

Enabling better decision making

CEH's water resource management knowledge and skills complement our wider science portfolio. Our expertise in information collection, analysis, modelling and forecasting allows us to provide scientific analysis, knowledge exchange, training and decision support systems and tools in many areas of freshwater management. In conjunction with the water resources services outlined in this brochure, we are able to offer services in:

- Hydrometeorological observation systems, including: design and operation of monitoring systems, development and review of large-scale observation networks, hydrological data and information management
- Flood risk management, including: real-time flow forecasting, flood monitoring, forecasting and warning services, flood risk estimation and reservoir safety assessments
- Surface-groundwater interactions: working with our sister organisation, the British Geological Survey (BGS), we are able to provide whole catchment system solutions.

Delivery of CEH's support

CEH can offer capacity development in water resources to suit customer needs, including:

- In-country assessments of stakeholder needs and current systems
- Multi-disciplinary stakeholder engagement and mediation
- Development of tailored water management processes, guidelines and manuals
- Development, installation and customisation of decision support tools and software
- Tools and warning systems to deliver hydrometeorological information to end users
- Model development and training
- Research project design and management
- Management advice and policy guidelines
- PhD supervision / university / private sector training partnerships
- Staff placements and exchange visits
- Design and delivery of field- and classroom-based training courses.

CEH project: Working in East Africa for the Lake Victoria Basin Commission and with the governments of the five riparian states, a CEH-led team developed a new water release and abstraction policy for the Lake Victoria basin.



Lake Victoria, Uganda

Contact

Science Area Lead
Water Resources

Gwyn Rees

hgrees@ceh.ac.uk

Business Development Manager

Neil Runnalls

nrr@ceh.ac.uk



**Centre for
Ecology & Hydrology**

NATURAL ENVIRONMENT RESEARCH COUNCIL

INTERNATIONAL WATER RESOURCES SERVICES

Support for sustainable freshwater management in river basins around the world

The Centre for Ecology & Hydrology (CEH) is the UK's Centre of Excellence for integrated research in terrestrial and freshwater ecosystems and their interaction with the atmosphere.

CEH offers expertise and tools in water resources management and research to support governments, water suppliers, environmental regulators and scientists.

Our solutions aid management decisions and water resource allocation, helping ensure water, food and energy security.

CEH key competencies

CEH offers catchment- to continental-scale solutions including:

- Assessments of current and future water availability
- Evidence to inform the design and operation of water resource systems
- Advice on monitoring and management of water quality and pollution
- Environmental flow assessments and ecological report cards
- Agricultural water management
- Guidance for lake, reservoir and wetland management
- Management of drought risk
- Knowledge transfer, staff training and capacity building.

CEH experience

CEH's unique ability to integrate multi-disciplinary scientific capabilities allows us to provide a wide range of flexible solutions to address key water management issues. As the Centre of Excellence for freshwater science, our hydrological modelling capabilities allow us to understand the current and projected future state of freshwater systems and the impacts of changes in climate and land-use, population and economic development.

We provide evidence and decision support tools to underpin Integrated Water Resource Management approaches at local, national, regional and global scales, including support for transboundary river basin management.

CEH has a long history of supporting governments around the world to develop and operate water resources systems. For over 50 years, CEH (and its predecessor the Institute of Hydrology) has worked in scientific and capacity building partnerships, including those under the UNESCO International Hydrological Programme and World Meteorological Organization (WMO) Hydrology and Water Resources Programme.

We have successfully delivered large multi-disciplinary projects for governments and agencies across the world. Our clients have included: the World Bank Group, European Union, UK Department for International Development, WMO, UNESCO, the Food and Agriculture Organization of the United Nations and NGOs.



Buriganga River, Dhaka, Bangladesh

Assessment of current and future water availability

By combining our hydrometeorological monitoring capabilities with considerable scientific expertise in multi-scale hydrological analysis, modelling and interpretation, we deliver information and solutions to a wide range of user communities, through:

- Quantification of past and present states of water resources from local to global scales
- Forecasts and analysis of future water pressures, demands and availability
- Decision-support tools for robust environment change impact assessment and testing of adaptation strategies and mitigation measures
- Studies of the variability of soil moisture at different scales
- Seasonal river flow forecasts
- Development and application of hydrological models for flow estimation in ungauged catchments.

Water resources management systems

CEH is experienced in delivering science and decision support tools that underpin effective management of water resource systems. Our services are used to inform operational and regulatory decisions in areas that include:

- Management of artificially influenced river flow regimes, including the design and review of abstraction and water release policies
- Development of regulatory guidance, river basin management plans and water allocation policies
- Assessments of hydropower potential
- Assessments of crop water demand and water saving technologies/strategies for irrigation systems
- Water stress indicators to aid water resources management
- Strategic environmental assessments.

Water quality and pollution science

CEH can provide a range of services designed to assess and reduce the risks associated with water quality and pollution. These solutions include:

- Water quality modelling in rivers and lakes, including estimates of pollution loads and sources apportionment
- Prediction of the impacts of pollutants on aquatic organisms, ecosystems and human health
- Environment Quality Standards and discharge consents
- Water quality and biological monitoring programmes to assess ecological status and compliance
- Modelling and field based estimation of suspended sediment and associated nutrient flux, transport and loss
- Studies of urban pollution and stormwater runoff.

CEH project: CEH investigated water use efficiency of different crop types as part of Water4Crops, one of the largest EU-India collaborative projects exploring biotechnological waste water treatments and reuse in agronomical systems.



Ecohydrology

CEH offers unique expertise in the analysis of freshwater ecosystems. We develop and review water management strategies to minimise detrimental effects on ecosystems. Our services include:

- Environmental flow design and impact assessment
- Instream habitat assessment and simulation modelling
- Development of biological indicators of ecosystem status and analysis of ecosystem recovery
- Design and operation of manipulation experiments
- Characterisation of suspended and deposited sediment quantity and quality dynamics to inform target setting and development of ecological indicators
- Hydrogeomorphological studies.

Management of lakes, reservoirs and wetlands

CEH science is used to underpin the effective management of lakes, reservoirs and wetlands ensuring a catchment-wide approach to integrated water resources management. We offer expertise in:

- Wetland management, use and restoration
- Analysis of catchment nutrient budgets
- Review of reservoir operating policies to satisfy the demands of different water services
- Lake water balance and quality assessments
- Decision-support tools for lake management and restoration
- Monitoring, management and modelling of harmful algal blooms.

Drought risk management

Our understanding of drought risk allows us to develop management strategies to support Disaster Risk Reduction. Our science can provide solutions in areas such as:

- Drought and water scarcity risk assessment, including improved understanding of drought development and controls on drought risk
- Low flow prediction and forecasting
- Development of metrics and visualisation tools for drought situation assessments
- Prediction and monitoring of the environmental and socio-economic impacts of drought
- Drought mitigation and adaptation strategies
- Advice on managing water resources during drought periods.

CEH tool: CEH's Global Water AVailability Assessment (GWAVA) model has been used throughout the world to understand the impacts of changes in climate, population and land use on catchment hydrology and water demand.

