DISCUSSION POINTS

These discussion points were raised during the LTLS Stakeholders Meeting at Lancaster (April 2014). They have been organised approximately by topic area, but neither prioritised nor attributed to any individual.

Agriculture

- Soil carbon storage – not only the amount but also its turnover rate
- How to reduce impact of agricultural runoff on water bodies
- How can we allow an increase in agricultural activity, needed for Food Security, while maintaining or reducing environmental impact
- Need to understand baseline conditions, and get the LTLS models to show how nutrients flow in the landscape.
- Model how change in agricultural practice can improve ecological and/or chemical status of water bodies
- Desirable to capture socio-economic impact, and drivers of farming practice
- How policy can impact Ecosystem Services - flows, biodiversity, greenhouse gases
- How do these things work across scales? How aggregating across scales impacts quality of water bodies
- How this impacts on the Water Framework Directive
- Think about effects of temperature, issues of time lags in Global Warming, ecological timelags
- Models can be integrated to deliver more than just Water Quality (WQ) - explore how WQ impacts other components
- Impact mitigation measure at national scale – Farmscoper project
- The LTLS Integrated Model will be useful for baseline scenarios across different compartments
- How do we incorporate scenarios for designing new processes? Are processes captured to address policy direction?
- Buffer strips around streams are at too small a scale for LTLS - cover crops may be easier to deal with
- The UK is currently 62% self-sufficient in agriculture – NFU policy to sustainably grow that percentage
- Green food project - we need a more competitive resilient farm economy, to meet demand for more food
- 2011 Foresight - need to increase food production but without being detrimental to the environment
- Sustainable intensification = better efficiencies and achieving the same or better output - encourage the poor performers to improve practice and clean up
- Science innovations, policy and regulation needed for global intensification
- We should look back in time – in 1980s fertiliser use declined, number of livestock has declined, pesticide use has declined – have we seen a response in the ecology yet?
- Need to be better at recycling products to land

- The uplands are about Ecosystem Services, not necessarily productivity, require support to deliver these functions

Atmospheric inputs

- Significant anthropogenic N deposition has been occurring for centuries
- Fuel combustion has peaked and emissions decreased but no significant evidence of N deposition effects on waters (conclusion from Critical Loads Dynamic Modelling project). Will we see effects on waters in the future?
- Further control measures (of N and other emissions) are at least partly driven by better understanding of potential benefit and risk of control
- What has happened to the atmospherically-deposited N?
- Emissions trends – NH_y has not changed so much, NO_x has decreased and will decrease further to 2030
- Ecosystems at risk of N effects (eutrophication effects on biodiversity) - in 2009-11 CritIcal Loads are exceeded in 68% of habitats (85% of SAC and SSSI). Future trends to 2030 suggest 44% still exceeding, and with Commission AQ package still 38%.
- Benefits of LTLS will be a better understanding of N behaviour to get beyond Critical Loads as a statement of risk of nitrogen to ecology
- CAP reform may alter control measures for NH3 from agriculture
- There are air quality emission ceiling targets for 2020

Carbon

- Soil carbon storage – not only the amount but also its turnover rate
- Implications for peatland restoration following forestry – carbon & nitrogen cycling, greenhouse gas balance, water quality and quantity, biodiversity
- How much of land conifer could be restored to peatland? If you remove forest, where does water go?
- Conservation of peatlands
- Afforestation impacts and benefits to soils and water, GHG
- Are soil and forest carbon stocks being increased as a result of fertilisation by atmospherically-deposited nitrogen?

Dissolved organic carbon (DOC)

- Why are we seeing increases in DOC (~ colour) in water used for supply (e.g. Yorkshire)?
- Cost of DOC treatment is high, and prediction through modelling would help planning

- Land management had big effect on colour; grouse moor burning, gripping. But remedial action may not have sufficient ameliorative impact on water quality.
- How will peatlands respond to climate change? Some climate change projections indicate there could be significant risk to the existence of the Peat uplands. This would dramatically increase complexity and cost of treatment or force companies to consider radical changes to where they source water from, both involving significant infra and non infra capital spend.
- DOC increases appear to be linked to recovery from acidification, due to increased solubility.

Erosion

- Do grouse affect erosion?
- Is wind erosion significant, e.g. in the Fens?
- Forestry practice can cause erosion
- Farm drains may transfer soil to water courses

Freshwaters

- Algal problems for taste and odour in supply reservoirs
- Conservation – importance of freshwater biodiversity of upland sites (Natura 2000, SSSI)
- Compliance with the Water Framework Directive is important, but does not override other drivers for freshwater such as the Habitats Directive
- There is an evidence gap in the effects of nitrogen on eutrophic or mesotrophic waters. If you get site specific target how can that link into N deposition?
- Atmospheric loads of N are not currently factored into WFD actions/targets
- Organic P in water, effects on freshwater biodiversity
- Past total phosphorus loads may have been quite high, so current targets may be challenging to meet
- Revised P standards site specific, hindcasted P is required.
- What are the most effective farming measures? - LTLS IM not at the right scale to judge
- Adapting to climate change – how will increasing river temperatures affect processes (earlier algal blooms etc)? How will rivers respond to storms and drought?
- Long term record of nitrate in the River Thames (Howden & colleagues) – likely impossible to return even to 2mg L^{-1} as a reference condition (late 19^{th} century value)
- 58% of land in England is in a Nitrate Vulnerable Zone.

Woodlands

- [Also see presentation by Elena Vanguelova]

- Woodland cover will increase (but no new planting on peat), GHG benefits, help in reducing risk of flooding, woodland opportunity mapping for water benefits (under the English Woodland Grant Schemes), reduce diffuse pollution
- What are the implications of afforestation and reforestation on organo-mineral soils? – link to greenhouse gas mitigation potential
- Implication of heath land restoration for N, C and P release from forest floor in dry areas under high N loading by agriculture and farming,
- Environmental sustainability implications in renewable energy from forestry – impacts and benefits on soil carbon, nutrients, water, GHG mitigation potential
- Potential impacts on soil nutrients and carbon release resulting from disease outbreak control fellings
- Long term studies and spatial datasets by Forest Research are highly relevant to LTLS modelling

Economic circumstances

We explored how emerging driving forces could contribute to different socio-political and economic conditions in the future by using the UK National Ecosystem Assessment framework as a basis for discussion.

Timescales

- 2015 for achieving Environmental Objectives under the WFD
- 2020 Aichi biodiversity targets
- 2021 Scottish Water delivery target based on Business Plan
- 2021 Next WFD target for achieving GES (where extended deadline used)
- 2027 Next WFD target for achieving GES (where extended deadline used)
- 2030 Air quality emission targets
- 2030 UKWIRP target for integrated solutions in water security and sustainability
- 2050 Woodland Expansion Advisory Group (Scotland)
- 2060 Climate change targets
- Water companies plan in 25 yr cycles (Infrastructures 50-60yrs)