducing Cormorant problems at European Fisheries. COST Action 635 Final Report III. ISBN 978-1-906698-09-6.

Seiche, K, Gerdeaux, D, Gwiazda, R, Lévai, F, Musil, P, Nemenonoks, O, Strod, T, and Carss, D N. 2012. Cormorant-fisheries conflicts in Carp pond areas in Europe and Israel — an INTERCAFE overview. COST Action 635 Final Report V. ISBN 978-1-906698-10-2.

van Eerden, M R, van Rijn, S, Volponi, S, Paquet, J-Y, and Carss, D N. 2012. Cormorants and the European Environment: exploring Cormorant ecology on a continental scale. COST Action 635 Final Report I. ISBN 978-1-906698-07-2.

18 FURTHER READINGS ON KEY 'CONTEXTUAL' THEMES

18.1 Introduction

Both the rationale and the structure for this element of **INTERCAFE's** work evolved considerably during the course of the Action. The original intention was to produce *'a comprehensive library/bibliography of relevant material pertaining to all apsects covered by each of INTERCAFE's Work Groups'* (see Preface for further details of these). However, having attempted to list relevant scientific papers during the REDCAFE Concerted Action (in relation to case studies of Cormorant impact at fisheries), several pit-falls were evident. First, the issue of quality-control in relation to different people's understandings of scientific papers: how was it possible to deal with the boundaries between formal independently-refereed papers and unrefereed articles in the so-called grey literature? Also, how — if at all — could the huge volume of Cormorant-related material in the media (see for example chapter 9) be assimilated and reviewed? Associated with this was a somewhat restrictive requirement — given the official language of **INTERCAFE's** work — for articles to be written in English. Second, the intention was to not restrict coverge to merely references about Cormorants and fish. Finally, and perhaps most importantly, there were doubts over the usefulness of merely producing a long list of authors, dates, journal issues and volume numbers, and titles that included some mention of cormorants or relevant fish species.

Clearly, it was not the title or other details that were important or useful, but the content of an article. Consideration was given to producing an 'annotated bibliography' but, again, it was difficult to standardise how best to produce a few insightful words for each reference offered, and this could clearly develop into an almost endless task. Ultimately, seven topics emerged repeatedly from **INTERCAFE** meetings that people were consistently keen to know more about. This led to the format of this chapter where an **INTERCAFE** participant introduces themselves and then talks through a relatively short list of selected publications (not restricted to refereed scientific papers) that give readers clearer insight into these commonly recurring topics.

This chapter thus provides pointers to further reading on a number of recurring themes emerging from **INTERCAFE's** consideration of Cormorant-fisheries interactions in their broadest sense. Each is discussed in some detail with the hope that this informs readers on some of the key concepts, perspectives and issues.

18.2 Wetlands (David Carss)

Dave Carss is a vertebrate ecologist with particular interest in fish-eating predators and their prey. He has worked on Cormorant-fisheries issues for over 20 years and, far from being a parochial subject, this work has done nothing but broaden the outlook and scope of his research interests. Here, to some extent at least, he goes back to basics and identifies a number of publications dealing with the topic of wetlands, either explicitly or implicitly. These cover such diverse subjects as ancient civilisations,



wetland ecology and ecosystems, rivers, lakes and seas, the Cod, commercial fishing and angling. Nevertheless, each of these issues is interwoven. In their most diverse sense, wetlands are invariably highly productive habitats and, from time immemorial, they have been both valued and exploited by people on local to global scales.

Wetlands and civilisation

- Penguin Encyclopedia of Ancient Civilisations, Cotterell, A. (ed.) (1980). Penguin Books, London, 367 pp.
- Journeys from the Centre of the Earth, Stewart, I. (2005). Century, London, 239 pp.

Like all good encyclopedias, it is easy to get lost for hours in the diversity of information, maps, images, drawings and photographs that Arthur Cotterell and over 30 international experts have accumulated in their coverage of 'Ancient Civilisations'. Turn to almost any page and, if it is not the coast and shallow seas, it is a major river system and its associated lakes and marshes, supporting both transport and travel and the formation of human settlements. This intimate association between human settlement, society and culture and the land- (or water-) scape is further explored by Iain Stewart in his detailed look at the Mediterranean, the cradle of western civilisation. The book is a discovery of how geology has shaped our lives and, in a chapter entitled 'Water: elixir of life', he eloquently describes western civilisation's dependency on, and management of, water.

The main messages for **INTERCAFE** here in these two books are that humans and wetlands have a long association stretching back for many thousands of years. Furthermore, these human ties to wetlands — as a source of food or recreation, of contemplation or conservation — are very strong indeed, and wetlands are also temporarily and spatially dynamic, a theme we shall return to at the end of this section.

Wetlands — environment and management

- Wetlands (4th Edition), Mitsch, W.J. and Gosselink, J.G. (2007). John Wiley & Sons, New Jersey, 582 pp.

This textbook starts with a short scene-setting chapter describing the vital importance of wetland ecosystems, their unmistakable links with human history and cultures (see above), their importance as a source of food, fuel and building materials, their reference in literature, and their destruction and conservation. It ends by dipping a toe into the



Egypt's River Nile: an iconic image of the link between water and civilisation. Photo courtesy of Shutterstock.



Danube Delta, Romania: one of Europe's largest wetlands. Photo courtesy of Shutterstock.

worlds of wetland science and scientists, wetland management and managers. The book tackles the difficult task of defining what wetlands are (giving both management and legal perspectives) — unique areas that have standing water for some time during the growing season, unique soil conditions, organisms and hydrological conditions — concluding that we should not expect an absolute answer to the question 'what is a wetland?'. The final chapter of this section describes some of the wetlands of the world — which cover about 7–10 million km^2 (or 5–8% of the land surface area of Earth) but the historic loss of which may have been as much as 50%. The remaining two sections of the book cover the wetland environment and wetland management.

In five chapters, the authors cover many important issues in relation to wetland environments. These include basic ecological concepts starting with wetland hydrology and water budgets before moving into wetland functions and the transport and transformation of chemicals ('biogeochemical cycles') in wetlands. Whilst it is elegantly written, some of the language and mathematics here may be too daunting for some readers but simple diagrams and photographs help to get the main points across. One of the key messages here is the productivity of wetlands — the diversity and abundance of life that they contain and maintain. Wetlands are often highly productive habitats and, as we shall see in some of the other books below, this apparently endless bounty has often led to serious over-exploitation. Just an hour or so browsing through this section is surely enough to convince anyone of the beauty, complexity and dynamism of the world's wetlands.

The third, and perhaps the most thought-provoking, part of the book describes and discusses human impacts and management of wetlands, both directly through drainage and other alterations and modifications and indirectly through climate change. Here is where, for me, the book excels, setting up the indisputable conclusion that wetlands provide many services and commodities to humanity at every level from population, through ecosystem, to global. It also discusses wetland destruction, its modification, conservation and restoration, and the authors then examine the values and valuation of wetlands. Attempts to value wetland ecosystems and their provision of services and commodities are numerous, often complex and seldom complete. Nevertheless this makes fascinating reading and covers both ecological and economic evaluations. All this is of direct relevance to **INTERCAFE's** interests, the values it discusses, including those of fisheries harvests, waterbird conservation issues, wetland ecosystem services, aesthetics, and societal and cultural perspectives. Although not addressing Cormorant-fishery interactions specifically, this part of the book really makes the reader aware of the complexity that exists at the interface between ecological systems and human ones. It also eloquently demonstrates the great variety of wetland habitats. Given this diversity and the multiple human perspectives affecting wetlands and their management, perhaps we should not be too surprised that conflicts like the Cormorant-fisheries one arise, or that they are often difficult to resolve to peoples' mutual satisfaction (see also 13.1).

Standing and running waters: rivers and lakes

- Life in Lakes and Rivers, Macan, T.T. and Worthington, E.B. (1951). The New Naturalist series, Collins, London, 320 pp.

This, slighty old-fashioned, book is number 15 of a classic series of British natural history books. The series, first begun in 1945, now numbers over 100 titles and the books are renowned for the comprehensive coverage of their subjects in language that is authoritative but not patronising. As well as describing the emerging science of ecology in terms of the intricacies of animal and plant communities and the intellectual drive to link previously compartmentalised biological and geographical subjects, Macan and Worthington's book also admirably describes the diversity of lakes and rivers. It is this aspect on which we will concentrate here as it reflects, as did many of **INTERCAFE's** deliberations, the range of habitat diversity involved and the need to jump between various spatial scales — here, from the worlds of chemicals and nutrients, plankton and invertebrate larvae to those of geology, volcanoes and Ice Ages — in order to better understand these functioning ecosytems.

Macan and Wortington explain that lakes are, in fact, transitory

features of the landscape in geological terms, each one formed by one event happening in a limited area, and that rivers — watercourses — are much older features existing in spite of the events which created lakes. As it is so easy to assume that all waterbodies are fundamentally the same, this is an eye-opening revelation. While rivers obviously flow (see below), there is another temptation — to consider lakes as merely giant buckets of static, homogeneous water. Nothing could be further from the truth. In their elegant chapter 'A Typical Lake', the authors first describe how temperature influences the water in lakes through stratification, that a warm water layer (the epilimnion) floats on one of cold water (the hypolimnion), and how the boundary between these (the thermocline) will thus change both seasonally in the case of temperate regions but also geographically in terms of broader climatic issues. These seasonal changes are fascinating, and the situation of a lake in summer is vastly different to its situation in winter, changes ocurring all the time as days either lengthen or shorten. Rivers entering lakes are usually much warmer than the lakes deeper waters and so they tend to mix and circulate only with the warmer epilimnion waters. Lake waters are also circulated in very subtle ways by wind action, and sunlight (as well as producing heat for the warmer surface waters) does not penetrate far into water and thus greatly affects the distribution of plant growth in lakes, linked also to the effects of sedimentation and suspension on light penetration. Consideration of light penetration leads on to a description of plankton and algae,



Perch *Perca fluviatilis:* a key predator in many European lake ecosystems.
Photo courtesy of Shutterstock.

their lives and importantly their deaths. This raises further issues of temperature, perpetual darkness and changes of oxygen concentrations and dissolved nutrients. All this complexity before higher plants, fishes and waterfowl even enter the picture.

Whereas Macan and Worthington describe a typical lake and go on to explore 'Different Kinds of Lakes' in a following chapter, this approach can not be applied to 'Rivers'. This impossibility is a result of the age of riverine watercourses and their modification by many geological strata. Ultimately, the density of water at different temperatures is the most important property of water in the study of lakes. For rivers, the most vital characteristic is its downhill flow. The beauty of the description of rivers revolves round the differention of different zones or reaches along their length. These can range from torrential headstreams to very slow, broad river sections — the very lowest of which are inundated every 12 hours with saline water from the sea.

Associated with these flow regimes, rivers are constantly depositing material on their beds, the size of such material depending on the force of flowing water. Ultimately, this flow-related depositon influences the course of a river's flow and the plants and animals that it supports along its length. As rivers respond to factors within their catchments — which can be very extensive — they are perhaps more easily affected by human activity than are lakes. It is interesting to note that Macan and Worthington state that the history of the investigation of rivers fits most easily into an account of their misuse by humans. For **INTERCAFE**, the issues highlighted most eloquently by Macan and Worthington are those which show that rivers and lakes



Seashore on Baltic coast, INTERCAFE field trip, Poland.
Photo courtesy of **INTERCAFE**.

are far more that mere bodies of water. Perhaps that is the key? Like our own bodies, lakes and rivers are subtle in their complexity, but this complexity is understandable. The complexity of lakes and rivers forms the basis for the ecology of fishes (and ultimately their predators, including Cormorants) and affects their distribution, community ecology, breeding productivity and life-history strategies.

Coasts and the seashore

- Seashore, Hayward, P.J. (2004). The New Naturalist series, Collins, London, 288 pp.

Here we are at number 94 of the *New Naturalist* series, and whilst this book does not necessarily cover all that we might expect from the term 'coasts' used in this section, the shallow sea habitats described can easily be applied to considerations of Cormorant-fish interactions in coastal waters. Like the writings on rivers and lakes described above, Hayward also covers the crucial geographic and geological issues that conspire to produce the diverse coastlines we are all familiar with. Of particular interest here are the chapters on 'Rocky Seashores' and 'Sandy Seashores', each of which is a unique system with specific characteristics and, ultimately, fish communities. Although some of the species described in the 'Seashore Fishes' chapter are restricted to inter-tidal habitats, many of them also live further offshore and are commonly eaten by predators, including Cormorants.

This chapter describes the ecology of these shallow-water fishes, emphasising their relationships with habitat — be that substrate or the three-dimensional cover and food resources offered by seaweeds. Important issues here are the availablity of shelter from winds and tides, and the tidal, diurnal, and seasonal distributions and 'rhythms' of fishes. Again, the key issue here for **INTERCAFE** is the dynamics of fish in shallow-water systems — shallow coastal seas are far more than just blocks of water with fish in them. Individual fishes and their communities (both of their own, and of other species) are in constant flux, feeding and taking risks or avoiding observation or detection by other organisms through seeking physical cover on a daily basis, in response to daylength, the state of the tide, and the season. More apparent, there are huge shifts in the abundance of fish on a seasonal basis, many species using inshore coastal waters as breeding and/or 'nursery' areas, others becoming far less active as waters cool in winter. Associated with this, some species may move into deeper waters in winter while others disperse to different habitats.

For **INTERCAFE**, the message is, again, that species, communities, and habitats are dynamic. Here

we read that fish are not evenly distributed but occur in 'patches' in the environment, that the abundance and so-called 'availability' of fish is constantly changing. This flux occurs not just at the foraging site of a Cormorant, for instance, but at all other sites too. Thus, in order to exploit this situation it becomes obvious why Cormorants focus on a site with particularly high prey availability and also why there is often considerable 'turnover' at sites as birds visit numerous other potential feeding sites, presumably testing the levels of fish availability in order to shift foraging sites to maximine their energy balance when necessary.

Chips with everything — commercial fishing as a phenomenon 'that changed the world'

- Cod: a biography of the fish that changed the world, Kurlansky, M. (1998). Jonathan Cape, London, 294 pp.
- Fish, Markets, and Fishermen: the economics of overfishing, Iudicello, S., Weber, M. and Wieland, R. (1999). Earthscan, London, 192 pp.
- Commercial Fishing: the wider ecological impacts, Moore, G. and Jennings, S. (editors) (2000). British Ecological Society, Blackwell, Cambridge University Press, 66 pp.
- The End of the Line: how overfishing is changing the world and what we eat, Clover, C. (2004) Ebury Press, London, 314 pp.
- The Unnatural History of the Sea: the past and future of humanity and fishing, Roberts, C. (2007). Octopus Publishing Group, London, 448 pp.

We all see fish in shops, on market stalls, and on our plates, and we seldom stop to think where it came from or how it was caught. These books, published over almost a decade, tell a powerful story, focussing as they do on humanity's cunning in devising ever-more efficient means to catch fish and the effects this has had on what remain largely 'unseen' underwater ecosystems.

Kurlansky's book focusses on one species - Cod - and begins by detailing how, over a thousand years ago, it was no coincidence that the Viking 'empire' stretching from Norway to Iceland and west to Greenland and Canada was the exact range of the Atlantic Cod. By the year 1000, the Basques, with their access to huge reserves of salt, had developed a truly international trade in Cod. The book then goes on to describe the international politics and economies resulting from the market in Cod and, ultimately, the over-exploitation of the species.

In Fish, Markets and Fishermen, Iudicello and colleagues offer a very readable synthesis of how over-fishing can come about. Fishermen, processors and marketeers responded rationally to legitimate market opportunities but as fish became more scarce, problems arose. Sometimes, these were overcome (in the short-term) by switching to other capture species. Ultimately, however, the overcapitalisation of the fisheries industry has lead to serious stock depletions the world over. These impacts have not only been felt on the quarry species of the fishermen but on a much wider ecological scale. Moore and Jennings describe the wider ecological impacts of commercial fishing and start by decribing the commonly-used fishing gears. They then describe the effects that commercial fishing has through the production of





Many fisheries across the world, and including many European waters, have been the victim of over-fishing. Photos courtesy of Shutterstock.

'litter' ('ghost' netting and the ingestion of gear fragments by birds, mammals and turtles) and on such things as underwater habitats and non-target organisms. Like many of the books in this section, this one ends with a chapter looking to the future, aspects of conservation, and the way forward — but having read what comes before, the current situation is sobering.

Clover's book is indeed a bleak one. It concentrates on the global scale where some 75% of the world's fish stock are either fully exploited or over-fished, and he contends that the attitude of industrial-scale fisheries to conservation is 10,000 years out of date. Whilst the language is sometimes provocative — *'whole ecosystems are trashed and the lives of people in poor counties are impoverished through rapacious neo-colonialism and unsustainable forms of trade'* — the story of over-fishing is made clear. The book does an admirable job of exposing the sometimes crazy relationship (particularly from an EU perspective) between politics, scientific information, conservation and global companies and markets, especially in the 'Burning the Midnight Oil' and 'Theft of the Sea' chapters before considering how best to face the future in 'Reclaining the Sea'.

In some ways, Roberts does a similar job — though perhaps in a more holistic, ecological way than does Clover. However, an additional beauty of Roberts' 'The Unnatural History of the Sea' is the concluding chapters which explore how scientific recommendations are translated into controls on fishing — through political descision-making that seldom, if ever, operates without strong social, cultural and economic leanings. Through a careful dissection of the issues, Roberts considers the future in his 'Reinventing Fishery Management' chapter. This is followed by an exploration of 'fish reserves' in 'The Return of Abundance' before 'The Future of Fish' is discusssed in the final chapter. Ultimately, this chapter argues that there cannot be exploitation without protection and suggests that, with the appropriate management and the will to devise and implement it, many of the world's fisheries could be returned to abundance within a few decades.

For **INTERCAFE**, the main issues to consider here are the massive impacts of commercial fishing, effects that influence not only the target species but many other species and even specific habitats. Changes in such systems can be immense and startling through relentless fishing. That all these books focus on coastal/marine fisheries is interesting. Clearly, sea-fishing has a wider global scope but similar issues are known to occur with freshwater fisheries, too. Although there is obviously not complete overlap between the geographic areas covered by fisheries that have become over-exploited and those areas where Cormorant-fisheries conflicts occur, there is clearly a meaningful overlap in terms of the ecological consequences. For example, in many cases, through 'fishing down food webs' the resulting fish communities (impoverished by over-fishing or habitat destruction or modification) are ideally suited to a generalist fish-eating predator such as the Cormorant. Leaving biology aside for a moment, the numerous insightful discussions on the role of science in wildlife and fisheries management are also very pertinent to **INTERCAFE's** work. So, too, are the historical, cultural and ecomonic issues ultimately associated with commercial fishing.



Fishing in stormy waters.
Photo courtesy of Shutterstock.

Fishing — in the blood

- O'Hanlon, R. (2003). Trawler: a journey through the North Atlantic. Hamish Hamilton, London, 339 pp.

Deeply associated with the cultural and economic issues referred to above, this is the story of social anthropologist, writer and naturalist Redmond O'Hanlon's trip on an Orkney fishing trawler with its young crew as they ply the



waters of the North Atlantic off the Scottish coast in search of fish. The book focusses on Scottish fishermen working at sea but much of what it says is probably equally valid for inshore fishermen, and for commercial fishers on many of Europe's rivers and lakes. The author tries to understand what it means to be a commercial fisherman and what the job is like. The tale that unfolds is, however, revelatory. While the background to much of the journey is the worst of the winter weather and O'Hanlon's inevitable seasickness, the crux of the book is the intimacy and insight he brings to the daily reality of those who work on a deep-sea fishing boat. The boat's skipper has a 2.4 million euro overdraft with the bank after converting the trawler for deep-sea fishing, so the economic incentive to catch fish is certainly there.

But there are other incentives too — not least, the 'drive' to be at sea and to be fishing — and there's excitement and an almost primeval thrill of the hunt. There is interesting discussion of the politics of UK and EU fisheries among those who are actually affected by it but perhaps the most insightful aspect of the book is the description of the spaced-out, paranoid atmosphere on the boat created by a communal lack of sleep. With a standard routine of three hour-long sleeps in every thirty-six hours, everyone on the boat is driven to their mental limits by the sleep deprivation necessitated by a trawlermans' work. In fact, this book is as much about the human condition than anything else. But there is also risk and fear and superstition, all part of the daily routine of the fisherman. It clearly takes a special person to be one. This book expresses some of the values, the personality traits, the economic, cultural and social things that drive fishermen to be fishermen, issues that are of great interest and influence in **INTERCAFE's** Cormorant-fisheries explorations.

O'Hanlon mentions that trawler men have the highest death rate of any workers in Britain. Today, few jobs are truly life-threatening but I remember a long harbour wall in a Dutch fishing port that had been inscribed with the names of all the fishermen from the town that had died at sea. It would be impossible to pass such a memorial on your way to work without reflecting on both the dangers or your job and the long line of fellow fishermen behind you. Similarly, perhaps one of the most moving encounters of the REDCAFE work was to spend some time (both at sea on on land) with Danish pound net fishermen. After visiting the pound nets and extracting and boxing the catch, we met for a discussion on Cormorant-fisheries problems. Although the fishermen conceded that many issues were negatively affecting their catches, one of the most obvious was Cormorants taking fish trapped within their nets. The birds damaged fish and severely reduced their market value: they were clearly a problem that fishermen felt they should be able to solve.

One young man described how his father had been a fisherman, and his father before him. Fishing was in his blood. Cormorants were a real threat to his livelihood (and as living standards were improving all the time, the need to make more money was increasing too) but he was deeply troubled. How could he contemplate being the last generation in his family-line to go fishing? How could he reconcile the responsibility of continuing this family tradition whilst resigning himself to the reality of having to stop fishing because of Cormorants? He clearly couldn't. As a group of ecologists, privileged to spend some time with fishermen and get a glimpse of their way of life, it was also clear that biology by itself could really offer no answers to this dilemma.

Fishing — in the mind

- The Complete Angler, Walton, I. (1653). Hamlyn, Oxford University Press, 322 pp.
- The Way of a Trout with a Fly, Skues, G.E.M. (1921). A & C Black, London, 271 pp.
- Small-river Fly Fishing for Trout and Grayling, Evans, J. (1972). A & C Black, London, 208 pp.

- Fish, Fishing and the Meaning of Life, Paxman, J. (editor) (1994). Penguin Books, London, 556 pp.
- Dear Jim: reflections on the beauty of angling, Schwab, A. (2004). Merlin Unwin Books, Ludlow, 256 pp.

The subtitle of Izaak Walton's (1676) classic 'The Contemplative Man's Recreation' is a strong clue here. But first, the gender issue. Throughout I have tended to call fishermen 'men'. Of course, women catch fish too but in much of this literature and in my personal experiences, most fishermen are indeed men (with a few notable exceptions, of course). Angling for fish is far more that the mere act of catching them. Walton's discourse is a wonderful doorway into the mind of the angler. It is written as 'a conference between an Angler [Piscator], a Faulkner [a falconer: Venator] and a Hunter [Auceps], each commending his recreation' and whilst the falconer and the hunter feature clearly, the real beauty lies in the contribution of the Piscator. Walton's observations on why anglers choose to fish, what it means to them and how it affects them are clearly timeless. The words may have been written well over 300 years ago and refer to an English angler of Elizabethan times but I would wager they are equally applicable today to a French roach fisherman or an Austrian grayling angler. Another beautiful aspect of this book are the chapters describing the natural history of particular fish species. There is a wealth of detail here and some perfect ecological insights linking fishes to specific habitat types and describing the different preferences and behaviours of different fishes. The desire to understand why fish do what they do — as a precursor to angling for them and catching them — is intense.

This idea of getting inside the mind of a quarry-fish is exemplified in Evans' chapter on 'Watercraft'. Without anthropomorphising (indeed, this is the biggest mistake one could make), it admirably explores the behaviour of fish — in this case Brown Trout and Grayling — their senses and how these work underwater, and how they balance their survival. This balance is essentially the same for all wild creatures and is between only two factors — sustenance and security, or simply, food and fear. The chapter goes on to discuss how a fish positions itself within a stream in relation to both cover and the 'food lane', the region where most food drifts down the river either on the surface or in mid-water before finally discussing 'where to look for fish'. As with previous sections, this whole area is a mass of subtle complexities.

Much of Skues' book explores similar biological territory but also describes the skills involved in trying to tempt a trout to take an artificial fly. This gets the reader both into the mind of the fish and the mind of the fisherman, in this case specifically in relation to out-witting an adversary. Both Paxman and Schwab acknowledge this apsect too but often focus on other issues in the minds of anglers. Paxman's anthology is awe-inspiring in its depth of coverage and starts with the thought that the happiest days of his life have been spent fishing: in 10 chapters over more than 500 pages he tries to get to grips with 'Fish, Fishing and the Meaning of Life' to explain why this might be so. Finally, the same basic theme is explored by Schwab. In a clear nod to Walton's work, this book takes the form of a 'conversation' between the author and a boy called Jim conducted via email. In his exploration of 'what's good about fishing?' Schwab explores a common theme in the experience and paraphernalia of angling — beauty. Ultimately, this and all the other



The contemplative man's recreation. Photo courtesy of Shutterstock.



What's good about fishing? Photo courtesy of **INTERCAFE**.

books mentioned here attempt to describe both the biological and the human side of angling and what makes it so powerful to those who go fishing … and so mysterious to those who do not.

Again, much of these writings encapsulate the historical, cultural, even philosophical issues deeply embedded in angling and, again, **INTERCAFE** learned that many of these issues (and those surrounding Cormorant-fishery conflicts) could not be fully comprehended without understanding humans and their behaviour as well (if not better) than the behaviour of the fish and the birds.

Considering people, fishes and birds together

- Competing and co-existing with cormorants: ambiguity and change in European wetlands, Carss, D.N., Bell, S. and Marzano, M. (2009). In Heckler, S. (editor) (pp 99-121) Landscape, Process and Power: re-evaluating traditional environmental knowledge. Oxford, Berghahn Books, 289 pp.

It feels slightly odd recommending a piece of writing that I have been involved with in this commentary on wetlands. However, in some ways, this paper neatly encapsulates some of the issues that have gone before. From the starting point of Cormorant-fisheries interactions, the paper explores the conservation of biodiversity and the sustainable management of natural resources. It visits the United Kingdom, Greece, Lithuania and Romania, and it touches upon environmental change, economic hardships, anxieties over natural resource use, and collaborative working. One of the recurring themes in this work is the multiple factors that are having a negative impact on commercial and recreational fish catches. Although Cormorant predation is part of this, it is rarely (if ever) the sole reason for such declines. Having said that, it is at least a tangible reason, and one that many feel could be tackled directly unlike, say, changing demands on water resources or political upheavals. This paper also categorises wetland environments as 'shifting landscapes' and this is a powerful concept. The term imparts the dynamism and interconnectedness of the human and biological issues under consideration here.

As I hope this brief discussion has shown, Cormorant-fishery interactions are part (an important part, of course) of much bigger, complex issues — as much to do with people, their nature and

behaviour as with ecological issues — that can best be understood and addressed through an interdisciplinary approach. In some ways, this brings the discussion full-circle to its starting point with wetlands. They are also cultural landscapes, unique habitats with deep-rooted, interwoven values for people. Wetlands are unique, highly productive habitats, hotspots for both biodiversity and its conservation, and humanity and many of its cultures. Exploring such issues related to wetlands will hopefully allow us to tackle the controversial topic of Cormorants and fish more effectively.

18.3 Cormorants and Fish (Ian Russell)

Ian Russell, a UK fishery scientist and policy advisor on freshwater fisheries issues, reviews a number of publications that he has found particularly useful in the context of understanding Cormorant ecology, the interaction between Cormorants and fish stocks and fisheries, and the management of Cormorant-fishery conflicts.

Introduction

As is evident from the previous section, Cormorant-fishery conflicts are widespread across Europe, affecting a range of wetland habitat types. It is generally accepted that predation by Cormorants can cause problems at some sites — for example, by impacting on fish stocks and reducing catches. However, it also needs to be recognised that predation is just one of a wide range of factors that can affect the status of fish populations in the wild; that Cormorant-fishery conflicts are often inherently complex; and that assessing impacts can be subject to a range of uncertainties. The resolution of Cormorant-fishery conflicts is therefore rarely easy, and it usually requires some balance to be struck between safeguarding fish stocks and fisheries and conservation of the birds.

Informed management of the conflicts between Cormorants and fisheries in Europe needs to be based on careful consideration of the best available information on Cormorant populations in the region, a good understanding of the underlying ecology of both the birds and fish, and an awareness of the management techniques that are likely to be the most effective in different situations. The following selected sources have proved useful to **INTERCAFE** in this context.

Basic overview of Cormorant ecology

- Riding on the crest of the wave: Possibilities and limitations for a thriving population of Cormorants (Phalacrocorax carbo) in man-dominated wetlands. M.R. van Eerden, M.R., Koffijberg, K. & Platteeuw. M. (editors). (1995). Ardea 83(1), 338 pp.
- Cormorants in Europe. Proceedings of the 3rd International Conference on Cormorants in Europe. Gromadzki, M. & Gromadzka, J. (editors). (1997). Polish Journal of Ecology, Ekologia Polska vol. XLV, no. 1, 334 pp.
- Proceedings of the 4th European Conference on Cormorants, Baccetti, N. & Cherubini, G. (editors). (1997). Supplemento Ricerche Biologia Selvaggina, vol. XXVI, 591 pp.



Cormorant populations have grown strikingly across Europe in recent years. Photo courtesy of Shutterstock.

- Cormorants: Ecology and Management. Proceedings of the 5th International Conference on Cormorants, Keller, T.M., Carss, D.N., Helbig, A.J. & Flade, M. (editors). (2003). Die Vogelwelt 124, Supplement, 402 pp.

The Great Cormorant is an exceptionally successful species, which is currently probably more abundant in Europe than ever before. It is one of the most intensively studied wild birds in Europe, and extensive information from an array of sources is available in relation to its numbers, distribution, migratory movements, behaviour and ecology. Among the best sources of information on these varied topics are the proceedings of the various symposia convened by the Wetlands International Cormorant Research Group, the most recent examples of which are listed above (further



details are also available on the CRG website: http://cormorants.freehostia.com/index.htm. Papers in these volumes chart the striking changes in Cormorant populations across Europe in the past two or three decades, report on Cormorant habitat selection, feeding and migration strategies and behaviour, and provide information on the feeding ecology and diet of the birds in various habitats.

Such basic biological information on the species is essential to **INTERCAFE's** understanding of how and where Cormorant conflicts occur and in providing a basis for assessing impacts and evaluating and prioritising management options.

- Techniques for assessing cormorant diet and food intake: towards a consensus view, Carss, D.N., Bevan, R.M., Bonetti, A., Cherubini, G., Davies, J., Doherty, D., el Hili, A., Feltham, M.J., Grade, N., Granadeiro, J.P., Grémillet, D., Gromadzka, J., Harari, Y.N.R.A., Holden, T., Keller, T., Lariccia, G., Mantovani, R., McCarthy T.M., Mellin, M., Menke, T., Mirowska-Ibron, I., Muller, W., Musil, P., Nazirides, T., Suter, W., Trautmansdorff, J.F.G., Volponi, S. & Wilson, B. (1997). Supplementi di Ricerche Biologia Selvaggina, XXVI , 197-230.

An understanding of Cormorant diet and food intake is particularly important in assessing Cormorant-fishery conflicts. Various techniques are available for studying this, but these are subject to a range of methodological problems and inherent biases which, in turn, generate uncertainties and often make it impossible to compare studies. This paper reviews current assessment methods, lists sources of error and attempts to quantify these, identifies areas of common ground and gaps in current knowledge, and provides suggested standardised techniques for assessing Cormorant diet and food intake. The authors recognise that the paper does not provide the final word on the subject. However, it has been singled out from the above volumes as a particularly important information source, since it represents a consensus view from a large number of researchers across Europe on a key topic. This paper has become something of a benchmark for guiding investigations by Cormorant researchers worldwide.

This paper is of direct relevance to **INTERCAFE**, both in the context of helping to establish our best understanding of Cormorant ecology and with regard to recognising the importance of building consensus and establishing agreed assessment methods and research protocols.

Cormorant-fishery conflicts

- Case studies of the impact of fish-eating birds on inland fisheries in England and Wales Feltham M.J., Davies J.M., Wilson B.R., Holden T., Cowx I.G., Harvey J.P. & Britton J.R. (1999). Report to MAFF (Project VC1006), 406 pp.

Although Cormorant biology and ecology has been the subject of considerable scientific research, understanding the interactions between Cormorants and fish and fisheries has remained problematic. By way of illustration, this report, commissioned by UK government departments, discusses the general methods associated with assessing Cormorant impact and highlights the difficulties of assessing fish populations, particularly in large bodies of water. The report includes a number of detailed case study investigations at different recreational fishery sites in England and Wales and indicates that while losses to Cormorants at different sites were highly variable, they could be high at some sites. The report concludes that impact by Cormorants is a problem for specific fisheries rather than a general problem and that while depredation levels at some sites may be high enough to cause a decline in fishery performance, at others it may not. The report further highlights the complexities of impact assessment, noting that this was site-specific and influenced by the complex interaction between Cormorant consumption and fish population dynamics, and between

consumption and production. The report does not explore socio-economic issues or attempt to assign monetary values to Cormorant-fishery conflicts. These issues are discussed in more detail in section 13.4 of this chapter.

Key messages for **INTERCAFE** arising from this, and other similar reports from sites around Europe, have been: recognition of the complexity of Cormorant-fishery conflicts and the uncertainties that are associated with impact assessment procedures; the importance of adopting an inter-disciplinary approach to addressing conflicts; and the need for active stakeholder engagement in such processes.

- Cormorants and Human Interests, van Dam, C. & Asbirk, S. (editors). (1997). Proceedings of the Workshop towards an International Conservation and Management Plan for the Great Cormorant (*Phalacrocorax carbo*), 3 and 4 October 1996, Lelystad, The Netherlands. National Reference Centre for Nature Management (IKC natuurbeheer), Wageningen, The Netherlands, 152 pp.

This report details the outcome of a workshop 'Towards an International Conservation and Management Plan for the Great Cormorant' held in The Netherlands in 1996. The report reviews information on: Cormorant population estimates; population increase and the mechanisms responsible for this; impacts on fisheries (both perceived and documented effects); main uncertainties regarding both the



Cormorants are often considered a threat to human fisheries interests. Photo courtesy of Shutterstock.

Cormorant population and impact on fish stocks; and the effectiveness of management measures. The effect of various management scenarios on the Cormorant population was also modelled, and the workshop sought to establish a basis for the development of a co-ordinated management plan in Europe. Subsequent to the workshop, a further meeting of international experts was convened in 1997 when a 'management plan' was produced and circulated to range states (for further details and analysis see chapter 5). However, in the event, Cormorant management continued to be undertaken at a local (range state) level.

This report has remained pertinent to **INTERCAFE** deliberations since many of the issues raised in 1996 continue to be relevant to the Cormorant 'issue' today. For instance, there are still calls from a number of stakeholder groups for the development of a pan-European Cormorant management plan.

Managing Cormorant fishery conflicts

- Review of international research literature regarding the effectiveness of auditory bird scaring techniques and potential alternatives, Bishop J., McKay H., Parrott D. and Allan J. (2003). Report for Defra, 52 pp. Available at: http://www.archive.defra.gov.uk/environment/quality/noise/research/birdscaring/birdscaring.pdf

Relatively little objective scientific information is available with regard to the efficacy of the various products and techniques that can be used to deter 'problem' birds, or with regard to guidance on how best to use such techniques to maximise their effectiveness against target species. This report provides a comprehensive review of the efficacy of a range of general bird scaring techniques, based on information gleaned from scientific and grey literature and consultation with experts in the field. The work was

commissioned by a UK government department in order to provide a sound scientific basis for policy decisions and to assist with the development of appropriate guidance material. The report includes information on deterrents used against fish-eating birds, including Cormorants, and incorporates information on the effectiveness of various devices as well as highlighting constraints in their use.

- The assessment of the effectiveness of management measures to control damage by fish-eating birds to inland fisheries in England and Wales McKay, H., Furness, R., Russell, I., Parrott, D., Rehfisch, M., Watola, G., Packer, J., Armitage, M., Gill, E. & Robertson, P. (1999). Report to Ministry of Agriculture, Fisheries and Food, London, 254 pp.

This report provides a review of potential Cormorant management measures and details of a range of trials conducted during targeted investigations into selected Cormorant management techniques. The report includes the findings of a large-scale experiment, undertaken at a range of fishery types, into the efficacy of shooting at reducing Cormorant numbers. The results indicate that shooting (to kill or to scare) significantly reduced the number of Cormorants at a site during the treatment period and also for a two-week, post-treatment period — an average bird reduction of over 50% was reported. However, bird numbers subsequently recovered to pre-treatment levels over a period of two to six weeks.

- Protecting your fishery from Cormorants, Fisheries and Angling Conservation Trust (FACT) Joint Wildlife Management Group. (2002). London, 23 pp. Available at: http://www.salmon-trout.org/pdf/Fishery_management_guide_March_06.pdf

This short advisory booklet has been produced by the Fisheries and Angling Conservation Trust (FACT), which represents the major fisheries and angling organisations in England and Wales. The booklet is particularly noteworthy in that it is one of the key outcomes of constructive dialogue and active co-operation between a range of stakeholder groups representing anglers and fishery managers, fishery scientists, ornithological interests and conservationists. The booklet provides simple, practical guidance for fishery managers on techniques that they might use for protecting their fish stocks from Cormorants, both through management of the birds, management of the fish stocks and modifications to the aquatic habitat. The guide is reinforced by specific case studies, where different management techniques have been tried and tested, together with diagrams and pictures to illustrate particular deterrents. Contact addresses and websites are also included to indicate sources of further information (in the UK). The guide also provides a simple step-by-step guide for fishery managers in England and Wales who may want to apply for a licence to kill birds at a site if other means fail.

INTERCAFE recognises that different stakeholders involved in Cormorant-fishery conflicts can have very different values and perceptions in respect of these issues and that a major challenge for natural scientists is to make their work more relevant and useful to these various stakeholder groups. Hence, this advisory booklet from FACT (and an earlier leaflet from the same group 'Cormorants — The Facts', available from: http://www.environment-agency.gov.uk/static/documents/Business/cormorantfacts_234731.pdf provide excellent examples of the benefits of building consensus between stakeholder groups and of communicating scientific findings and advice in a simple, clear style and in an easy-to-access format.

- Reducing the impact of cormorants: the use of fish refuges. Natural England Advisory Leaflet TIN028, 6 pp. Available from: http://www.naturalengland.org/ourwork/regulation/wildlife/species/fisheatingbirds.aspx
- Reducing the impact of fish-eating birds: The use of nets and wires. Natural England Advisory Leaflet TIN029, 6 pp. Available from: http://www.naturalengland.org/ourwork/regulation/wildlife/species/fisheatingbirds.aspx

These two advisory leaflets provide further examples of effective communication of scientific results and stakeholder engagement. While government scientists have produced these leaflets, they have, as with the FACT publications, been produced in consultation with stakeholder groups and been subject to extensive review. The leaflets provide further practical information and guidance on techniques that fishery managers

and fish farmers might use to protect their fish stocks from Cormorants, and they are targeted specifically at these groups.

The leaflet on fish refuges is based on government-funded research carried out in England and Wales, and it focuses on the potential of modifying the habitat available to fish as a means of reducing their vulnerability to predation. Experimental trials have indicated that this can be an effective technique in certain situations. Further details on this work are available in: Russell *et al*. (2008). The other leaflet, on the use of nets and wires, is based on a review of experimental trials with these techniques undertaken throughout of the world. While relatively costly, nets and wires can prove highly cost-effective at certain sites. The report provides 'best practice' guidance, as well as outlining constraints and limitations on the use of these deterrent structures.

The above documents on management techniques (and others) have proved invaluable in the development of the **INTERCAFE** Cormorant Management Toolbox: methods for reducing Cormorant problems at European fisheries (Russell *et al*. 2012). Whilst attempts to provide some information — however subjectively — on the cost-effectiveness of management techniques have been made in many of these documents, an understanding of the economics of Cormorant-fishery conflicts appears very difficult to achieve. This economic topic is discussed in more detail in the following section.

18.4 Economics — Valuation and Compensation (Trude Borch)

Trude Borch, a Norwegian social scientist working on natural-resource management and conflict solving, reviews literature on economic valuation that can be of relevance when considering Cormorant-fisheries interactions and compensation in Cormorant-fishery conflicts.

Cormorant-fisheries economics

Perhaps surprisingly, the economic aspects of Cormorant-fisheries conflicts have seldom been quantified. Indeed, the EU-funded Concerted Action REDCAFE spent some time considering why this might be so.

- Reducing the conflict between Cormorants and fisheries on a pan-European scale: REDCAFE, Carss, D.N. (editor) (2003). Final report to the EU, contract No. Q5CA-2000-313878, 169 pp.

During the REDCAFE project, participants tried to compile information on the financial turnover of fisheries and the estimated financial losses as a result of Cormorant predation. Simplistically, it was thought that such information might be able to show the cost of

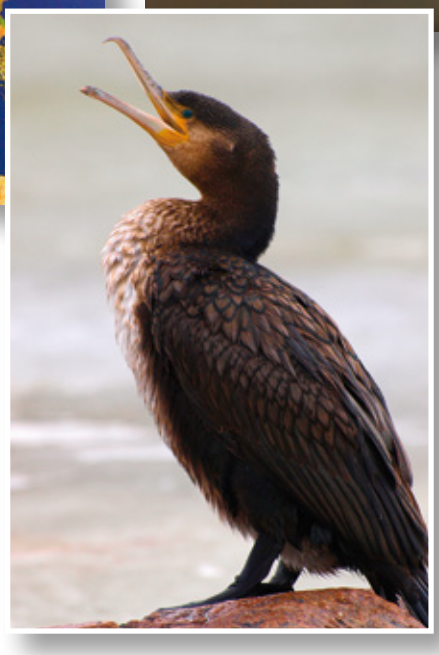




Floating 'eco-island' fish refuges being installed (*left*), fish refuges made from coils of stock fencing prior to installation (*right*). Both photos courtesy of Mark Ives.







Across Europe, there is little available financial information on Cormorant-fishery interactions.
Photos courtesy of Shutterstock.

Cormorant predation at fisheries. However, it was found that such information was very difficult (and usually impossible) to obtain. Section 6.5 of the report (pp.153–54) discusses why project participants thought this might be so. Further work during the **INTERCAFE** Action has largely failed to obtain much useful financial information on Cormorant-fishery interactions. Whilst the report discusses why this might be so, the broad finding is of considerable interest. One might imagine that such financial information would be crucial to possible management actions, for instance the cost of such techniques in terms of hardware and manpower versus the cost of stock lost as a result of Cormorant presence or predation. Publicly, at least, this information does not seem to be available.

Although best estimates of the cost-effectiveness of different techniques for managing Cormorant problems at fisheries are reported, these are usually, at best, semi-quantitative or subjective. Indeed, the state-of-the-art in relation to the economics of Cormorant management — at its simplest the replacement cost of the fish lost directly or indirectly to Cormorants versus the cost and the effectiveness of particular management scenarios — seems not to have progressed much, if at all, in the several years since this pioneering overview:

- Cormorants and Human Interests, van Dam, C. and Asbirk, S. (editors) (1997). Proceedings of the Workshop Towards an International Conservation and Management Plan for the Great Cormorant (*Phalacrocorax carbo*), 3 and 4 October 1996, Lelystad, the Netherlands. IKC natuurbeheer, Wageningen, The Netherlands, 152 pp.

Chapter 4 of this report (pp.61–122 entitled ‘Management of Cormorant numbers in Europe: a second step towards a European conservation and management plan’) explores how (and to what extent) Cormorant population size may be reduced by exploring six so-called scenarios. The size of the total population of birds is estimated by a simple model using factors such as reproductive output, age of first breeding, and survival. Against this model, a number of management actions are tested in an attempt to explore how total population numbers may be affected. These actions ranged from (scenario 0) no attempts to control overall numbers, (1) preventing the establishment of new colonies, (2) cutting nesting trees and disturbing breeding birds, (3) reducing reproductive output, (4) introducing a hunting season in Europe - control of adult birds outside the breeding season, to (5) combining measures.

Results from this modelling were presented to participants at a workshop (pp.123–129) at which they were asked to discuss and comment on the results in terms of a number of issues. The model predicted that each potential management scenario would theoretically lead to a stabilisation of the European Cormorant population at a level lower than would be predicted in the absence of the actions. However, the key point of interest here is that for each scenario the general conclusions after a plenary discussion were the same: *'The weakest part of this scenario is the cost effectiveness. In fact, we do not know anything about this issue. The prognosis made here cannot be considered as a solid basis.'* Only for scenario (4) was it also agreed that: *'With regard to shooting, however, it can be said that this method, applied on a local scale, seems to be cost effective.'*

The message here is clear. Whereas it might be possible to theoretically model Cormorant population responses to different management actions aimed at reducing the overall breeding population in Europe, it was impossible to assess how this might be undertaken nor how effective it might be in improving the financial returns of fisheries, for instance, and at what likely financial costs. This was, and remains, a vitally important issue when considering management actions on a large geographic scale.

Valuation of fisheries and associated management

Not withstanding that an economically-based assessment of the cost-effectiveness of Cormorant management actions appears to be a considerable gap in current knowledge, it is certainly possible to value fisheries and the costs of associated management actions.

- Economic evaluation of inland fisheries: the economic impact of freshwater angling in England and Wales, Radford, A., Riddington, G. and Gibson, H. (2007). Environment Agency Science Report SC050026/SR2. Available at: http://www.fisheries.org.uk/EconomicEvaluationOfInlandFisheries-EA2009.pdf

This report aims to estimate (i) the annual expenditure on different types of freshwater angling on a regional level in England and Wales, and (ii) the impact on regional economies of potential increases and decreases in different types of freshwater angling, and identifying the contribution made by tourism.

This study used a stratified sampling regime, an online questionnaire, a telephone survey, access to national data on fishing licences, and a modelling system tailored to each regional economy. Ultimately, it estimated total income in the form of wages, profits and income from self-employment accruing to households and total employment and a number of associated parameters. For the whole of England and Wales, this study (for 2005) estimated that 30 million angler-days were spent, mostly for 'coarse' fishing (e.g. for cyrpinids and perch, pike and others), with only minor activity for salmon and sea trout angling. Angler gross annual expenditure in 2005 was estimated to be £1.18 billion, with household income receiving £980 million and 37,386 jobs being created across



Some forms of economic valuation of fisheries are possible.
Photo courtesy of Shutterstock.

England and Wales. Coarse angling supported household incomes of £804 million and 30,580 jobs. If this was to cease in England and Wales, an estimated £161 million would be lost, resulting in a net loss of £133 million in household income and 5,060 lost jobs.

Whilst there are limitations to the use of this type of information (and the authors strongly urge readers to consult the full scientific report), such exercises clearly show that (a) some form of economic valuation of (in this case, recreational) fisheries is possible, and that (b) the sums of money involved are far from trivial. The following paper continues to explore fisheries economies, this time from the perspective of the cost-effectiveness of management measures.

- Loomis, J. (2006). Use of survey data to estimate economic value and regional economic effects of fishery

improvements. North Americal Journal of Fisheries Management 26: 301-307.

This study, which was based on river stretches in Wyoming and Idaho, uses a simple survey-based approach linked to 'contingent valuation and input-output models' to estimate how angler use, benefits, and regional effects (such as tourism-related employment) would increase with increases in the number or size of fish caught by anglers. Thus, it is not necessarily the cost-effectiveness of specific practical fisheries management measures that are explored here; it is how the behaviour and spending of anglers might change if their catches were to be improved. Overall, the study suggested that there would be a sizeable but plausible increase in the number of angling trips made in response to either a doubling of the catch rate or a 25% increase in the size of fish caught. Thus, a 100% increase in anglers' catches would result in a 65% increase in angler use and a corresponding increase in the annual economic value of the fishery, and in regional employment and income, attributed to angling. Increases of a similar magnitude were also predicted for an increase in the size of fish caught. Although the financial costs of delivering such improvements to the fishery were apparently not included in these calculations (and would obviously have to be taken into account in practice), this methodology does offer an example of how economic information and the (stated) behaviour of fishermen might be linked and examined for different scenarios. Such an approach, or something similar, has not yet been applied to aspects of the European Cormorant-fisheries issue.

In relation to one region and associated fishery type that was explored in some detail during an **INTERCAFE** meeting (recreational angling in sub-Alpine rivers), the following study at least offers some economic information that the Action found lacking in other places.

- An assessment of the importance of sports fishing in the Soca and Idrijca basins, Slovenia. Sullivan, C.A., Jesensek, B., Jesensek, D., and Zuza, A. (2003). Project report toTour du Valat, CEH, Wallingford, pp32.



In Slovenia, sub-Alpine rivers attract recreational anglers and are thus an important source of local income.
Photo courtesy of Shutterstock.

This report presents the results of an economic study into how fly fishing contributes to the local economy of five communities in one region of Slovenia known internationally for its angling opportunities. Here the main quarry species are Brown Trout *Salmo trutta* and Grayling *Thymallus thymallus* but also the introduced Rainbow Trout *Oncorhynchus mykiss* and the endemic and highly-prized Marbled Trout *S. marmoratus*. This area is relatively remote from Slovenia's capital Ljubljana and is predominantly rural, with a human population density about half that of the national average.

Sullivan *et al's* study explores how both anglers and local residents view angling-generated income as part of the regional development strategy. The money generated by recreational angling (a form of tourism) acts as an injection into the income flows of the region (and the country more generally), and it can be thought of as an 'invisible export'. In assessing the full impact of such tourism in the area, the authors consider both the direct and indirect incomes that are generated. Direct income is the additional sum generated per additional 'unit' of tourism expenditure, whilst indirect income is the additional money generated by the local population's response to the increase in enconomic activity. Using standard tourism-economics approaches, this study shows that the monetary value of expenditure on fly fishing to the region was in excess of 2.3 million euro during the 2002 angling season, a significant sum in this remote, rural region.

The authors suggest that, as the ecosytem requirements of fly fishing serve to protect local natural habitats, the angling-related economic inputs they estimate provide insight into the values of the ecosystem services provided by the healthy functioning of the river catchment. By illustrating the importance of high quality habitats, the authors conclude that the income generated by fly fishing activities demonstrates that ecologically-sensitive management is not only financially beneficial but also meets the requirements of sustainable development in the area. As is also being recognised in many other parts of Europe and elsewhere, the freshwater fishery provides livelihood support for many local people, support which will collapse if ecological integrity is not maintained within the catchment.

From **INTERCAFE's** perspective, this study and the economic relationships it explores does not enable quantification of the financial losses to the fishery that may be caused by Cormorants, but Sullivan *et al.'s* study was not designed to do this. However, this work does give some insight into the primary foundation of the local angling economy — the health of the local ecoystem and anglers' perceptions of this. Perhaps not surprisingly, the fish, the river and the environment are what fishermen say are the elements that attract them most to the region. The issue of Cormorant presence and/or predation is not mentioned in the report but it is possible to see how associated economic consequences might arise. For instance, Cormorants might be reducing the abundance of fish available to anglers, and some local people do consider this to be the case. The birds' presence could therefore be undermining the ecological integrity of the river system. Interestingly, even if this is not the case, some recreational anglers may still believe it to be so despite lack of quantitative evidence. It is not hard to see that, in such circumstances, fewer anglers may want to visit the region for fly fishing. Consequently, because angling expenditure is not restricted to fishing tackle or licence fees, any reduction in angling effort (i.e. the number of anglers visiting the region or the length of time they spend there) may have measurable financial implications. Similarly, it should also be possible to rigorously quantify the financial costs of management actions taken to reduce Cormorant problems to the same level of detail that can be done for tourist income. Importantly from **INTERCAFE's** perspective, Sullivan *et al.'s* work uses a suite of methods by which it would be possible to estimate both financial losses to Cormorants and the cost-effectiveness of management techniques.

It may be possible to assess the economic value of wildlife damage and the cost-effectiveness of management techniques rigorously, albeit that **INTERCAFE** (and REDCAFE before it) found few, if any, examples of this in relation to Cormorants. Nevertheless, financial compensation is often paid, in many different situations, for wildlife damage.

Financial compensation for wildlife damage

- The solution of goose damage problems in The Netherlands, with special reference to compensation schemes, van Eerden, M.R. (1990). Ibis 132: 253-261.

- The solutions to the brent goose problem: an economic analysis, Vickery, J.A., Watkinson, A.R. and Sutherland, W.J. (1994). Journal of Applied ecology, 31: 371-382.
- Compensation programs for wildlife damage in North America, Wagner, K.K., Schmidt, R.H. and Conover, M.R., (1997). Wildlife Society Bulletin, 25(2): 312-319.
- Valuing the non-market benefits of wild goose conservation: a comparison of interview and group-based approaches, Macmillan, D.C., Philip, L., Hanley, C., Alvarez-Farizo, B., (2002). Ecological Economics 43: 49-59.

Although they tend to focus on conflicts with geese (or other wildlife, often mammals), these papers are relevant to **INTERCAFE's** interests in economics, valuation and compensation because they present information from human:wildlife situations where such economic issues appear to be generally easier to quantify than are those involving Cormorants. Moreover, many of these financial compensation programmes have been in operation for many years and so it is possible to explore relatively well-developed schemes.

In a situation not dissimilar to that of European Cormorants, van Eerden (1990) explores the Dutch agricultural conflict with wintering wild geese. Bird numbers have increased dramatically over recent decades and, responding to significant losses in their original habitats and reductions in hunting pressure, the birds have shifted to feeding on intensive, improved, agricultural areas. Here the birds come into conflict with farmers, although the author states that the extent of goose damage to agricultural crops is still inadequately known. Nevertheless, a relatively complex appraisal process is in place to assess crop damage by geese in The Netherlands, and it is applied by provincial 'Damage Committees'. This process is based mainly on professional judgement and includes estimates of the loss of green biomass as a direct result of grazing, retardation of plant growth due to grazing, checking for compensatory crop growth, translation of damage into financial loss, possible reseeding costs and those of relevant use of herbicides and fertilisers, reduction in soil quality and the supposed negative effect of goose droppings on the palatability of the sward. Despite such detailed damage assessments, data show that professional judgement can lead to substantial bias on the level of individual fields (whilst the overall correlation between judgement and actual damage is quite good).

van Eerden reviews ways of improving the accuracy of damage estimates but he concludes that the intensification of marginal land and trends to increase production towards the extremes of the growing season are likely to lead to proportional increase in conflicts. This suggests that financial compensation will probably have a limited role in solving future problems, especially in light of likely governmental unwillingness to pay ever-increasing amounts in compensation.

Vickery *et al*. (1994) look at over-wintering Brent Goose (*Branta bernicla*) damage to crops in Britain specifically in relation to solving the problem through an economic analysis. They examine five possible solutions to the goose problem — doing nothing, culling geese, paying compensation to farmers, setting-up alternative feeding areas on 'set-aside' land, or reserves. Financial costs and benefits associated with each solution are calculated with respect to society as a whole (taxpayers), farmers, conservationists and wildfowl hunters. The resulting cost-benefit analysis showed that the optimal financial solution for society (i.e. the cheapest one for them) was the establishment of alternative feeding sites for geese, whereas the optimal solution for farmers would be the payment of compensation for goose damage. This suggests that there is a disparity between the national interest (society) and the local one represented by farmers. The authors also discuss the complexity added to the situation when one considers



Greylag Goose on agricultural land.
Photo courtesy of Shutterstock.

so-called 'use' and 'non-use' values either of the land or the geese. Nevertheless, the authors believe that a suitable financial support scheme could be developed for the Brent Goose in Britain, including a cross-compliance element under which there are environmental conditions on the payment of agricultural support. Interestingly, the authors do not use the term 'financial compensation' in this context, and they are also explicit in saying that a suitable scheme could only be developed given the political will to do so.

Wagner and colleagues' (1997) starting point is that, although financial compensation for damage caused by wildlife is an alternative to lethal management techniques, 'little is known about the use of these programs in North America'. Through a wide-ranging survey, these authors found considerable opposition to compensation schemes for wildlife damage even amongst the potential beneficiaries and many other different stakeholders, and they discuss several arguments in opposition to this aspect of wildlife management.

Although financial compensation programmes are an intuitively appealing alternative to more traditional, lethal, management options, they are not always suitable. Compensation does not stop the damage, and producers with a sense of responsibility for the well-being of their stock (or the habitats they occupy) may be less likely to accept compensation. In the case of wildlife species at high densities and continued population growth, failure to address problems may result in harmful actions taken against the species as well as increased damage. Also, at a time of increasing budget constraints, the financial burden of compensation schemes may be unacceptable. Given these issues, Wagner *et al.* suggest that all states and provinces implement a formal review system of the evaluation procedures for their compensation programmes.

Macmillan and colleagues (2002) try to examine whether current compensation payments made to farmers for wild goose damage in the UK represent value for money, by estimating the value placed on goose conservation by the general public. Although much of the paper is taken up describing the methods used by the researchers (such as a group-based approach and two one-hour meetings held one week apart), one of the key messages here from a Cormorant-fisheries perspective is the ultimate complexity of any rigorous attempt to quantify 'value for money'. These authors conclude that such an intensive information-gathering process helps to resolve misunderstandings and fill knowledge gaps, and it also allows people to understand what they want to know in order to make a rational decision. Furthermore, the interval between meetings allows people to re-evaluate their descision-making by offering time for *'further thought, information searching, and crucially for household economic decisions, discussions with family members and/or friends'* (p.57).

When considered in these terms, coupled with the complexities of even understanding the damage caused by wildlife both directly and indirectly, never mind attempting to quantify it accurately — two things become clear. First, that in almost all circumstances, such detailed exploration has not yet been undertaken for Cormorant-fishery problem cases. Second, given that (a) there is often opposition to compensation schemes, and (b) other avenues besides financial compensation are often explored,



Financial compensation could be part of the overall management of some Cormorant-fisheries conflicts. Photo courtesy of Shutterstock.

such as the possibilities of restoring natural habitats and altering land use management (e.g. van Eerden 1990), it seems unlikely that compensation could be the sole, long-term solution to European Cormorant-fishery problems. Nevertheless, compensation could play an important part in a well-designed suite of management options and so is well worth further and detailed consideration.

When seeking compensation for damage from Cormorants on fish stocks, interest-groups or decision makers must provide calculations of the monetary value of the fish that the birds consume and damage. In dealing with commercial fisheries it is also important to note that fish stocks have to be above minimum densities to ensure that such fisheries are economically viable. There is also a requirement for fish to have a suitable age-distribution to be reproductive. In calculating the value of preserving non-commercial birds, hypothetical methods have to be applied. For example, contingent valuation methods could be used for this purpose. The public or different interest-groups could be asked how they would value, in monetary terms, the future existence of a species. In the search for arguments for preserving fish stocks over predators like Cormorants, interest-groups or decision makers provide simple calculations of the monetary value of the fish that Cormorants consume. However, the following references provide some insight into other calculation methods:

- Estimating the Economic Impact of a Trophy Largemouth Bass Fishery: Issues and Applications, Chen, R. J., Hunt, K. M. and Ditton, R. B., (2003). North American Journal of Fisheries Management, 23: 853-844.
- A guide for undertaking economic impact studies: the Springfest examples, Crompton, J., Lee, S.and Shuster, T., (2001). Journal of Travel Research, 40: 79-87.



In terms of direct expenditure, anglers often pay considerable sums to be able to fish in certain waters that are otherwise prohibited.
Photo courtesy of Shutterstock.

The fishery affected may be a commercial fishery in freshwater, offshore and coastal waters, recreational fishing/angling tourism or fish farming. A range of methods are in use to calculate the economic value of a fishery. Generally these methods utilise two basic frameworks, namely 'economic impact' and 'net value' approaches. These frameworks differ sharply in what they are valuing and to whom this value accrues. Economic impact approaches focus mainly on turnover, expenditure and related variables. The aim of these approaches is to evaluate the impact of expenditure on income generation, employment and overall economic activity in a region. In calculating the economic impact of recreational fishing or angling tourism, for instance, the focus is on direct expenditure by anglers and the indirect and induced effects of this expenditure on different aspects of the economy. The direct expenditure from recreational fishing is the money anglers spent on licences, transportation, accommodation, boat rental, guiding services, fishing equipment, etc. The indirect and induced effects of this direct expenditure are the economic effects generated to the economy at local, county or state level as a result of the money spent by anglers.

The sum of direct, indirect, and induced effects constitutes the total economic impact of recreational fishing. When applying the net value framework, one is aiming

at quantifying the net benefit received by an individual or group from a fish resource. This includes not only a focus on benefits as in economic impact studies, but also a focus on the costs involved in obtaining the natural resource, e.g. costs involved in going fishing.

In assessing economic valuation from both economic impact and net value approaches, it is essential to be accurate about the framing of what is being valued. It is important to decide which level of the economy should be the focus (local community, county, state, etc.), the type of fishery (recreational or commercial), the money spent by whom (tourists/non-locals, locals), and income or sales output that should be applied as a measure for value.

Saxony is one region visited by **INTERCAFE** where financial compensation is part of a wide-ranging management programme relating to Cormorant issues. Conflicts and the method of addressing them at Carp pond farms here, are well-described by Seiche (2003).

- The conflicts between Great Cormorants *Phalacrocorax carbo* sinensis and Carp fish farming: attempted resolution and strategy in Saxony, Germany. Seiche, K. (2003). Vogelwelt 124, Suppl.: 349-354.

This review (and see also section 8.3.1 in Seiche *et al*., 2012 and following paragraph) demonstrate two important issues at play in Saxony. First, that there is incomplete quantification of the damage presumed to be caused by Cormorants at Carp pond farms. Second, that there is a limited amount of money available for damage compensation and so, in practice, fish farmers just get a share of this.

Seiche *et al*. (2012) describe how with the commencement of the Cormorant Regulation, pond farmers in Saxony can make an application for damage compensation claims (so-called 'damage equalisation claims'). However, this is only available for the ponds where deterrence techniques are prohibited for nature conservation reasons. Furthermore, another big problem is that possible financial help can only be supplied in the context of the *de minimis* regulation of the European Union. In the European Union, *de minimis* 'state aid' regulation allows for aid up to a certain maximum amount to be provided from public funds to any business enterprise over a period of three years. Under this regulation, compensation payments for Cormorant damage to fish stocks can be paid per pond. However, if the hardship case includes any compensation payment for Cormorant damage, as now interpreted by the EU, no specific damage compensation is available any more. In practice, in most of the cases relating to Carp pond farms in Saxony, only a limited amount of the damage claimed to be caused by Cormorants can be compensated. This amount is calculated from the actual (i.e. the 'real') number of Cormorants counted for specific areas. In practice, for single farms, only 20–50% of the calculated damage settlement for one year can be paid because of the upper financial limit imposed under the *de minimis* regulation.

One final important point arises from Seiche's (2003) review of



Fish pond harvest, INTERCAFE field trip, Czech Republic.
Photo courtesy of **INTERCAFE**.

the situation in Saxony which may also be applicable to Cormorant-fisheries conflicts in other fisheries sectors. The aim of financial compensation is not to re-pay fish farmers for the losses attributable to Cormorant predation but to offer support and to make management of nature attractive and acceptable. As fish ponds are seen as important ecological habitats, great attention is given to maintaining and managing them and to finding a long-lasting, extensive, sustainable form of use for these ponds.

Overall, financial compensation schemes are one means of addressing the problem of wildlife damage but (albeit, in the case of Cormorant-fisheries interactions, where this damage has seldom, if ever, been valued rigorously) damage is only one of many issues encapsulated in the topic of human:wildlife conflicts. This is the subject of the next section.

18.5 Human-wildlife Conflicts (Mariella Marzano)

Mariella Marzano is a social anthropologist with a background in natural resource management. Here, she identifies a range of papers and books or book chapters that explore why human-wildlife conflicts occur. Many of the situations, or explanations identified, in the references below are applicable to a range of human-wildlife conflicts, including Cormorant-fisheries. These references are particularly useful because many of the decision makers involved in Cormorant-fisheries conflicts are also involved with other natural resource (NR) conflicts in such things as wildlife management, forestry, mining, land-use, protected areas management, marine resources, waterways and navigation. Furthermore, the concepts and recent successes in NR conflict management, especially in forestry and wildlife, provide interesting and relevant ideas in terms of, for example, available processes, principles, and tools.

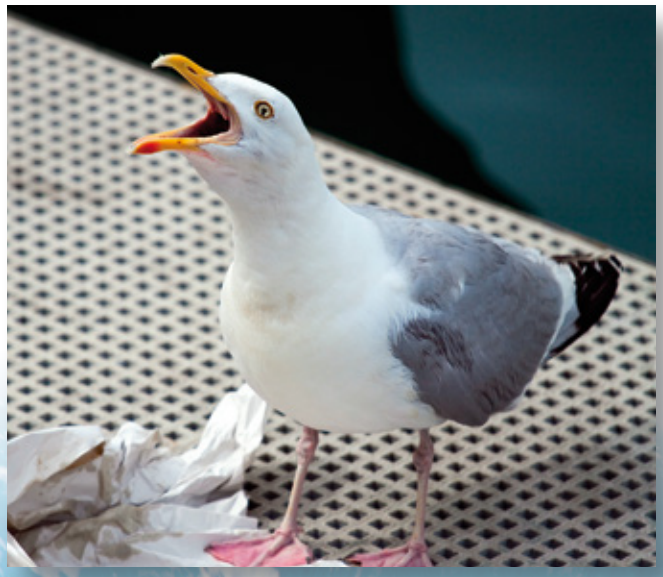
Cormorants: pests and pestilence?

Previous attempts to resolve Cormorant-fisheries conflicts largely relied on work of biologists but REDCAFE and **INTERCAFE** recognised that an ecological focus, while important, cannot fully explain why human-wildlife conflicts occur and why they remain contentious for decades.

- Natural Enemies: People-wildlife conflicts in anthropological perspective. Knight, J. (editor). (2000). London and New York, Routledge, 254 pp.

The introduction to this edited book is particularly instructive as Knight explores the wider contexts in which human-wildlife conflicts happen and why. He maintains that many human-wildlife conflicts are actually human-human or human-state conflicts. For example, there will be divisions between individuals and groups over how a species should be managed. Species can be identified as wildlife pests for a variety of reasons. For example, wildlife pests can serve as scapegoats for other problems in society.

In fact, Knight suggests that *'many claims of wildlife pestilence are inaccurate, exaggerated or ill founded'* (p.8). How and why an animal becomes a pest species may be related to the symbolic role the species plays in particular cultures. In fact, 'pestilence discourse', which identifies the animal as the problem, can obscure the other factors in society that have led to, or at least contributed to, the conflict. Some animals receive more attention as pests than others that are also responsible for damage, and the more conspicuous species tend to receive a larger share of the blame for damage. Moreover, Knight records that species which are highly mobile and routinely cross territorial boundaries can threaten the spatially-based taxonomic order, resulting in negative symbolism. This is linked to human perceptions of balance and reciprocity, so, Cormorants that are seen to come from another country might be perceived as 'greedy'. Interestingly,





Gulls *Larus* spp. and Rats *Rattus* spp. are commonly considered by many to be 'pests'. Photos courtesy of Shutterstock.

human-wildlife conflicts can also contribute to social solidarity as well as divisions between people. Identifying wildlife threats and other people associated with these threats can reinforce in-group boundaries and identities in an 'us versus them' attitude, for example.

- Integrated Management of European Wetlands (IMEW), Bell, S. (2004). Report of EU 5th Framework project (EVK2-CT-2000-00081).

How Cormorants are a good example of 'pestilence discourse' was discovered in the EU-funded Fifth Framework project IMEW (Integrated Management of European Wetlands). IMEW carried out comparative research in four European wetlands — Lake Pihlajavesi, Finland; Lake Kekini, Greece; the Nemunas Delta, Lithuania; the Danube Delta, Romania. The research set out to address a number of issues, among which was an examination of conflicts between humans and fish-eating predators. In all locations, except for the Finnish field sites, the most commonly cited nuisance species was the Cormorant. Commercial freshwater fishermen and other local fishers at the three field sites were initially inclined to blame Cormorants for the decline of their fisheries.

However, after further probing by IMEW researchers it became apparent that no single factor was understood as responsible for the ubiquitous decline of desirable fish species. Most informants also associated the loss of commercial fish species with human interventions, such as the perceived mis-management of hydrological regimes and overfishing. IMEW's most significant finding was that people who lived in these European wetlands feel marginalised by biologists and policy makers. Despite the frequently negative appraisal of those who make and contribute to conservation policy, local people are not against the general principles underlying nature conservation and would be more accepting of the overall increase in Cormorant numbers if they were more fully involved in the design and application of management strategies for these and other species.

European Cormorant-fishery conflicts: developing an interdisciplinary process

- Reducing the conflict between cormorants and fisheries on a pan-European scale (REDCAFE) pan-European overview, Carss, D.N. (2003). Report of EU 5th Framework Concerted Action (Q5CA-2000-31387) 169 pp.
- Reducing the conflict between cormorants and fisheries on a pan-European scale (REDCAFE) Summary and national overviews, Carss, D.N. and Marzano. M. (2005). Report of EU 5th Framework Concerted Action (Q5CA-2000-31387) 374 pp.

As a Concerted Action, REDCAFE was developed as a network of natural scientists with experience of Cormorant issues across Europe. All elements of REDCAFE's European approach are described and presented in Carss (2003) whilst REDCAFE's Summary and National Overviews (Carss and Marzano, 2005) provides a comprehensive insight into Cormorant-fisheries conflicts across



Cormorants at Lake Kerkini, Greece.
Photo courtesy of Shutterstock.

all 24 participating countries. Here, information on the status and distribution of the birds, case studies of conflicts, seasonality of problems, finance, potential management tools, and the national stakeholders consulted are documented on a country-by-country basis.

The REDCAFE network attempted to provide an overall understanding of Cormorant-fisheries interactions in Europe. Patricipants focussed on four key elements. First, REDCAFE synthesised available information on Cormorant-fisheries conflicts across Europe and, importantly, this element of the work also highlighted the diversity of knowledge-bases used to assess Cormorant problems and the fact that such problems were seldom based solely on biological data and information. Second, it explored the



key biological features — ecology and physiology, diet, habitat use, migration and movements, for example — that were considered to contribute to the view of many that Cormorants were a problem species. REDCAFE then identified the wide range of methods used in attempts to reduce conflicts between Cormorants and fisheries interests, and it collated expert evaluations of their practical use. This work included an attempt to consider in a qualitative way at least the effectiveness, practicability, acceptability, and costs of these methods as people experienced them in real life situations.

Finally, REDCAFE also ran a stakeholder workshop in Waltham Abbey, north-east London, a catchment experiencing many biological, social, cultural and economic changes, including a considerable increase in Cormorant numbers in recent years. This workshop brought together representatives of local angling and birdwatching clubs, national fisheries/angling organisations, the regional water company, and national inland waterway management, environmental protection and environmental conservation bodies to explore the elements required to devise a local Fisheries Action Plan.

REDCAFE work showed how Cormorant- fishery conflicts across Europe are dynamic and multi-faceted, and it provided a starting point for considering how conflicts with these highly mobile and adaptable birds are interconnected at a wide range of geographical scales. This work also began to consider how mitigation actions against Cormorants, changes in the economic value of a particular fishery type, and the regional interpretation of relevant legislation in one region/ or country may have implications and consequences for what happens in another. Importantly from **INTERCAFE's** perspective, as the work of the REDCAFE network developed it was clear that a group predominantly comprised of biologists/ecologists was ill-equiped to consider all aspects of European Cormorant-fishery conflicts. Biology was, of course, a vital component but conflicts were more often than not more human:human than human:wildlife ones (the starting point for REDCAFE). Thus it was decided that a clearer — and more useful — approach would be to develop an interdisciplinary process and include a strong social science element to future explorations of how best to understand and mitigate against European Cormorant-fishery conflicts.

Ambiguity, change, and complexity

- Competing and co-existing with cormorants: Ambiguity and change in European wetlands, Carss, D.N., Bell, S. and Marzano, M. (2009). In Heckler, S (editor) (pp 99-121) Landscape, Process and Power re-evaluating traditional environmental knowledge. Oxford, Berghahn Books, 289 pp.

This chapter is based on the work of REDCAFE and IMEW and explores the underlying tensions around rapid environmental change that appear to fuel Cormorant-fisheries conflicts. With examples from the Lea Valley in England, Lake Kerkini in Greece, the Nemunas Delta in Lithuania and the Danube Delta in Romania, the authors found that local people's claims that Cormorants are the cause of a decline in commercial fish species mask greater social, economic and environmental problems.

For example, in the Lea Valley, while Cormorants are the most conspicuous problem, there are also concerns with changes in water quality and levels, invasive species, encroaching development on river banks, poaching, access and competition from private enterprises. The knock-on effects of these factors can have severe economic impacts, such as lack of income from fishing permits making angling clubs unviable, and the closure of local tackle shops. Economic decline has ecological and social implications affecting stocking and maintenance of rivers and river banks. Moreover, local angling clubs are crucial





The Romanian Danube Delta: an area affected by extensive water management. Photos courtesy of Shutterstock.

in environmental stewardship and urban fisheries regeneration schemes and contribute to national youth schemes.

Water level changes at Lake Kerkini have impacted on fish spawning and fish composition. Local fishermen claim that the increase in Cormorant numbers has seriously impacted their livelihoods resulting in young people leaving the area to work elsewhere. However, hydrological changes have had a greater impact on wetland habitats such as reed beds. Overall, Lake Kerkini fishermen feel powerless and unable to influence control of water levels, and this frustration manifests itself in a number of ways.

There were similar concerns with water management in the Nemunas Delta but fishermen here also face uncertainties around socio-political and economic transition facing Eastern Europe. Here, Cormorants are considered as 'outsiders' representing a new threat to fisheries, along with privatisation, leading to the expansion of the black market system and over-fishing. Further challenges involve the increased salinity of the lagoon and the imposition of a boundary across the waters between Kalingrad (Russian Federation) and Lithuania. The Romanian Danube Delta case provides further evidence that wildlife can become symbolic vehicles for the expression of social conflicts as local inhabitants try to voice their frustrations with the water management of the Danube Delta Biosphere Reserve authorities.

Overall, the authors find that increasing numbers of Cormorants become the 'object of dissatisfaction with degraded environments'. Moreover, many fishermen feel that Cormorants are given unnecessary protection and that legislation works against them. The authors also note that while Cormorants may be considered a problem on a pan-European scale, attempts to manage conflicts may be most effective at the local scale. They discuss co-management approaches in trying to address fisheries management that focuses primarily on the 'symptoms' - such as too many Cormorants - rather than on the underlying social, economic and environmental problems and on integrating local fisheries and scientific knowledge.

Different perspectives and multiple dimensions

- Creating Coexistence between Humans and Wildlife: Global perspectives on local efforts



to address human-wildlife conflict, Maddon, F. (2004). Human Dimensions of Wildlife 9:247-257.

While focussing primarily on human-wildlife conflicts in protected areas in developing countries, Maddon identifies a range of key factors that contribute to why human-wildlife conflicts occur. The author highlights that such conflicts can escalate when people feel that the needs or values of wildlife are given priority over their own needs and when they (or local institutions) do not have the means to deal with the conflict. Maddon highlights that each conflict situation is unique as it is influenced by socio-cultural, biological, geographical, political, institutional, economic and historical factors. However, as many human-wildlife conflict situations involve similar causes and challenges, Maddon points towards guiding principles, processes and tools that can be drawn upon and adapted across a variety of conflict situations. In this paper six key lessons are identified. The first, as Knight has also pointed out, is that human-wildlife conflicts often mask conflicts between people with different goals, attitudes and values. Lack of trust and inadequate or inappropriate communication can also contribute to conflicts. Lesson two is that biological understanding is only part of the solution as it cannot provide a complete understanding of the conflict, especially the human dimensions. Lesson three recommends that any solution(s) must address perceptions as well as reality. Maddon notes that negative public reactions can be linked to perceptions of potential risk and inability (or a feeling of powerlessness) to address the problem.

Lesson four relates to the need to balance global insights with local variability. Maddon suggests that many lessons learned from human-wildlife conflicts in one area or with a specific species can offer valuable insights that can be adapted to address conflicts elsewhere. However, the author warns against a 'one-size-fits-all' standardised approach to conflict mitigation as each conflict will have its own unique local context and complexities. Lesson five advocates the use of multiple tools and approaches in any conflict situation, which will allow greater success in dealing with a range of social and biological factors and allow for flexibility to change as conditions change. The final lesson advises that demonstrating a willingness to address the issue and promoting greater communication and trust will often have a positive effect on the attitudes and actions of people involved in the conflict. Maddon highlights that in addition to technical solutions, more research is needed into the complexities of human-human conflicts. He proposes a range of gaps that need to be filled, including a formal global network to foster the exchange of ideas and information, which was also a major aim of **INTERCAFE**.

- Co-managing human-wildlife conflicts: a review, Treves, A., Wallace, R.B., Naughton-Treves, L., & Morales, A. (2006). Human Dimensions of Wildlife 11:1-14.

Again, this article focuses on threatened species in developing countries but the authors attempt to adapt lessons learned in other contexts for application in the United States. Treves *et al*. note that the fate of many wildlife species depends on how they coexist with humans, and they call for interdisciplinary collaboration, particularly the inclusion of social scientists, to deal with the wide range of biological and social factors influencing conflicts.

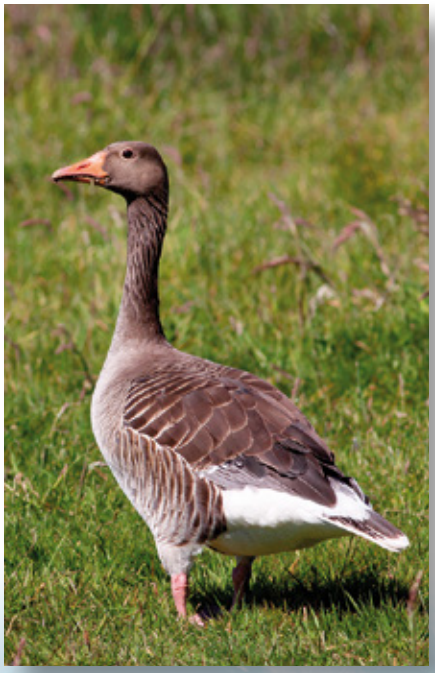
Like Maddon and Carss *et al*., Treves *et al*. maintain that addressing people's perceptions of wildlife impacts is as important as scientific measures of loss or damage. The authors advocate a participatory, co-management approach, which they suggest often hinges on managing expectations and clearly communicating

roles and responsibilities. They observe that people often want compensation or interventions against wildlife rather than research, and those suffering losses to wildlife frequently want outsiders or the government to provide money or final solutions. However, the authors warn that it is important to dispel hopes for either if this is not possible. The paper provides three detailed steps for managing human-wildlife conflicts. The first involves baseline applied research on the conflict, the second on coordinating participatory planning, and the third advises on how to monitor the effectiveness of interventions.

- Human Wildlife Conflict Worldwide: collection of case studies, analysis of management strategies and good practices. Distefano, E. (2005). Food and Agricultural Organisation.

This report from the FAO adopts a more conservation-oriented perspective and examines cases where human-wildlife conflicts are threatening potentially endangered species worldwide. The focus is primarily on the tropics and in developing countries but Distefano does provide a selection of case studies highlighting common problems and key lessons learned. The author suggests that a series of global trends have contributed to an increase of human-wildlife conflicts. These include human population growth, changes in land use as well as degradation and fragmentation, species, habitat loss, growth in popularity of eco-tourism, climatic factors, increasing wildlife population following conservation programmes, and changes in the abundance and distribution of wild prey. The report also summarises a range of management measures which are evaluated according to whether it has promoted co-existence, minimised conflicts, involved greater local participation and support for conservation objectives, improved local people's attitudes towards wildlife and improved relations between local people, local authorities and decision-makers.

Like many of the studies throughout this chapter, this report argues for more comprehensive data collection on the ecological and social dimensions of conflicts-such as actual versus perceived economic impact. Distefano also recommends education initiatives and capacity building to help local communities develop tools for dealing with human-wildlife conflicts and for the promotion of dialogue and cooperation among stakeholders.



Geese are a common cause of human:wildlife conflicts in agricultural situations.
Photo courtesy of Shutterstock.

- Interdisciplinary approaches for the management of existing and emerging human-wildlife conflicts. White, P.C.L., Ward, A.L. (2010). Wildlife Research, 37:623-629.

This main objective of this paper is to highlight the benefits of an interdisciplinary approach to human-wildlife conflict management. However, it also summarises neatly how conflicts can arise, particularly where wildlife species are perceived to impact negatively on human interests. White and Ward note that human-wildlife conflicts become increasingly complex when more than one stakeholder group is involved, as effective management often requires agreements between stakeholders on what actions are needed to reduce impacts and on the coordination of such activities across geographical, political/ legislative boundaries. They call for more research to improve our understanding of the factors contributing to conflicts, not only in relation to ecology but also human behaviour. They suggest that any management action should involve a mixture of traditional (e.g. culling) and novel approaches.

- Complexities of conflict: the importance of considering social factors for effectively resolving human-wildlife conflict. Dickman, A.J. (2010). Animal Conservation 13:458-466.

This paper outlines the range of social factors that influence how

humans perceive conflicts with wildlife. As Dickman notes, even when appropriate strategies have been put in place to deal with wildlife problems, it is rare for conflicts to be completely resolved over the long-term, suggesting that the causes of conflicts are more complex and deep-seated. The author notes the importance of understanding human attitudes and behaviour and identifies a frequent 'mismatch' between common assumptions of how people think about and behave in relation to a human-wildlife conflict and what actually happens in reality. He proposes three key factors that influence this mismatch: (i) perceptions of risk, (ii) disproportionate responses, which are closely linked to (iii) social influences. Understanding how people respond to risk is especially important where people may blame external agenices for imposing wildlife risks on them. Dickman also highlights the mismatch between the actual degrees of risk and how people's perceptions of the severity of risk can be increased when their fears escalate (although the evidence presented mostly relates to large carnivores). Ultimately, people base their perceptions and attitudes on societal experiences and cultural norms and so it is possible for wildlife to symbolise underlying social tensions.

Dickman uses ethnographic examples to explain how certain wildlife species become scapegoats for wider issues such as tensions between ethnic groups or those between rural communities and the urban elites who they believe are undermining their positions and values. One of Dickman's suggestions for addressing human-wildlife conflicts is to move beyond examining species-based conflicts towards a more holistic interdisciplinary approach that assesses the social, economic, cultural, political and ecological landscape in which conflicts occur.

Conflicts in the media: risks and frames

- From victim to perpetrator: Evolution of risk frames related to human-cormorant conflicts in the Great Lakes. Muter, B.A., Gore, M.L. and Riley, S.J. (2009). Human Dimensions of Wildlife. 14:366-379.

This paper explores how media coverage and people's perceptions of risk influence conflicts with cormorants. The authors looked at 140 articles in Canadian and United States newspapers between 1978 and 2007 to examine how coverage of human-cormorant interactions changed over time. They highlight how human-wildlife conflicts always attract the media because they can feature recognised personalities, polarised perspectives or have local significance. Importantly, they argue that media coverage is influenced by, or can influence, perceptions of risk. Through an examination of media articles, the authors chart the 'reframing' of cormorants from 'victim' in the 1970s (of pesticides or diseases), to an over-abundant species and 'perpetrator' — a potential source of risk to fish species, habitats and tourism.

The authors observe how the media and public frame environmental issues, stating that frames can help people define problems and make moral judgements about these problems and how to solve them. The ways in which the the media portray wildlife issues will also help shape opinions about how conflicts should be addressed and resolved. According to Muter *et al.* the media can contribute to public awareness of risks and perceptions of victimisation. They note that news stories are often episodic and thus normally involve a specific case study where responsibility is often assigned to individual victims or perpetrators. The authors maintain that examining how cormorants have been presented in the media over a long time-frame can assist in identifying how and why wildlife management does or does not become contentious. An analysis of media articles can also help wildlife managers to reduce conflicts, identify the perspectives of different stakeholder groups in relation to the issue and also the most useful forms of participatory engagement and/or collaboration.

18.6 Conflict Management (Scott Jones)

Scott Jones is an interdisciplinary researcher and facilitator with considerable international experience in conflict management and partnership work in natural resources, wildlife and conservation. He is Director of Mind the Gap Research and Training (Staffordshire, UK) and a Senior Lecturer in the Department of Environmental and Geographical Sciences, Manchester Metropolitan University. Here Scott recommends a number of publications that are commonly used in the discipline of conflict management. Although many of the references are biased toward western and business

audiences, they are relevant to people working in Cormorant-fisheries conflicts and have generic use for those who want to explore how conflict management is discussed and applied as a discipline.

'What is' conflict?

- Cultivating Peace: conflict and collaboration in natural resource management, Buckles, D. (editor). (1999). International Development Research Centre, Ottowa.

This is one of the most valuable books on natural resource conflict management written in the last 15 years. It does not discuss Cormorants or fisheries, it is based largely on natural resource conflicts in developing countries, and it has an early chapter written in an anthropological style to which some natural scientists might not easily relate. Nevertheless, readers interested in Cormorant-fisheries conflicts will easily be able to relate much that has been learned from **INTERCAFE** Case Studies (chapter 17) to the chapters on policy, stakeholder analysis and some other field examples for instance. These chapters support (a) understanding the relevance of stakeholder analysis, (b) learning a little about the process of undertaking this analysis, and (c) ways of relating policy development to the practical aspects of managing Cormorant-fisheries conflicts. The book presents original case studies from Africa, Asia, and Latin America, together with essays on the cultural dimensions of conflict, the meaning of stakeholder analysis, the impact of development interventions on peace and conflict, and the policy dimensions of conflict management.

There is much to appreciate here as many of the principles and ideas have strong resonance with European Cormorant-fisheries conflicts. Case studies analyse specific natural resource conflicts in 10 countries and the interventions of people close to the conflicts (in some cases, the authors themselves). Four concept papers draw the case studies together around particular themes: culture, society, peace, and policy. Two chapters are especially relevant for Cormorant-fisheries conflicts. These are accessible by the following web links: Stephen Tyler (Policy implications of natural resource conflict management, chapter 14; http://www.idrc.ca/en/ev-27986-201-1-DO_TOPIC.html) and Ricardo Ramirez (Stakeholder Analysis and Conflict management, chapter 5, http://www.idrc.ca/en/ev-27971-201-1-DO_TOPIC.html).

Some of these issues are further explored in:

- Negotiations and Conflict Management, Jones, P.S. and Dudley, N. (2005). Chapter 18 in Mansourian, S., Vallauri, D. and Dudley, N. (editors), Forest Restoration in Landscapes, Springer Verlag.

This 10-page chapter describes types of conflict and common elements in a natural resources conflict situation — in this case, forest landscape restoration — that are equally applicable to Cormorant-fisheries conflicts. These include conflict analysis, capacity building, designing a process to manage conflict and managing that process.

The chapter also describes some of the principles and skills



Learning about conflict management, INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE**.



Natural resource conflicts can occur over biodiversity-rich habitats such as Alpine meadows.
Photo courtesy of Shutterstock.

involved in negotiations, aspects of creative thinking and effective communications (especially listening) that seem always to be involved in problem solving and moving from conflict to collaboration. In terms of good practice for natural resource conflicts, the next article provides some useful guidelines.

- Biodiversity Conflict Management, Jones, P.S., Young, J. and Watt, A. (editors). (2005). Centre for Ecology and Hydrology (NERC). Available at - http://www.unibuc.ro/prof/risnoveanu_g/docs/res/2012sepBiodiversity_Conflict_Management_-_A_report_of_the_BIOFORUM_project.pdf

This publication was an output from a European Project on managing conflict in biodiversity and human interactions. It discusses conflicts in natural resource contexts and offers good practice guidelines for people interested in managing conflict.

Eleven case studies from across Europe are included, relating to issues on water, otters, mining, meadows, forestry, conservation, biodiversity and community issues. Each of these is described under the following headings: description and origin, stakeholders, issues and outcomes, what worked well, what worked less well, and key lessons learned. Those interested in Cormorant-fisheries conflicts will be able to scan this fairly quickly and pick out the examples that relate to their own situation.

'How to' solve conflict

There are further very useful 'how to' books, including in particular:

- Working with Conflict: skills and strategies for action, Fisher, S. Dekka, I.A., Ludin, J., Smith, R., Williams, S. and Williams, S. (2000). Zed Press, London.

This book is included as a useful example of a conflict management manual. It is more about how to solve conflict than about what conflict is, which is covered by some of the publications above. Although not specific to natural resources, it is very accessible, easy to understand and relevant to all people working with conflict.

The book is divided into four parts: Analysis, Strategy, Action, and Learning. It includes helpful diagrams and tools to use in conflict resolution and illustrates its points with many examples. Chapter Three is especially valuable, dealing with 'Critical Issues' such

as gender, power and culture in practical ways. Whilst the issue of gender did not appear to be too important during **INTERCAFE's** meetings (in terms of an issue requiring attention regarding conflict management, at least), power and culture were certainly critical in many instances.

The following guide sets out to explore how to address the process of reaching consensus amongst individuals or institutions who may have conflicting values, opinions or positions.

- Negotiation and Mediation Techniques for Natural Resource Management, Engel, A. and Korf, B. (2005). Food and Agriculture Organisation of the United Nations, Rome.

This guide offers practical guidance on how to establish and manage a process of consensual negotiations involving multiple stakeholders in collaborative natural resource management. Readers will find suggestions for three key areas: (1) facilitating negotiations and agreement among individuals, groups and institutions who believe that they have incompatible objectives, (2) broadening people's understanding of their own and others' interests and needs, and (3) encouraging people to think beyond their own often entrenched, perhaps emotionally charged, positions. Each of these has clear resonance with, and application to, much that **INTERCAFE** has seen and learned in relation to Cormorant-fisheries issues across Europe.

The guide can be accessed on the internet via http://www.fao.org/docrep/008/a0032e/a0032e00.HTM and could help in a number of areas pertinent to Cormorant-fisheries conflicts. These areas include an exploration of how natural resource conflicts can affect collaborative natural resource management and a description of the different conflict management approaches (e.g. customary, legal, alternative) that can assist decision-making. Furthermore, the guide describes principles of consensual negotiations as a methodology for dealing constructively with natural resource conflicts.

Not only are the principles, processes and negotiations of conflict management complex, as seen in the preceeding publications, the conflict situation itself is seldom static. Indeed, it is generally a dynamic phenomenon, a perspective explored in the following book.

- The Eight Essential Steps to Conflict Resolution, Weeks, D., (1992). Penguin/Putnam, New York.

Although it is now over 20 years old, this book is still available for a reason — Weeks has an engaging writing style and an approach that works with conflict which he sees not as an event but as an ongoing process. The book is not geared toward natural resource conflicts but the skills described here are a valuable foundation for those working with Cormorant-fisheries conflicts, or any other. His tone and the examples he uses make each step easy to follow, even to those uninitiated in conflict resolution.

The book breaks down the process of conflict resolution into eight manageable steps: Create an Effective Atmosphere; Clarify Perceptions; Focus on Individual and Shared Needs; Build Shared Positive Power; Look to the Future, Then Learn from the Past; Generate Options; Develop 'Do-ables': The Stepping-stones to Action; Make Mutual-Benefit Agreements. Appendix A also offers a helpful guide that suggests methods for addressing common issues with conflict resolution, such as anger, trying to see issues from another's perspective and seemingly un-solvable conflicts. Of the latter, the next book addresses these directly and helps us understand them.



Commercial forestry, from planting to logging, can lead to emotive natural resource conflicts.
Photo courtesy of Shutterstock.

- Making Sense of Intractable Environmental Conflicts: concepts and cases, Gray, B., Elliot. M. and Lewicki, R.J. (eds.). (2003). Island Press, Washington DC.



As this book explains, much can be done to address intractable environmental conflicts. The European Cormorant-fishery issue does have many of the hallmarks and characteristics of 'intractability', making this book of considerable interest. Perhaps its most important aspects are the examples related to reframing issues. Framing is the process of constructing our views of the world; reframing involves shaping these views into perspectives that are more helpful and positive with respect to managing conflict.

Eight in-depth cases are presented, divided into four categories: Natural Resources, Water, Toxics, and Growth Management. Each section includes a useful summary of each type of case study. Chapter One and Chapter Two are also helpful, providing an introduction to 'Framing of Environmental Disputes' and 'Intractability' in a broader context.

People interested in Cormorant-fisheries conflicts might find two case study chapters particularly useful: Chapter 3 (When irresolvable becomes solvable: the Quincy Library Group Conflict), and Chapter 6 (Comparing natural resource cases) which compares how participants in the first three case studies frame disputes in terms of identity, conflict management processes and social control.

Regarding the lessons learned through the numerous examples of natural resources management given here, and earlier in this section, a useful overview of how to respond to conflicts in practical contexts is given in the following book.

Practical guidance

- Making Collaboration Work: lessons from innovation in natural resource management, Wondolleck, J.M. and Yaffee, S.L. (2000). Island Press, Washington DC.

This book describes the importance of collaboration in resource and environmental management.

For the natural scientist, it is a great entry point for matters that relate to natural and social science issues as well as public policy. The authors provide a wealth of examples taken from their own extensive experience in resource management in the United States. The most important chapters for Cormorant-fisheries conflicts are in Part II, which focuses on building common ground, creating new opportunities for interaction, process, partnerships, and a proactive entrepreneurial approach. Part III ('Getting Started') addresses collaboration amongst agencies, and accountability, providing a useful summary of advice. Although more scholarly than a practical manual for solving conflicts, this book provides a sound understanding of how to respond to a variety of natural resources conflicts in practice.

Among the issues to emerge when working on conflicts in practice — the desire to move towards the longer-lasting legacy of partnerships — are those of capacity-building, training and research. These are well described and expanded in the next publication.

- Biodiversity and Stakeholders, Bouamrane, M. (editor). (2006). Biosphere Reserves Technical Note 1; UNESCO, Paris.

This is a great publication from UNESCO's 'Man and Biosphere' Programme. It contains lots of useful information and practical guidance on participation and partnerships (including partnerships with researchers) making it almost essential reading for European scientists interested in Cormorant-fisheries conflicts. It does include some examples from Africa but the whole book (80 pages, including useful references) will be understood by European stakeholders interested in conflict management and partnership work.

There are some super diagrams and flow charts that will provide many people with ideas on how to address capacity building, research and training for some of the Cormorant-fisheries contexts that exist across Europe.

This material is thoroughly recommended and available on the web in several languages:



Collaboration between researchers, INTERCAFE meeting, Slovenia.
Photo courtesy of **INTERCAFE**.

French: http://unesdoc.unesco.org/images/0014/001465/146566f.pdf

Spanish: http://unesdoc.unesco.org/images/0014/001465/146566S.pdf

English: http://unesdoc.unesco.org/images/0014/001465/146566e.pdf

Incidentally, for those interested in 'science and society', 'Man and Biosphere' have also produced a short publication that is helpful: http://unesdoc.unesco.org/images/0015/001500/150009e.pdf

The following reports deal with human-wildlife conflicts between the conservation of the Grey Seal (*Halichoerus grypus*) and small-scale coastal fishing in Sweden and Finland. The editors highlight that the lessons learned from this specific conflict contribute as steps on a more encompassing strategy of sustainable resource management in the coastal zone.

- Findings from the Case Studies in the Baltic Sea Reconciliation in Practice: The Seal Conflict and its Mitigation in Sweden and Finland, Bruckmeier, K., Westerberg, H. & Varjopuro, R. (editors). (2006). FRAP Project 3rd Periodic Report. Available at – http://www.frap-project.ufz.de/downloads/EU_FRAP_Deliverable_21e.pdf

The main messages from these case studies in the Baltic Sea are formulated with regard to the significance of the coastal fishery and conflict mitigation measures, including not only hunting and technical measures but a combination of measures and overall approaches to conflict management.

In comparison with the Cormorant-fisheries conflict the core problems and many of the management strategies are rather similar to the seal-fisheries conflict. The resource competition between seals and the fishery is both direct and indirect, and it has caused serious economic problems to the coastal commercial fishery. The direct competition takes place in a form of damage to the fishery: loss of catch, physical damage to nets and extra work. Indirect damage to the fishery is mainly a consequence of competition between seals and fishermen over the same resource.

Both Sweden and Finland have applied various policy instruments to manage this conflict. These include protective hunting, compensation payments, financial support for technical measures, fishery insurance, stakeholder forums and training of seal hunters. The paper evaluates these policy mixes situated in their social, administrative and ecological contexts.

Conclusions are made with regard to small-scale coastal fisheries and to the mitigation of the seal conflict. Restricted protective hunting cannot be seen as a means of reducing the overall seal population, but it has importance for individual fishermen. In the Finnish case, Grey Seals are classified as a game animal and there have been attempts to revitalise the tradition of using seals for human consumption. The paper also concludes that in Finland the de-centralised approach to the management of the seal-fisheries conflict included more bottom-up components than did the Swedish centralised and top-down approach.

These publications all demonstrate that there are a wide variety of stakeholders or interested

parties involved in natural resource management issues. The Cormorant-fisheries case, for instance, is clearly not just an issue for conservationists and fishers, anglers or fish farmers. Many of the books and articles described here offer suggestions which aim to ensure that all stakeholders are involved in the conflict management process and explain how best to manage both the issues and the groups of people involved, including agencies and government groups. However, a vital consideration in the whole concept of conflict management is how best to actually manage oneself. This is the subject of the final recommendation for this topic.

- Peace is Every Step, Thich Nhat Hanh, (1991). Rider/ Ebury Press, London.

Managing conflict is not just about skills, tools, policies and processes but about how we work with ourselves — our own fears, concerns, attitudes, perceptions. In fact, 'managing self' is an essential part of successful conflict management. This small, beautiful book is written by a Buddhist monk who notes that people have control over themselves and influence in any conflict situation. All difficult situations raise the possibility that people can manage themselves in better ways, and in so doing, could possibly make a better contribution to the problems people face in the conflict.

This accessible little book helps us to think about how we might do this, including simple tools such as reflection, breathing, and what Buddhists call 'Mindfullness' — in this case, being mindful of how we can be a positive force for change as well as settling ourselves and feeling comfortable 'inside ourselves' with the tough work of facilitation, negotiation and problem solving. This is not overtly a 'self development' book. However readers will be able to draw on the ideas in it personally and professionally in conflict situations.

18.7 Science-Policy-Society Relationships (Trude Borch)

Trude Borch is a Norwegian social scientist working on natural-resource management and conflict solving. Here she provides a summary of a series of references that focus on relationships between science and policy and the communication of science between the scientific community and politicians, managers, stakeholders and the general public.



Learning about a coastal fishery in the Baltic, INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE**.

As **INTERCAFE** has found and experienced (see Processes chapters in Part One), in spite of a general ideal that natural resources, and conflicts over them, should be managed on the basis of scientific evidence (or advice), this is not always the case. This may be because of the need for a precautionary approach where there is no time to wait for scientific findings on an issue. In other cases, scientific findings might be presented but are not taken into consideration (or are dismissed) because stakeholders often contest science with which they do not agree. Strong interest-groups are often able to provide their own scientific experts in support of their positions in any significant policy decision and, in doing so, will exploit scientific uncertainty and diversity in scientific opinion to legitimise their preferred policy options. In any of these situations the fundamental decisions of resource managers are not based on science alone because value judgements are also incorporated into political decision-making processes.

- Science and Politics in the International Environment, Bryner, G. C. and Harrison, N.E. (2004). Lanham: Rowman & Littlefield.

This book discusses how science is inextricably connected to any discussion about the environment and environmental problems. It explores weaknesses in current thinking about the relationship between science and politics in international environmental issues by examining ten case studies. These are arranged in four parts to introduce readers to

the range of issues confronting scientists and public officials engaged in international ecosystem management and cooperation. The case studies include transboundary ecosystem management, food security, climate change, acid rain deposition, forest regulation, international agreements regulating common good resources, and the movement of transboundary pollutants.

The authors investigate what they label 'epistemic communities' or particular communities of scientists that influence policy-making attempts to resolve environmental problems. The conclusion they reach is that the relationship between science and politics is more varied and more complex than current theories predict, and they present cases where very good science was not sufficient to obtain an appropriate political response to a problem (in Part 3 'Science and Precaution'). For example, the chapter by Don Munton ('Using Science, Ignoring Science') addresses the acid rain issue and Ontario's (Canada) response to the conclusions of scientific research. Munton points out that the issues of debate are not new but what changed were the societal and political values of the time which helped sharpen people's perceptions and response to acid rain. Canadian citizens were also more inclined to participate in the public forum because the source of the acid rain problem was 'extranational', coming from locations within the United States. There are some obvious parallels with the European Cormorant situation here — for example in some stakeholder's responses to the uncertainties surrounding assessments of Cormorant impact or damage at fisheries and the consequent lack of unequivocal conclusions of scientific research. Such scientific uncertainties are also probed by stakeholders in terms of differing opinions on likely outcomes and effectiveness of management actions taken against Cormorants (see 18.3). Similarly, there may also be parallels in relation to feelings expressed in many places that Cormorants are extranational too — that they are non-native 'aliens' or 'outsiders', a common theme throughout Europe (e.g. see chapters 9 and 12).

- Comment: the interplay of policy, politics, and science, Healey, M.C. (1997). Canadian Journal of Fisheries and Aquatic Sciences, 54(6): 1427-1429.

Healey suggests that resource-management has been characterised as a science-based activity, and policies in resource management should ideally be consistent with scientific evidence. However, he argues that the fundamental decisions of resource managers are not resolved by science alone. Instead, it is almost inevitable that other subjective and objective judgements form part of the political decision-making process. This situation is relevant for Cormorant-fisheries conflicts as it highlights that the increasing technical and scientific sophistication of stakeholder groups implies that scientists and political decision-makers no longer have a monopoly on information. According to Healey, competing interests will be able to muster their own scientific experts in support of their positions in relation to any significant policy decision. In doing so stakeholders might exploit scientific uncertainty and any diversity in scientific opinion to legitimise their preferred policy options. Indeed, as science — including that associciated with European Cormorant-fisheries issues — is often more likely about uncertainty and competing opinions than about certainty, Heazle (2004:373) concludes that *'…it is not difficult for governments and organisations, with an interest in doing so, to selectively criticise and reject scientific advice when it conflicts with their needs'*.

- Ideology and scientific credibility: environmental policy in the American Pacific Northwest, Steel, B.S., Lach, D. and Satyal, V.A., (2006). Public Understanding of Science, 15 (4): 481-495.

As part of an ethos of opening up political decision-making, there is an increased focus on explaining scientific findings that inform policy to stakeholders and the general public. This includes the setting up of arenas and channels where stakeholders can acquire scientific insights as well as challenge science. These arenas include public hearings, governmental advisory groups, consensus conferences, information meetings, popular media and internet based discussion forums. In this context, Steel *et al*. examine different stakeholders' attitudes towards science, scientific research and scientisits themselves. In relation to environmental policy participants, these authors suggest that stakeholders could generally be divided into the following groups: scientists (in universities and federal agencies), managers, members of interest-groups (e.g. environmental groups and industry

associations), the 'attentive public' (i.e. citizens who have participated in the environmental policy process), and the general public.

Interestingly, the preliminary results of this study reveal significant differences within these stakeholder groups between liberals and conservatives in their orientations towards scientists. Self-identified liberals appear more likely to see science and scientists as objective with conservatives (i.e. 'the right') having the contrary view. Furthermore, the authors conclude that *'many on the right remain sceptical* [of science and scientists] *and strongly support the use of nonscientists in the* [environmental policy] *process as well'* (Steel *et al*., 2006: 492).Whilst any exploration of the influence of ideology in relation to the use of science in environmental policy was beyond the scope of **INTERCAFE**, these findings imply yet another potential source for polarisation within environmental conflicts such as the Cormorant-fisheries one. Furthermore, at the European scale, such polarisation could be compounded both nationally (e.g. in federal countries such as Austria, Belgium, and Germany) and internationally between various member States of the EU-27.

- What's next for science communication? Promising directions and lingering distractions, Nisbet, M.C. & Scheufele, D.A. (2009). American Journal of Botany, 96: 1767-1778.
- The communication process as evaluative context: what do nonscientists hear when scientists speak? Weber, J.R. & Word, C.S. (2001). bioScience, 51: 487-495.

The extensive review by Nisbet and Scheufele covers several issues pertinent to science-policy-society relationships, not least of which is the assumption that 'ignorance is the root of societal conflict over science' — the so-called 'deficit model' (p.1,767). The authors explore research from social sciences on how the public make sense of, and participate in, societal decisions about science and technology. Specifically, they highlight the role of the media and communication in this process — challenging the deficit model's assumptions about science literacy. They discuss research that shows that science literacy only accounts for a small fraction of how the lay public forms opinions about controversial issues of science. Far stronger influences on opinion come from 'value dispositions' such as ideology (see Steel *et al*. above), partisanship and religious identity.

Of further relevance in terms of **INTERCAFE's** interests in science-policy-society relationships, Nisbet and Scheufele's paper reviews other studies which show that *'no matter how accurately communicated and understood the science, policy decisions cannot be seperated from values, political context, and necessary trade-offs between costs, benefits, and risks'* (p.1,768). This is indeed an important issue for all those engaged in the European Cormorant-fishery debate, as are the conclusions of Weber & Word.

Weber & Word explore examples of science communication that involve interactions with non-scientists and arrive at three conclusions. First, that rather than being a 'product', science communication is a 'process' which both attempts to exert mutual influence and casts information as being either positive or negative, ethically good or bad, useful or not useful, and interesting or not interesting. Second, that information is understood through both general and local contexts. Whilst knowledge may be gereralisable, it is framed through numerous specific contexts. For example, on issues of risks versus benefits, recent studies appear to confirm that non-experts' experience often over-rides their trust of experts: local ('direct') knowledge provides a more compelling frame of reference than does the expertise of others. Third, Weber & Word conclude that 'objectivity is not neutrality'; once an apparently objective body of information is placed in a public context, it will inevitably be evaluated and used to assess other information. **INTERCAFE** found numerous examples of these situations occurring during its work. Thus, an awareness of them is undoubtedly an important element of recognising some of the social perspectives surrounding the occurrence of Cormorant-fisheries conflicts, as well as contributing to how they might be addressed.

- Roles of research scientists in natural resource decision-making, Mills, T.J. and Clark, R.N., (2001). Forest Ecology and Management, 153(1): 189-198.

This paper is relevant to **INTERCAFE's** work on Cormorant-fisheries conflicts because Mills and Clark appropriately describe issues surrounding natural resource decision-making as being *'complex,*

varied and debated frequently contentiously by the public' (p.189) and note that scientists are being asked to actively engage in the debate. In turn, this raises questions about what is credible scientific information and how such information *'is used in often emotionally or politically laden natural resource management decisions'* (p.189). One issue that this paper highlights is that decision-makers are challenged to clarify their management goals, to fully understand and use science, as well as explicitly identifying levels of acceptable risk.

On the other hand, Mills and Clark describe how scientists are often asked to frame their work so as to maintain scientific independence yet be responsive to management questions. However, these researchers are also asked to do this under finite time constraints and at scales that often challenge exisiting scientific knowledge.

The focus of Mills and Clark's work, here in the context of river basin management, is to examine the interactions between scientists and natural resource decision-makers and to propose appropriate roles for each. Too many propositions are discussed in the paper for them all to be noted here but some examples should be highlighted. For research scientists these include (pp.192–193) being comfortable working in a crisis-driven atmosphere; that quality control of the scientific information is the scientist's responsibility; that to protect their credibility, science findings should be published for public review; and that research scientists must be prepared to respond to harsh critiques and attacks meant to undermine their credibility or to challenge their work. For decision-makers, propositions include (pp.194–195) that management goals must be clarified prior to initiating the work of research scientists; that — for accountability — it is necessary that they should challenge the logic of science findings if they seem faulty; and that they should clarify how scientific information was considered in the decision-making in order to demonstrate the relative importance of science versus other decision factors.

In relation to European Cormorant-fisheries issues, the roles proposed by Mills and Clark for scientists and decision-makers are extremely pertinent and, indeed, they can be regularly observed in operation in the realms of science. However, it is perhaps less easy to see clearly how the roles of decision-makers are undertaken, and importantly, who the decision-makers are, as a consequence of the diverse multi-level governance systems (see 18.8) operating across Europe.

While the roles for scientists and decision-makers proposed by Mills and Clark are useful and practically relevant, the authors acknowledge that there are many points of view regarding the value of, as well as the problems associated with, integrating science information into the policy process. Indeed, others argue that the roles of science and policy are actually far from being mutually exclusive in the field of environmental governance (see van der Hove, 2007) and that there is a move towards closer engagement between science communities (both 'natural' and 'social') and environmental decision-makers.

It is these decision-makers, their legislation, and their ways of thinking and working, that are the final topic of this chapter.

18.8 Environmental Law, Ethics and Governance

(Ilona Cheyne and Pekka Salmi)

Ilona Cheyne is a Professor in law and has developed research interests to include international trade law and the environment and, more recently, science and law, management of human-animal conflicts, intellectual property law, the protection of traditional knowledge and biodiversity, and law and ethics. Pekka Salmi is a researcher and fisheries sociologist at the Finnish Game and Fisheries Research Institute. His areas of expertise include fisheries conflicts and social and economic aspects of commercial and recreational fisheries, with a focus on governance issues.

Environmental Law

- Environmental Law (7th edition), Bell, S. and McGillivray, D., (2008). Oxford: Oxford University Press, ISBN13: 9780199211029.

This is the leading environmental law textbook in the UK, written for students but very accessible to general readers. It covers all the key topics from an international, European and British perspective. One of the key issues of interest here is the nature of Directives and how they work. This book covers the chronological and historical perspectives of European environmental law as well as issues important to **INTERCAFE**. It also

gives practical examples in the form of cases. Oxford University Press also offers an Online Resource Centre which provides twice-annual updates by the authors, and links to key websites (available from http://global.oup.com/uk/orc/law/environmental/bell8e/).

- Environmental Protection, Law and Policy (2nd edition), Holder, J. and Lee, M. (editors). (2007). Cambridge: Cambridge University Press.

Holder and Lee provide a collection of materials, with extensive explanation and commentary by the authors. The book emphasises the policy context in which environmental law operates and offers a more critical approach to environmental regulation than a standard textbook, questioning the dominance of science and urging greater public participation in environmental decision-making.

- A Guide to EC Environmental Law, Gillies, D. (1999/2009). London: Earthscan.

This is a short but informative introduction to environmental law in the EC (now the EU). It gives an outline of the institutions and legislative instruments which, although now a little out of date, nonetheless provides a useful account of how the institutional structure works. The book explains both general principles of EU environmental law and specific legislative areas, including nature conservation. Of particular interest to those interested in trying to resolve Cormorant-fisheries disputes at the level of EU law is the section on how to use EU law and institutions to protect the environment and how to influence future environmental laws.



The EU27 Member States. Photo courtesy of Shutterstock.

- European Environmental Law (3rd edition), Jans, J.H. and Vedder, H.H.B. (2008). Europa Law Publishing, Gronigen.

This book gives a good overview of the development and basic principles of EU environmental law. It gives clear and concise explanations of the relevant legislation and case law, including a brief but accessible account of the EU's nature conservation law.

- Understanding Environmental Law, Stallworthy, M., (2008). Sweet & Maxwell, London.

Stallworthy sets out a thoughtful analysis of the nature of environmental law and the relationship between regulatory mechanisms and environmental protection. The author explores some of the most difficult questions about environmental policy-making, including social responses to environmental threats and the difficulty of representing environmental values in legal and policy fora. More broadly, he examines the relationship between law, risk and sustainability and asks whether the traditional anthropocentric focus on the individual can be challenged to accommodate a more collective or ecological agenda. Like Holder and Lee, the author locates the law in its social and policy context rather than giving a simple, descriptive account.

European Commission (EU) Resources

The EU's website gives access to legal documents, recent case law, and guidelines relating to nature and other environmental legislation. There are also explanations designed to be accessible to the general public. An excellent place to start to find documents,

explanations and useful links for the Wild Birds Directive (WBD see chapter 7) is: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

A corresponding page for the Habitats Directive (HD) is at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm#interpretation

These sites — relating to the two areas of EU environmental legislation perhaps most relevant to Cormorant-fisheries conflicts — give comprehensive information on these Directives in a reader-friendly format, as well as access to the legal documents themselves. In the Cormorant-fisheries context, the WBD is perhaps most important as it affords protection to Cormorants whist offering a means whereby problem situations caused by them can be addressed. The HD is important because it is the basis of much wetland habitat protection. Indeed, the conservation areas established under the 1992 Habitats Directive are the foundation of an EU-wide network of nature protection areas (so-called Natura 2000 sites) which is the centrepiece of EU nature & biodiversity policy. The Natura 2000 network[106] comprises Special Areas of Conservation (SACs) designated by Member States under the HD and incorporates Special Protection Areas (SPAs) designated under the WBD.

There is also an excellent summary of the EU Court of Justice's case law on nature conservation (up to 15th July 2006) which is very helpful for general readers who may not have the opportunity to read the cases themselves. This webpage also contains a long list of useful website links and can be found at: http://ec.europa.eu/environment/nature/info/pubs/docs/others/ecj_rulings_en.pdf

The recent case law of the Court is available from its own website (click on 'case law', then search form to access text searching) which can be found at: http://curia.europa.eu/

Environmental ethics

- Ethics and the Environment: an introduction, Jamieson, D. (2008). Cambridge University Press, Cambridge.

This is a clear and thought-provoking introduction to the major ethical questions and schools of thought relating to environmental matters, including discussion of humanity's treatment of animals and the value of nature. It is written in an engaging style and is accessible to non-specialists.

- Environmental Ethics: an introduction to environmental philosophy (5th revised edition), DesJardins, J.R. (2012). Wadsworth, Belmont, California.

DesJardins' well-established textbook offers lucid explanations of the major ethical theories and sets them in the context of case studies illustrating the difficulties of making ethical decisions in complex situations. The emphasis is therefore on applied ethics and a recognition that there is rarely a right or wrong answer to value conflicts.

- Environmental Ethics: an overview for the twenty-first century, Attfield, R., (c2003). Polity Press, Cambridge.

This publication is a review of the major ethical debates around environmental issues with an eye to the future and the increasing importance and prevalence of the concept of sustainability. It is a little more challenging for the non-specialist than some of the other publications discussed. Like O'Neill *et al* (2008, below) Attfield accepts the centrality of human interests but suggests an ethic that accommodates the need to protect non-human species, including a defence of the notion of stewardship. He provides a detailed and nuanced analysis of the ethical schools of thought, and suggests useful further reading for those who wish to pursue specific issues and arguments. Attfield challenges readers to reflect on fundamental questions of humanity's place in the world, and provokes them to think more deeply about humanity's relationship with other species and the implications for the future.

- Environmental Values, O'Neill, J., Holland, A. and Light, A. (2008). Routledge, Abingdon, Oxon and New York.

This book is an attempt to establish an ethical viewpoint that acknowledges the centrality

[106] The aim of the Natura 2000 network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is not a system of strict nature reserves: most of the land remains in private ownership where the emphasis is on ensuring that future management is sustainable, both ecologically and economically. Further information is avaiblable at: http://ec.europa.eu/environment/nature/natura2000/index_en.htm



Public notice board explaining some of the sustainability and multiple-use issues of fish ponds, INTERCAFE field trip, Czech Republic.
Photo courtesy of **INTERCAFE**.

of human interests but rejects the idea that those interests can only be expressed in terms of monetary values. It critically analyses the main schools of environmental ethical thought, and it proposes a new environmental ethic based on moral considerability of the non-human world and a sensitivity to the narrative context of the environment. In particular, the authors critique an 'itemising' approach to biodiversity that leads to a focus on numbers and frequencies of specific elements, such as ecosystems, species or genes. This, in turn, promotes economic valuation of separate elements because of their ease of calculation, such as numbers of species or 'red lists' of endangered species.

The problem that the authors identify is that such an approach creates an incomplete story about environmental values, if it incorporates values at all. It is static and lacks reference to the historical narrative of the local environment. Value is found not just in scientific or economic terms, or in abstract ethical theory, but in social significance and persistent change. The book challenges readers to think about the value they place on other species with a conscious focus on local social, economic and ecological concerns.

- Animal Liberation (2nd edition), Singer, P. (1995). Pimlico, London.
- The Case for Animal Rights, Regan, T. (1983). Routledge & Kegan Paul, London.

These two books are landmarks in the field of environmental ethics because they take ethical theories that have long been applied to human beings and argue that they can, and ought to, be applied to animals. Singer extends the scope of utilitarianism to include animals, arguing that the happiness of animals is as important as the happiness of human beings. Regan argues that non-human animals should be treated as having rights of their own.



Animal Rights protester. Photo courtesy of Eugenio Marongiu, Shutterstock.

Both views are controversial but have been influential in developing contemporary environmental laws and policies.

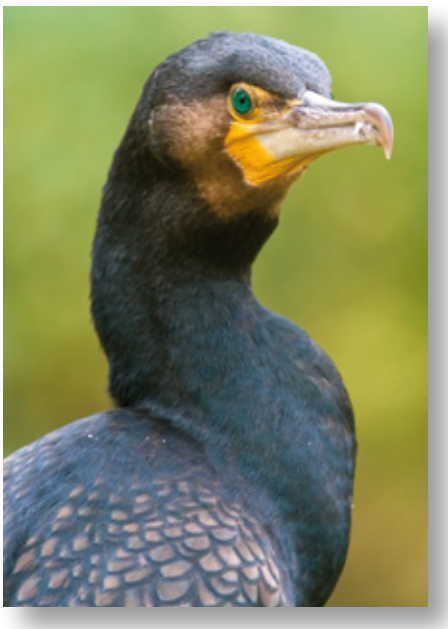
- Sand County Almanac: with essays on conservation, Leopold, A. (1966). Sierra Club/Ballatine Books, New York.

One of the most influential books ever written on conservation, this is a thoughtful meditation on the place of humanity in nature and the development of a 'land ethic'. Leopold's philosophy is summed up in his famous aphorism *'A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.'* Of course, in many respects, this would be synonymous with a 'wetland ethic'.

Governance

- Legitimacy of Species Management. The Great Cormorant in the EU, Rauschmayer, F. and Behrens, V. (2008). In: Keulartz, J. & Leistra, G. (editors). Legitimacy in European Nature Conservation Policy. Case Studies in Multilevel Governance. The International Library of Environmental, Agricultural and Food Ethics, Volume 14. Springer. pp. 55-74.

The problem of legitimacy is one of the core issues when aiming for sound and sustainable solutions in the governance of conflict-inducing animal species, like the Great Cormorant. Legitimacy refers to the issue of why the outcomes of binding collective decision-making ought to be accepted by those whose interests are being harmed by the decision in question. First, the book chapter by Rauschmayer and Behrens illuminates the legal and institutional backgrounds and levels of cormorant management in a variety of European Member States. In relation to management plans, the authors then take examples from Denmark, Italy and France.





Exploring the legitimacy of species management in Europe.
Photos courtesy of Shutterstock.



Three advantages of improved legitimacy are listed: (1) the legitimacy of decisions may be considered a value in itself, (2) the process leading to a legitimate decision may improve the quality of the decision itself, and (3) decisions that are considered legitimate are usually relatively easy to implement. The authors present four sets of criteria for evaluating Cormorant management plans: legal compatibility, accountability, interest representation and transparency. It is argued that accountability (is someone held accountable for the decision and its outcome?) and inclusion of interests pose the major legitimacy problem for national and sub-national plans for the management of Cormorants.



Rocks, trees and water — integral parts of the Finnish landscape, INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE**.

Rauschmayer and Behrens also discuss the perceived legitimacy of the Danish national Cormorant management plan. They conclude that the Danish case is an example of the high importance of scientific documentation and how this is linked to interest representation. Depending on what research is being carried out and being funded, the stakeholders are given different possibilities to document their problems and thereby influence decision-making. The authors also address the legitimacy problems encountered during the preparation process of the Action Plan for the Management of the Great Cormorant in the African-Eurasian Region. In comparison with the plans for multi-level governance, the national or sub-national plans are judged more or less legitimate, and more or less effective in mitigating conflicts. The authors conclude, however, that even the national and sub-national plans often fail to address the increasing dynamics of the problem (such dynamism is one of the issues explored in detail in the relevant sections of chapters 13–17).

- Institutional changes in fisheries governance: the case of the Saimaa ringed seal, *Phoca hispida saimensis*, conservation, Tonder, M. and Salmi, P. (2004). Fisheries Management and Ecology, 11: 283-290.

The controversy about the conservation of the endangered Saimaa Ringed Seal in Finland is a revealing example of ongoing transformations in society which are connected to paradigmatic changes in governance institutions. A decision by the national authorities, which restricted fishing in wide lake areas to support seal conservation, aroused strong resistance from the local level of fisheries governance. The local and regional stakeholders held that the already established local voluntary agreements for restricting the use of such fishing gear which could entangle and drown seal pups were sufficient.

The paper reveals a variety of challenges in crossing institutional borders between the domains of fisheries and nature conservation and in finding successful tools for conflict mitigation. Importantly, these institutional tensions are not dissimilar to those found in Cormorant-fisheries conflicts. In the case of Saimaa Ringed Seal conservation, there are substantial differences not only in the stakeholders' basic world views but also in their knowledge and power relations. Local people often believed that scientific research is goal-oriented in a way that scientific results empower external control instead of local decision-

making. The 'conservation-friendly' groups' perspectives are typically in line with the scientific research, and they also emphasised international responsibilities for biodiversity conservation such as obligations under the EC Habitat Directive.

In addition to finding a better balance between the domains of fisheries and conservation, this study also highlights a need to overcome the separation and mistrust existing between different spatial levels of governance. Historically, activities of the regional- and local-level fisheries institutions in Finland have been widely based on the local perspective of the social/community paradigm, in connection to the private water ownership system. As in the Cormorant-fisheries conflict cases, successful management of the seal-fisheries confrontations necessitates good knowledge and appreciation of the local and regional socio-cultural circumstances.

Additional References

Heazle, M. 2004. Scientific uncertainty and the International Whaling Commission: an alternative perspective on the use of science in policy making. Marine Policy, 28(5): 361–374.

Russell, I, Parrott D, Ives, M, Goldsmith, D, Fox, S, Clifton-Dey, D, Prickett, A, and Drew, T. 2008. Reducing fish losses to cormorants using artificial fish refuges: an experimental study. Fisheries Management & Ecology, 15: 189–198.

Russell, I R, Broughton, B, Keller, T, and Carss, D N. 2012. The INTERCAFE Cormorant Management Toolbox: methods for reducing Cormorant problems at European Fisheries. COST Action 635 Final Report III. ISBN 978-1-906698-09-6.

Seiche, K, Musil, P, Strod, T, Nemenonoks, O, Lévai, F, Gwiazda, R, Gerdeaux, D, and Carss, D N. 2012. Cormorant-fisheries conflicts at Carp ponds in Europe and Israel — an INTERCAFE overview. COST Action 635 Final Report V. ISBN 978-1-906698-10-2.

van der Hove, S. 2007. A rationale for science-policy interfaces. Futures 39: 807–826.

19 INTERCAFE'S APPROACH TO CORMORANT-FISHERY CONFLICTS IN EUROPE AND ISRAEL: building an effective multi-national conflict management process for complex human:wildlife interactions

Scott Jones

19.1 Introduction

This chapter discusses three linked themes:

1. The conflicts between people and organisations involved or interested in fisheries, and those involved or interested in the status of the Great Cormorant (*Phalacrocorax carbo*) and to a lesser extent, in some places, the Pygmy Cormorant (*P. pygmeus*).
2. The concerns and opportunities presented by these conflicts for a wide range of stakeholders, including communities, businesses, recreational anglers, fish farmers, commercial fishing concerns, conservation organisations, scientists and policy makers.
3. The development and potential future of approaches within **INTERCAFE** that were designed to improve scientific knowledge of these conflicts, and inform policy and information exchange on Cormorant-fisheries conflict management.

Cormorants do not feature in conflicts everywhere in the world. The cormorant (there are actually over 40 different species) has long been a celebrated icon or commercially valuable bird for certain groups or cultures. In China, Japan and elsewhere several cormorant species are skilfully employed by fishermen to catch fish (e.g. the Great Cormorant, *P. carbo* and the Japanese Cormorant *P. capillatus*). Along the Rio Dulce in Guatemala the author has seen populations of the Neotropical Cormorant (*P. olivaceus*) being admired as part of a tourist attraction, something to watch and appreciate as you eat your evening meal of fish caught from the same lake as the cormorants are fishing. In East Africa the author has spoken with village fishermen who regard cormorants as clever, skilful creatures, part of the natural world entitled to their share of the fish, although not all East African fishermen share this view, (e.g. Nature Uganda, undated). Cormorants have been celebrated in art and culture world-wide, carved as handles in ancient Mayan vases, painted on tile mosaics in Capernaum, and moulded into contemporary totemic sculpture on Oregon State University's Geography campus for instance.

However, in other places cormorants do feature in conflicts with fisheries, notably the Double-crested Cormorant (*P. auritus*) in the Great Lakes area of North America and the Great Cormorant and the Pygmy Cormorant (*P. pygmeus*) in



INTERCAFE field trip, Slovenia. Photo courtesy of **INTERCAFE**.

several places across Europe and the Middle East.

Conflicts involving *P. carbo* and fisheries emerged in a serious way from the mid- to late-1980s, when Cormorant numbers in Europe started to rise and populations began to re-establish themselves in many areas and also colonise new places (van Dam & Asbirk, 1997; Carss, 2003; Carss & Marzano, 2005). This chapter is based on learning from these conflicts and the **INTERCAFE** COST Action that has been concerned with them. It examines INTERCAFE's approach to Cormorant-fisheries conflicts across Europe and in Israel and explores how, as the Action neared its end, it moved from informing potential approaches to Cormorant-fisheries conflict management to becoming a conflict management process itself.

Anthropologists often make clear the perspective and role of the writer and this is important here. As a forest ecologist and social scientist I was an outsider with neither fisheries nor cormorant specialist knowledge. Yet my biological science and social anthropology training meant that I could understand and discuss the subject material. As time went on, my role as a neutral workshop facilitator became less important and my professional and academic work in natural resources conflict became more relevant. This chapter is therefore written from the perspective of a 'neutral outsider' (in my role as natural resource conflicts facilitator), by someone who was on the 'inside' throughout INTERCAFE's work.

19.2 Conflict Management

The management of conflict used to be regarded as a straightforward process. It was not necessarily an easy one, but at least straight, and forward. The problem is described, then analysed, a solution is designed and then implemented (Figure 19.1). If that approach fails, the chances are, it used to be thought, that either the solution or the implementation of it was wrong.

However, managing conflicts today is not generally regarded as such a blunt, linear process. Analysis, both of the conflict and its stakeholders, is now considered to be more of an ongoing activity. Successful conflict management strategies tend to involve different stakeholders' descriptions of the problem as part of the analysis and the search for solutions. The need to improve stakeholder engagement means that different views of the problem emerge through time. Designing and implementing solutions to conflict has thus become much more about change management in which progress is informed through

Figure 19.1 Managing Conflict — a straight, forward approach.

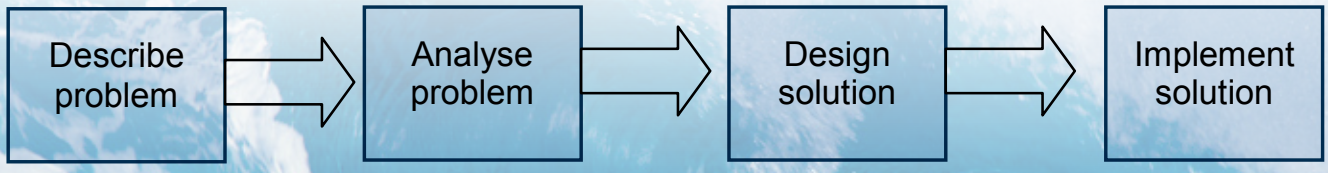
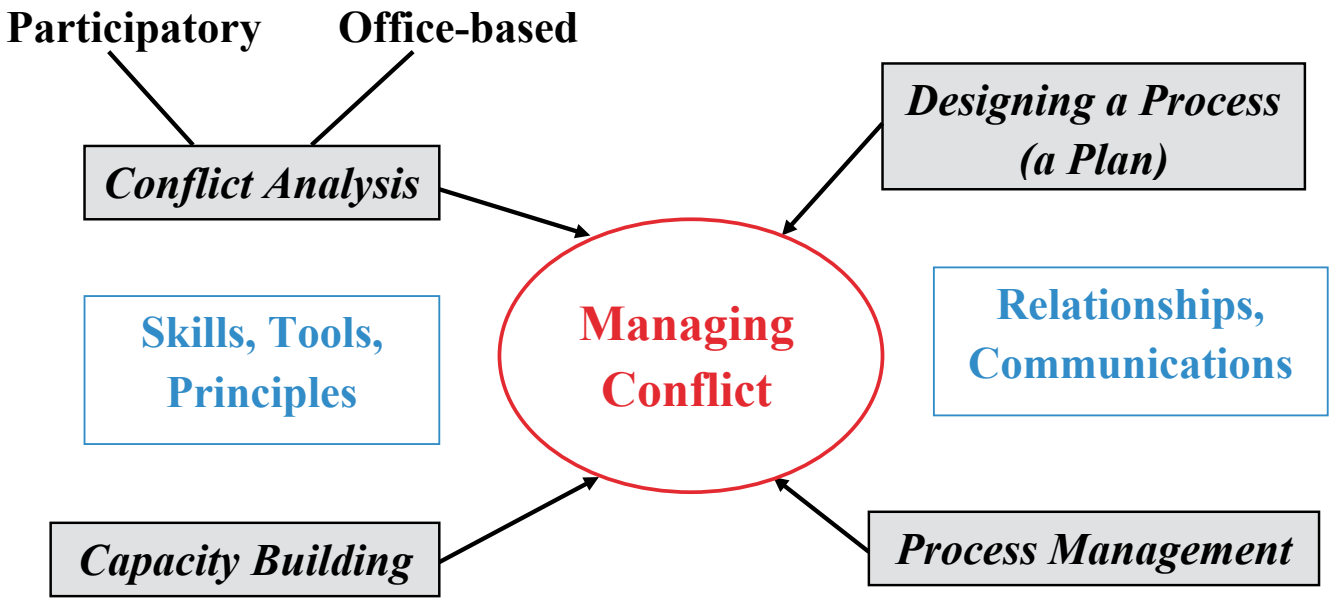


Figure 19.2 Key components of a conflict management process, (adapted from Warner and Jones, 1998).



cycles of analysis, action, reflection and learning.

An alternative model of managing conflict is shown in Figure 19.2 where four different elements do not necessarily proceed in a linear way. They are: (1) analysing conflict, (2) designing and (3) managing a process (e.g. a negotiation, policy-making or legal process, or an action planning process for building consensus among different stakeholders), and (4) building capacity (e.g. through training). Each of these elements is described briefly below.

Conflict Analysis is about understanding who the different stakeholders are and how they perceive or understand the conflict(s). Conflict analysis can be done in the office or as a participatory exercise with other stakeholders, although it is usually a combination of both. **Designing a Process** can range from voluntary activities such as consensus-building, negotiation, mediation, facilitation and some forms of arbitration, to involuntary processes such as regulation and law enforcement. It leads to a plan that recognises the need for flexibility, who to bring together, and where, when and how. **Process Management** is about the way in which the parties will work together, e.g. to explore issues, reach an agreement, and monitor outcomes. Examples include managing a process of fact finding between policy-makers and scientists, or negotiations between conflicting parties. Finally, **Capacity Building** is often needed throughout a conflict management process. For example, it may take place before negotiations with groups who are unaccustomed to working with other stakeholders. People in communities may have little experience negotiating with government or business. Scientists may need support to engage effectively with local knowledge and community-based discussions. Policy makers and interest groups may be accustomed to doing things in particular ways. Training support — for example, in negotiations — conflict analysis, reaching agreements, or 'people skills' may be an important aspect of capacity building for all these groups.

Supporting any conflict management process involves clear principles (e.g. openness, ethical dealings, adherence to the law) and practical skills and tools (e.g. negotiation, facilitation, analysis). A range of 'softer' skills is also required such as the ability to build and maintain effective relationships and communications, paying attention to peoples' feelings, maintaining rapport and so on (see Figure 19.2).

Conflict management has become a recognised discipline in its own right, emerging from a variety of strands, including political conflict and peace building, business negotiation, conflict within communities, and health and safety issues relating to employee welfare (Deutsch *et al.*, 2006).





INTERCAFE meetings, Lisbon. Photos courtesy of **INTERCAFE**.

Conflicts over natural resource management have added significantly to our understanding of conflict more generally. Fisheries, forestry, water issues, protected areas management, wildlife management, ecotourism and biodiversity conservation all present challenging conflicts at different scales. In recent years, global warming and climate change have become part of daily public discourse.

It is often attractive to seek a simple, single solution to some natural resources conflicts, especially where a species or population:

- becomes dangerous or threatening (e.g. African Elephants *Loxodonta africanus*, man-eating Tigers *Panthera tigris*, coral-eating starfish [crown of thorns] *Ancanthaster planci*, insect pests of agriculture or forestry) or
- uses a natural resource that people harvest or depend on (e.g. Beavers *Castor fiber*, seals *Phocinidae*, Wolves *Canis lupus*, fish-eating birds, see also Part One and chapters 4 and 5 in particular).

While insect pests and coral-eating starfish do not have many advocates fighting for their preservation, tigers, elephants, and fish-eating birds such as Cormorants do. It was the realisation that Cormorant-fisheries conflicts may not have a simple, single solution for all people in all areas that drove the scientific approach to conflict analysis in REDCAFE, the predecessor to INTERCAFE (see Carss *et al.*, 2003; Carss, 2003; Carss & Marzano, 2005).

Building on the lessons learned during the REDCAFE Concerted Action, **INTERCAFE's** development and its practical, multi-national approach was increasingly shaped by the need for co-ordinated research, technical and policy-based management tools, and collaborative management.

Taking Figure 19.2 as one model of the elements involved in a process of Conflict Management, much of what follows considers the successes and lessons from the approach taken by **INTERCAFE**. This chapter considers these under five further sections:

1. Conflict analysis and INTERCAFE's approach,
2. Designing a conflict management process and INTERCAFE's approach,
3. Managing a conflict management process and INTERCAFE's approach,
4. Capacity building and INTERCAFE's approach, and
5. Gaps and next steps.

19.3 Conflict Analysis

Conflict analysis is a process designed to help understand the conflict, including the issues, the stakeholders, people's different views and potential ways forward. The nature of the conflict, its history

and the stakeholders involved will help shape the analysis. Many tools are available to assist analysis, depending on the questions of interest (Jones, 1998a, b, 2011; Jones *et al*., 2005; Ramirez, 1999; Deutsch *et al*., 2006). These can be used in the office or as participatory exercises with other stakeholders but a combination of both approaches normally is valuable. As with any analysis, it is important to know from whose perspective it was done, when it was done, and for what purpose.

INTERCAFE's invitation was for an open, transparent, process of collaboratively building a shared understanding of the key issues surrounding Cormorant-fisheries conflicts. This process took place in both 'office' and 'participatory' settings. The office-based approaches included (i) presentations at INTERCAFE meetings from scientists, local researchers and officials, (ii) consideration of papers from primary research, and of (iii) secondary sources, such as newspapers and other media.

Shared understandings were also built between INTERCAFE participants, and between them and others, during the Action's Small Meetings. These were formal COST instruments where funding was made available in the Action's budget for selected researchers to meet together with other relevant people to pursue an issue highlighted as important during the INTERCAFE meetings.

The analyses developed in these ways were subject to open discussion among **INTERCAFE's** official participants, often by electronic means such as email







INTERCAFE field trip, Po Delta, Italy. Photos courtesy of **INTERCAFE**.



INTERCAFE field trip, Finland. Photo courtesy of **INTERCAFE**.

and through INTERCAFE's web-based forum (not available to those outside the Action). They were also made available to, and developed through, participatory approaches.

The key aspect of participatory approaches in INTERCAFE - indeed a major underlying principle - was the voluntary, open and inclusive nature of dialogue among a wide range of stakeholders. The motivation behind this was that the more that was known about the facts, feelings and perceptions about the conflicts, the more chance there was of developing relevant solutions for a greater number of people.

There were occasions when (primarily unpublished) data were not made available, and some need for confidentiality as data were collected, so that people had access to properly assembled data sets (e.g. on the most recently available Cormorant censuses). But, in general, the process was transparent and open to discussion and scrutiny.

Based on these principles of inclusive, open dialogue, a number of approaches to enable participation were developed and enhanced as **INTERCAFE** grew. These included:

- Case Studies.
- Inviting experts from each country.
- Inviting local stakeholders to INTERCAFE meetings.
- Field visits to meet with stakeholders in 'their place'.
- Collating different views and ideas in mini-workshops and through long-term working groups.
- Inviting stakeholders to participate in working groups as equal partners.
- Inviting local people and INTERCAFE delegates to reflect and comment on reports before they were finalised.

Some analyses were clustered around particular domains (e.g. biological, technical, social, cultural, economic or policy domains), depending on the data and the group undertaking the analyses. However, one of the strengths of INTERCAFE's overall design with its three Work Groups was to enable cross-disciplinary synthesis of 'unalike' data, so that social and natural scientists, policy makers and local stakeholders were able to view analyses in an interdisciplinary way. This approach tended to foster clear technical language where it was required, while encouraging a more user-friendly, accessible style of writing for wider audiences.

The holistic approach that **INTERCAFE** has taken to conflict analysis has generated some critical thinking and helpful insights that are now generally accepted by INTERCAFE's stakeholders. Three are particularly noteworthy. First, Cormorant-fisheries conflicts are not just about cormorants and fisheries. The inter-connectedness of the problems across ecological, social, political and geographical boundaries mean that both problems and solutions may be quite complex, depending on the scale at which the conflict is defined.

Second, Cormorant-fisheries conflicts need to be understood spatially. The characteristics of the conflict(s) depend not just on the birds and fish, but where they are. The bird species - even the individual birds themselves - may be the same, but in different places there are different stakeholders, opportunities, concerns and potential solutions.

Thirdly, the analyses have raised the need to 're-frame' Cormorant-fisheries conflicts beyond relatively simple conflicts of interest to address a number of important





INTERCAFE field trip, Saxony. Photos courtesy of **INTERCAFE**.

topics. These include underlying structural conflicts, conflicts over process, and issues of representation.

Structural conflicts relate to the way that society and the different stakeholders are organised. For example, parliaments, local authorities and legal systems involve adversarial positions, debate, and the need for facts and proofs. Interest groups often structure their response to meet this, so that lobbying and 'making your case' also can be adversarial and political. In fact, a large range of factors all contribute to the context in which the Cormorant-fisheries conflicts are taking place. These include class, gender, age, economic power, social power, political access, geography, public perceptions, language, the nature of subsidies, EU enlargement, ecological change and many others. These structural issues will have a bearing on the dialogue and potential outcomes, such as whether solution 'x' will work in different places for more than just technical reasons.

Conflicts over process relate to the way different stakeholders solve problems e.g. through scientific or technical solutions, legal approaches, using economic or institutional power, or through partnerships. Some may see legal processes as the only legitimate ones. Others may consider custom and tradition as the tried and tested way of solving problems, and legal approaches as a restriction to their 'way of life.' Some groups may view any process other than positivist science and empirical evidence as having no merit, while local people may feel that customary approaches and local knowledge are equally as valid as 'scientific proofs.' Experiences from biosphere reserves and national parks are indicating to many people that networks, partnerships or consensus-based approaches are key to working with natural resources conflicts (UNESCO-MAB, 2008).

Finally, issues of representation and legitimacy are important considerations both within and among different stakeholder groups. Stakeholder groups may elect representatives for official and constituted bodies but are these bodies able to speak on behalf of everyone? How legitimate is their approach to influencing decision-making? Which stakeholder groups have a seat at the table and which choose not to be there, or are not asked to be there? How are these choices made and by whom? In complex conflicts it is often challenging to ensure the right mix of people, and agree their individual and collective rights to represent different groups, or efforts to influence outcomes.

Thus, the chances of finding solutions to a conflict of interest can often be improved by engaging with the wider context, especially structural conflicts, process-related conflicts and representation issues.

INTERCAFE's two overarching goals from all the different



INTERCAFE field trip, Czech Republic. Photo courtesy of **INTERCAFE**.

analyses, and from the switches between office-based and participatory approaches to conflict analysis, were:

1. To achieve consensus on what was said, and on the analyses themselves — not necessarily to agree on the 'solution' but to agree what different people's views were on the problems.
2. To place outcomes from analyses in the public domain and invite comment.

These were key aspects of **INTERCAFE's** participatory approach to conflict management. Critically, they enabled:

- Follow through on the inclusive, open approach to the conflict analysis by making sure that analysis outcomes were clear, agreed and remained open to further discussion in subsequent workshops.
- A focus on analytical rigour and integrity from an appropriate range of stakeholders over the medium term, rather than a rush to 'quick fix' solutions from a limited set of stakeholders in the short term.

19.4 Designing a Conflict Management Process

A large menu exists of different approaches to managing conflicts. This includes political approaches such as diplomacy and peace building, voluntary activities (such as consensus-building, negotiation, mediation, facilitation and some forms of arbitration), as well as involuntary processes such as regulation and law enforcement (Deutsch *et al.*, 2006).

All these involve 'design', making plans about who to bring together, where, when, how and for what purpose in relation to conflict management.

INTERCAFE has provided a focal point for identifying a menu of options for interdisciplinary conflict management and problem solving (Table 19.1). Different options among these will be relevant for different places and perhaps even different times of year. The INTERCAFE Case Studies (see chapters 12–17) provided a particularly valuable way of describing the existing mix of options, gaps, and potential ways forward in the places on which the Action focussed. The Case Studies and other INTERCAFE meetings also enabled cross-site comparisons so that interested parties could consider which options from the emerging menus might be appropriate for their own specific situation.

INTERCAFE has also identified and described key gaps in these options that occur at various scales in different areas. To do this, the INTERCAFE process was not simply descriptive, but was able to triangulate and confirm issues in different places through analysing the wide variety of stakeholders' perspectives and scientific information.

Part of identifying options and gaps involved challenging regular INTERCAFE participants - even local stakeholders in Case Studies and other meetings - to go beyond their customary world view to explore other perspectives. A key element of the process was to invite people in each place visited by INTERCAFE to offer their views to outsiders, and to encourage exchange of views with people outside their area.

Table 19.1 An emerging menu of conflict management options and examples identified during the Action's work and associated meetings and discussions with local stakeholders.

Options	Examples
Technical	• Keeping birds from fish e.g. refuges, nets, scaring • Cormorant control e.g. shooting, oiling eggs
Ecological/biological	• Working with fish sizes, seasons, behaviours • Roosting/feeding/breeding sites
Economic	• Markets, compensation, local subsidy, eco-tourism
Cultural/Social	• Using social networks for developing collaborative solutions • Building coalitions for supporting fish festivals • Advocacy for traditional production methods • Raising awareness of social and cultural dimensions
Policy	• Using derogations to Birds Directive • Developing local strategies that engage with EU and national policies • Developing and disseminating policy-relevant information
Capacity building	• Developing knowledge, skills and attitudes in support of individuals, groups, government authorities, and agencies

INTERCAFE's work has provided a significant contribution to enabling stakeholders to design conflict management processes that are relevant for their own particular context. Concerns remain, however, about how to 'bring it all together' in different places, and a number of gaps can be identified.

While specific to INTERCAFE and Cormorant-fisheries conflicts, this list covering six main areas is not unusual, in the author's experience, for other natural resources conflicts.

Leadership — It was possible to identify leaders in every Case Study and place that INTERCAFE visited. However, the absence of leadership in critical domains, or in key departments, agencies or organisations was commonly reported.

Commitment — A lack of commitment to work with others was sometimes evident in places INTERCAFE visited. This was not due to low energy or uncertainty, but had much more to do with low levels of willingness — especially a lack of political will to address Cormorant-fish issues.

Capacity — Weak capacity to design and engage with conflict management processes was a common finding and is probably one of the major areas that needs to be addressed in Cormorant-fisheries conflicts, as well as in natural resources conflict management in general. Among the concerns were lack of knowledge, skills and attitudes about how to work with others on conflict management, how to manage oneself, and how to manage change (see 18.6 for detailed information on many of these issues).

History — There was a strong feeling that people's approach to conflict in general was strongly patterned. As such, peoples' roles and responses were often rather predictable, a result (in part at least) of a habitual way of working captured in the phrase: *'this is the way we've always done things.'* Getting to grips with new situations and changing the way stakeholders think about and 'frame' conflict is not easy (see also Gray, in Lewicki *et al*, 2003 for a discussion of 'framing' in intractable environmental conflicts).

Policy coherence — There were many examples of poor policy coherence within and between countries (with or without federal arrangements) at different scales and across sectors.

Scale — It is not always clear what spatial and temporal scales to work with, or how best to integrate across scales. Working with a single Cormorant that could quickly destroy the population of a threatened fish species on a small stretch of river is different to working with dozens of birds that may cause little impact on a very large water body of open water, even over many months.

19.5 Managing a Conflict Management Process

Managing a conflict management process is about managing the







INTERCAFE meeting, Poland. Photos courtesy of **INTERCAFE**.

resources (time, people, money, space, energy, etc.) needed to accomplish goals — for instance, to 'understand the situation from different viewpoints,' or to 'reach an agreement.' One example would be managing a process of negotiations relating to Cormorant-fisheries conflicts between a local aquaculture businesses, local government and a national park. This process includes monitoring and lesson learning.

INTERCAFE has itself become a conflict management process, the aims of which are (i) to improve knowledge, (ii) inform policy, and (iii) deliver an information exchange system across Europe, from the local to the international scale.

A number of important contributions to managing conflict processes have been developed by INTERCAFE. Key among these is the support **INTERCAFE** has provided for stakeholders to recognise and describe different conflict management options. INTERCAFE meetings have been remarkably successful in opening up discussion in relation to conflict management processes already being used, including:

- Legal (e.g. use of derogations, relating national law with EU law)
- Lobbying and advocacy (e.g. of policy makers)
- Adversarial approaches (e.g. between different interest groups)
- Negotiated consensus building (e.g. fisheries action planning)
- Fiscal processes (e.g. compensation, grants)
- Scientific evaluation (e.g. underwater studies of birds and fish refuges)

It has proved helpful for some participants and Case Study stakeholders to see that different possibilities are available. Some approaches to managing a conflict may not be effective in certain circumstances (perhaps especially adversarial processes), and by the end of the Action many stakeholders were considering how collaborative approaches to conflict management might yield greater success than choosing one approach alone.

For example, a much wider exploration of legal mechanisms was made possible through the leadership of a participant who specialises in European law and environmental issues. Indeed, a number of participants brought to INTERCAFE their differing experience of managing scientific processes in natural resources conflicts.

It was equally clear that the same gaps apply to managing a conflict management process as they do to designing one (see above). Few participants felt they had the skills and knowledge to work with customary approaches to problem solving (or would even consider them) or negotiated consensus building. This may explain why scientific, adversarial and lobbying approaches tended to prevail and why legal and fiscal approaches were a more common subject for discussion than were consensus-based approaches.

INTERCAFE has taken these debates a long way forward, highlighting how stakeholders might understand, work with and contribute to scientific, legal and fiscal approaches to management, while also highlighting the distance that remains to be travelled for some conflicts to be amenable to negotiated consensus building.

19.6 Capacity Building

Building capacity for effective conflict management is perhaps one of the most challenging but necessary requirements for successfully addressing natural resources conflicts.

Capacity building can include a variety of training, including specific knowledge (e.g. legal issues, technical solutions, negotiation), skills (e.g. facilitation, inter-personal skills, technical skills, cross-sector and partnership working), and attitudes (e.g. a positive attitude toward working with others, a willingness to collaborate between disciplines, address shortcomings in political will). Non-training aspects of capacity building on the other hand may include the development of institutions, managing organisational change or building physical, natural or economic capital.

INTERCAFE's contribution to capacity building did not involve formal training but has still been far reaching, addressing knowledge, skills and attitude issues for participants and Case Study stakeholders, and signalling the importance of these things for wider stakeholder groups through reports and publications. Broadly, INTERCAFE has contributed to capacity building in three main areas.

- **Knowledge:** for example, through technical, policy and economic information, to understanding of conflict management processes, analytical tools, and social and natural science collaboration, to appreciation of law and legal frameworks, to the role of the media, and appreciation of the way institutions and people work.
- **Skills:** for example, the main skills built up and demonstrated by INTERCAFE included communication, information sharing, managing meetings, managing self, good practices in participatory processes, positive approaches to discussions.
- **Attitudes:** on a practical level, INTERCAFE participants developed an increasingly positive attitude toward cultivating awareness of others' views. This also involved developing open-mindedness, positive attitudes to (and increased respect for) sharing, working in an interdisciplinary environment, and recognising recurring themes around different values that people held (e.g. toward conflict, toward nature, toward loss of livelihoods, loss of Cormorants, predation on fish).

Of particular importance was the group's growing understanding of people responding to what they believe, not just what they know. This led to an increasing openness toward understanding the value of 'perceptions' as well as 'facts'.

Other added value that **INTERCAFE** has brought to debates around Cormorant-fisheries interactions is difficult to quantify. However, it does include some of the 'softer' aspects of natural

resources conflict management that many participants have taken back to their work, as well as the way they approach Cormorant-fisheries conflicts. Some of the value added includes:

- **Relationships** — improved relationships among people and groups who may have opposing views. This has been demonstrated by increased trust and rapport, improved communications (especially listening and comprehension skills between different groups), and the ability to respect and work with the perceptions of others.
- **Experience** — the meetings, Work Group and Case Study approaches were unique, high quality opportunities that created safe spaces for people to look at various experiences — *'sharing mine, learning about yours, developing ours.'*
- **Tools** — participants had many opportunities to practice and enhance their skills with several important tools vital to effective conflict management. These included a wide range of analytical, process development, inter-personal and partnership development tools.
- **Principles** — INTERCAFE coordinators have worked hard to ensure that certain underlying principles have been followed throughout. It has been an exemplary Action in a number of respects, successfully modelling key principles that are part of successful conflict management and successful programme management.

INTERCAFE participants have also shown increasing interest in working with certain other principles, including accepting open, clear, dialogue; active listening and asking high quality questions; and taking a positive approach to learning and change.

19.7 Gaps and Next Steps

Three areas have emerged as important for follow up work: economics, capacity building and networking.

Economics

As mentioned elsewhere (see chapter 17 and section 18.4), there is a need to know more about the economics of the systems with which **INTERCAFE** has been working. Depending on available resources and expertise, it would be useful to explore the economics of particular fisheries and/or fishery businesses and to try to incorporate (a) best estimates of the financial losses caused by Cormorants and (b) the cost-effectiveness of mitigation measures used to reduce these. However, such economic information applies not only to economic enterprises such as aquaculture, or to the costs of Cormorant control, but to broader economic issues. These could include issues around diversification, vertical integration (e.g. where processes and products are integrated within a single company), scale, and conservation (e.g. tourism or hunting aspects).

Also important is a need to better understand and quantify the economic drivers behind different stakeholders' behaviour. For example, this could include the different economic frameworks within which businesses, governments, the voluntary sector and communities operate.



INTERCAFE meeting, Hula Valley, Israel. Photo courtesy of **INTERCAFE**.

Capacity building

There are several important gaps in capacity, perhaps the most important of which is in the area of conflict management knowledge, skills and tools. Follow-up work would definitely benefit from, or even require, things such as:

- Institutional development,
- Building capacities for partnership work, and developing and using networks effectively, and
- Training in skills and tools for key individuals and organisations to guide facilitation, mediation, negotiation and problem-solving processes.

Whilst some of these elements were captured and developed within the **INTERCAFE** research network, there may well be a need now to build such capacity within other key individuals and organisations/institutions. The practical working-life of INTERCAFE was time-limited but it is clear that Cormorant-fisheries conflicts across Europe will continue to be a concern to many people. Thus, one of the more important issues in this context might be to try to build capacity in an area of conflict management within both the European Commission and key stakeholder institutions.

At the European scale, there does appear to be a continued need for:

1. An information exchange framework,
2. Continued measures to build understanding, respect and trust among stakeholder groups,
3. An international debate on issues such as Cormorant numbers, impact on fisheries and wild fish populations, the implementation of legislation and the use of derogations within the Wild Birds Directive, and
4. A means of problem solving, including facilitation and mediation.

These seem to be minimum requirements if progress is to be made in resolving some of the key Cormorant-fisheries issues in ways that meet different stakeholders' needs.

A Cormorant-fisheries conflict management network

Perhaps the single most important outcome of **INTERCAFE's** work has been the development of an effective network of people and agencies that have an interest in (and can assist with) Cormorant-fisheries conflicts. While not all individuals contributed equally, a large number of people involved in the Action are well placed to take things forward.

Creating the policy and practical support for this network to continue in some form is important. The ecological, political and economic contexts and knowledge base concerning the systems involved all are changing. An informed, interested network of collaborators (such as INTERCAFE has nurtured) can bring together a wide range of different interests in a mature conflict management process to identify possible needs and actions.

There are two additional major elements that could improve the network. The first would be to develop a range of links with policy makers and stakeholder groups at different levels within Europe and beyond. The goal would be to improve the pace and efficiency of policy-making processes so that local stakeholders could respond in good time, while also supporting policy development.

For example, a well-managed network of informed people could assess the impact of policy on the ground and provide policy relevant information to policy makers. This would help highlight ways in which good practice in Cormorant-fisheries conflict management can inform policy. The aim would be to build something more than a 'think tank' or 'policy advice committee.' It would be to develop a network of policy developers, and those who had to live with or implement the policy to exchange information, provide feedback to one another, and contribute to policy development more rapidly than at present.

The second would be improving links with international cormorant-fisheries conflict management contexts — comparisons between Europe and the USA/Canada on various aspects of practice, management and policy for instance. Starting this process might involve an international conference on cormorants and fisheries/wild fish populations to which U.S., European, African, South American and Asian delegates would be invited. It could have a scientific focus in part and also involve stories and experiences from the ground. The value of this would be to exchange information and design practical workshops to contribute to understanding of policy and practice that works in a variety of situations.

References

Carss, D N (editor). 2003. Reducing the conflict between Cormorants and fisheries on a pan-European scale, REDCAFE: Pan European Overview. Final Report to the European Commission, 169pp. http://www.intercafeproject.net/pdf/REDCAFEFINALREPORT.pdf

Carss, D N, and Marzano, M (editors). 2005. REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, 265 pp. www.intercafeproject.net/pdf/REDCAFESummaryandNationalOverview.pdf

Carss, D N, Bregnballe, T, Keller, T M, and van Eerden, M V. 2003. Reducing the conflict between Cormorants *Phalacrocorax carbo* and fisheries on a pan-European scale: REDCAFE opens for business. Vogelwelt 124, Suppl.: 299–307).

Deutsch, M, Coleman, P T, and Marcus, E C (editors). 2006. The Handbook of Conflict Resolution; theory and practice, Jossey-Bass, San Francisco, 929pp.

Gray, B. 2003. Framing of environmental disputes, Chapter 1 in Lewicki, R J, Gray, B, and Elliott, M (editors). Making Sense of Intractable Environmental Conflicts, Island Press, London.

Jones, S. 1998a. The tree with healing properties, p.14 in Footsteps No.36, Coping with Conflict, Tearfund, Middlesex. http://tilz.tearfund.org/en/resources/publications/footsteps/footsteps_31-40/footsteps_36/

Jones, S. 1998b. Involving outsiders, p.11 in Footsteps No.36, Coping with Conflict, Tearfund, Middlesex. http://tilz.tearfund.org/en/resources/publications/footsteps/footsteps_31-40/footsteps_36/

Jones, S, Young, J, and Watt, A D. 2005. Biodiversity conflict management, a report of the BIOFORM project. http://www.unibuc.ro/prof/risnoveanu_g/docs/res/2012sepBiodiversity_Conflict_Management_-_A_report_of_the_BIOFORUM_project.pdf

Jones, S. 2011. Conflict Management Training Manual, Mind the Gap Research and Training, www.mind-the-gap.net/mtg_pages/cm_manual.html

Nature Uganda (undated). Musambwa Islands Conservation Project, www.natureuganda.org/MusambwaIslands.php

Ramirez, R. 1999. Stakeholder analysis and conflict management. Chapter 5 in Daniel Buckles (editor) Cultivating Peace: Conflict and Collaboration in Natural Resource Management, International Development Research Centre, Ottawa.

UNESCO-MAB. 2008. Madrid Action Plan for Biosphere Reserves 2008–2013, United Nations Education Scientific and Cultural Organisation — Man and the Biosphere Programme, Paris.

van Dam, C, and Asbirk, S (editors). 1997. Cormorants and Human Interests. IKC natuur beheer, Wageningen.

Warner, M, and Jones, S. 1998. Assessing the need to manage conflict in community-based natural resource projects, Overseas Development Institute Natural Resources Perspectives Number 35, August 1998.

APPENDIX: WORK GROUP 3 MEMBERSHIP

The **INTERCAFE** Work Group 3 met and undertook work at each of the stakeholder meetings and during the between-meeting periods. Over the four-year span of **INTERCAFE**, the participants listed below attended some or all of the Group's meetings and contributed greatly to them. **INTERCAFE** participants from other work Groups also made presenations and contributions to Work Group 3 meetings, but they are not named individually here.

Name	Affiliation & country
Mariella Marzano	(WG3 Chair) Centre for Ecology & Hydrology, Edinburgh, UK (now Forest Research, Edinburgh, UK)
David N Carss	(WG3 Vice-chair) Centre for Ecology & Hydrology, Edinburgh, UK
Michael Andersen	Danish Fishermen's Association, Copenhagen, Denmark
Sandra Bell	University of Durham, Durham, UK
Trude Borch	Norut Social Science, Tromsø, Norway
Jaroslav Boháč	University of South Bohemia, Ceske Budejovice, Czech Republic
Ilona Cheyne	University of Newcastle, Newcastle, UK
Susana França	University of Lisbon, Portugal
Miha Janc	Fisheries Association of Slovenia, Slovenia
Scott Jones	Mind the Gap Research and Training Ltd, Lichfield, UK
Nikolay Kissiov	Bulgarian Fisheries & Aquaculture Association, Plovdiv, Bulgaria
Renata Kpecka	Czech Environmental Inspectorate, Prague, Czech Republic
Simon Nemtzov	Israel Nature and Parks Authority (INPA), Israel
Rosemarie Parz-Gollner	Institute of Wildlife Biology & Game Management, BOKU, Vienna, Austria
Erik Peterssen	National Board of Fisheries, Sweden
Ana Afonso Polyviou	Ministry of Agriculture, Natural Resources and Environment Veterinary Services, Nicosia, Cyprus
Pekka Salmi	Finnish Game and Fisheries Research Institute, Finland
Ketil Skogen	Norwegian Institute for Nature Research (NINA), Unit for Human-Environment Studies, Norway
Faustas Stepukonis	Klaipeda University, Lithuania



COST — the acronym for European Cooperation in Science and Technology — is the oldest and widest European intergovernmental network for cooperation in research. Established by the Ministerial Conference in November 1971, **COST** is presently used by the scientific communities of 35 European countries to cooperate in common research projects supported by national funds.

The funds provided by **COST** — less than 1% of the total value of the project — support the **COST** cooperation networks (**COST** Actions) through which, with EUR 30 million per year, more than 30,000 European scientists are involved in research having a total value which exceeds EUR 2 billion per year. This is the financial worth of the European added value which **COST** achieves.

A 'bottom up approach' (the initiative of launching a **COST** Action comes from the European scientists themselves), 'à la carte participation' (only countries interested in the Action participate), 'equality of access' (participation is open also to the scientific communities of countries not belonging to the European Union) and 'flexible structure' (easy implementation and light management of the research initiatives) are the main characteristics of **COST**.

As a precursor of advanced, multidisciplinary research **COST** has a very important role for the realisation of the European Research Area (ERA) anticipating and complementing the activities of the Framework Programmes, constituting a 'bridge' towards the scientific communities of emerging countries, increasing the mobility of researchers across Europe and fostering the establishment of 'Networks of Excellence' in many key scientific domains such as: Biomedicine and Molecular Biosciences; Food and Agriculture; Forests, their Products and Services; Materials, Physical and Nanosciences; Chemistry and Molecular Sciences and Technologies; Earth System Science and Environmental Management; Information and Communication Technologies; Transport and Urban Development; Individuals, Societies, Cultures and Health. It covers basic and more applied research and also addresses issues of pre-normative nature or of societal importance.

Web: http://www.cost.esf.org



© COST Office, 2012

No permission to reproduce or utilise the contents of this book by any means is necessary, other than in the case of images, diagrams or other material from other copyright holders. In such cases, permission of the copyright holders is required. This book may be cited as Marzano, M, and Carss, D N. Essential Social, Cultural and Legal Perspectives on Cormorant-fisheries Conflicts. COST Action 635 Final Report IV, ISBN 978-1-906698-11-9

Legal notice by COST Office

Neither the **COST** Office nor any person acting on its behalf is responsible for the use which might be made of the information contained in this publication. The **COST** Office is not responsible for the external websites referred to in this publication.



ESF provides the COST Office through an EC contract



COST is supported by the EU RTD Framework programme

Published by: NERC Centre for Ecology & Hydrology on behalf of COST





Short Title: COST Action 635 Final Report IV

Year of Publication: 2012

ISBN 978-1-906698-11-9



www.intercafeproject.net