iCASP Response to Environmental Audit Committee inquiry: Biodiversity and Ecosystems

September 2020

iCASP

1. Yorkshire Integrated Catchment Solutions Programme (iCASP) is a five-year (2017-2022) Natural Environment Research Council-funded partnership established to support the UK Industrial Strategy. iCASP aims to generate £50 million+ of benefits to Yorkshire's economy by influencing investments, informing policies and strategies, identifying cost savings, and creating new products and jobs. It will do this through projects that support the use of environmental science in catchment management. As well as regional impact, iCASP is aspiring for national and international influence through sharing the experience of regional projects at the national level, and by exporting catchment management expertise and products internationally.

2. iCASP partners are: University of Leeds, University of Sheffield, University of York, National Centre for Atmospheric Science, Arup, Bradford Metropolitan Borough Council, City of York Council, Dales to Vales River Network-Yorkshire Dales Rivers Trust, Environment Agency, IUCN UK Peatland Programme, JBA Trust, Leeds City Council, Linking Environment and Farming, Met Office, Natural England, National Farmers' Union, Pennine Prospects, Yorkshire Water, Yorkshire West Local Nature Partnership, and Yorkshire Wildlife Trust. iCASP also works with a range of additional organisations through its projects.

3. iCASP is based out of water@leeds at the University of Leeds, one of the largest interdisciplinary centres for water research in any university in the world.

4. This response is from the iCASP Programme Office based at the University of Leeds, rather than on behalf of the iCASP partners, many of whom will be making their own submissions to this inquiry. The Office have compiled the views of the following experts Prof Guy Ziv, Dr Arjan Gosal, Prof Mark Reed, Dr Janet Richardson and Prof Joe Holden.

5. Further information about iCASP can be found on the iCASP website

Response to Inquiry

The state of biodiversity:

Where should the four nations prioritise resources to tackle biodiversity loss?

6. Each of the four nations have already committed to provide significant investment in peatland restoration, in line with recommendations from the Committee on Climate Change's Land Use report (2020). Given the win-wins for biodiversity and climate change, this should remain a core priority.

7. It is worth noting that there are currently 444 designated sites (EU and Ramsar) in the UK with at least one peatland habitat present, however many peatland habitats remain undesignated (Lindsay & Clough, 2017). Given peatlands form the UK's largest extent of semi-natural habitat, they have a particular role in conserving species. Some of these species are rare and/or declining and are priorities for conservation action. For bogs (rainfed peatlands), the vegetation can be akin to that found in boreal latitudes supporting particularly distinctive biodiversity, with vegetation dominated by Sphagnum mosses and low shrubs supporting species of open ground. The acidic, low-nutrient nature of most peatlands has led many of the plant species permanently associated with them to adapt and develop distinctive features, e.g. the digestion of insects by the carnivorous round-leaved sundew, Drosera rotundifolia (Minayeva, Bragg, & Sirin, 2016). Many 'peatland' birds and mammals are typically associated with particular seasons, such as breeding season or during migration. Peatland invertebrates can act as an important food source, such as tipulids (craneflies) for breeding golden plover (Pluvialis apricaria) and red grouse (Lagopus lagopus scoticus) chicks. Fen peatlands have developed under a wide range of wet conditions in all parts of the UK, from low-nutrient, acidic and bog-like through to high nutrient and base-rich. Consequently, a large number of species are associated with them. Some of these are now geographically restricted and rare, for example the swallowtail butterfly (Papilio machaon) which feeds on milk parsley (Thyselium palustre) and is restricted to the Broads. Large fen complexes now provide the only habitat for many threatened bird species including common crane (Grus grus) and the rare spotted crake (Porzana porzana).

Evaluating measures to conserve and enhance biodiversity:

How should the Environmental Land Management scheme maintain and improve biodiversity? What role might alternative land use play in delivering improvements to biodiversity under the ELM scheme?

8. It is essential that ELM options are prioritised on the basis of robust evidence that they will give rise to public goods. The iCASP and Resilient Dairy Landscapes project conducted a Rapid Evidence Synthesis of 13 popular options currently in agri-environment schemes, and found that there was robust evidence for only six options leading to soil health related public goods outcomes. Although biodiversity outcomes of schemes are among the best studied in Europe, meta-analysis and other forms of evidence synthesis show that there is weak or mixed evidence for biodiversity outcomes from many scheme options.

9. For example, a systematic map of evidence for agri-environment scheme options in temperate Europe identified 743 studies showing the effects of interventions to increase farmland biodiversity. It included organic, conventional and integrated systems and a wide range of interventions, from reduction in tillage and protection of field margins, to different types of grazing systems and hedgerows (Randall & James, 2012). The review found there to be a lack of evidence across all interventions about effects on amphibians and reptiles. This is a concern that has been voiced previously (by ADAS, 2004). Furthermore, there was a bias towards evidence from Western European countries, in particular the UK. There was also limited published evidence about the effects of certain scheme options, such as under sown cereals and cereal based whole crop silage on biodiversity, and there were too few published studies to draw conclusive findings about the effects of scheme options in different farming systems (e.g. organic versus conventional). Similarly, Benedetti (2017) conducted a systematic review that identified 90 studies from Western European countries and noted that just 1% considered effects of interventions on amphibians, arachnids, bryophytes, lichens and reptiles.

10. There is an urgent need to understand the nature and strength of evidence across the full range of publicly funded agri-environmental scheme options. In addition to peer-reviewed literature, there is a large amount of data available in grey literature produced by Government agencies, which could be included in future synthesis work. This would of course be subject to quality control inclusion criteria. There is then a need to commission targeted new empirical research and on-farm trials, based on evidence gaps identified in the literature reviews, to evaluate the public goods arising from interventions for which there is weak or mixed evidence. Given the inherent heterogeneity of agroecological systems, systematic collection of contextual data (e.g. soil type, altitude, slope and land use cover, management and history) is essential to enable the interpretation of conflicting results from different studies.

11. There is a unique opportunity to re-evaluate existing options and as a result of this prioritise funding towards interventions that are more likely to deliver public goods. There are a number of ways this might be achieved:

    a. Given the focus of post-Brexit agricultural policy across the UK on public money for public goods, it is logical that priority should be given to interventions for which there is an evidential link to the provision of public goods. Given the time taken for empirical research, field trials and subsequent evidence synthesis, the inclusion of scheme options would need to be flexible so new options could be added when sufficiently robust new data enables conclusions to be drawn via evidence synthesis. If evidence synthesis is not possible due to insufficient evidence, or if synthesis continues to show limited or mixed evidence, then interventions would remain on hold pending sufficient further evidence to enable synthesis work to be done to evaluate the evidence-base as a whole.

    b. Options with a limited or mixed evidence-base could be included in schemes, but with additional funding for data collection by land managers to build a more robust future evidence-base. Although this may be limited to indicators and proxies in some cases, there is evidence that citizen science approaches can provide robust insights for policy and practice.

This is especially the case when complemented by more localised hypothesis-driven research (Dickinson et al., 2010) and Payment By Results schemes (e.g. Allen et al., 2014). Natural England's recent trial (Chaplin et al., 2019) showed that farmers are able to collect relatively sophisticated monitoring data.

c. Funding could be prioritised towards scheme options with the best evidence for delivering public goods via an 'evidence-based premium' for the options we know are most likely to deliver multiple public goods. This would enable farmers to continue to choose from a wider range of scheme options relevant to their farm characteristics and management objectives. However, given the weak or mixed evidence for these options, they would receive a lower payment rate in order to reduce uptake and reduce taxpayer exposure to risks of non-delivery of public goods. It is possible that this could be one consideration in the setting of different payment tiers as is currently proposed for ELMS.

d. Alternatively, risk of non-delivery could be reduced across the scheme by giving farmers flexibility to adapt or discontinue interventions that are not delivering outcomes. For example, interventions designed to enhance water quality were sometimes reducing a target pollutant while increasing inputs of other pollutants, and if not maintained over time these interventions could lose efficacy or in some cases become a source of pollution themselves. The heterogeneity of conditions from field-to-field can also lead to highly variable results across a land holding. However, if farmers are collecting monitoring data, then this could be used to adapt intervention delivery, if sufficient flexibility were designed into the scheme. Alternatively, codes of good practices could be made part of future schemes to drive more effective implementation of interventions. The recent Defra Code of Good Agricultural Practice (COGAP) for reducing ammonia emissions provides simple, evidence-based ways to reduce NH3 emissions from agriculture.

12. In parallel with this, it is important that more funding is made available for evidence syntheses to be carried out by the research community, which would cover a targeted range of interventions/options that farmers are likely to take up, as well as assess the ability of these interventions/options to deliver multiple public goods. In the same way that our synthesis work identified evidence gaps, we would expect this to provide a more comprehensive assessment of key research needs, which could be targeted in future research funding calls. However, just generating more evidence will not be sufficient. How that evidence is generated and reported is also important if the data from future research is to be included in evidence synthesis and in turn provide robust evidence for policy and practice.

13. iCASP's Payment for Outcomes project with the National Trust and Yorkshire Dales National Park Authority highlighted a problem in paying for 'land' interventions – for examples trees which help with biodiversity. These are interventions which may have their main outcomes some way in the future, possibly even 100 years from now; this raised the question of how to pay for something with its main outcomes far ahead in the future?

Co-ordination of UK environmental policy:

How can policy be better integrated to address biodiversity, climate change and sustainable development?

14. Alongside public funding for biodiversity and conservation, Government has supported the development of national carbon markets (the Woodland Carbon Code and the Peatland Code), and there are a range of regional ecosystem markets (e.g. Landscape Enterprise Networks), which all help deliver biodiversity outcomes. However, there is evidence from the Woodland Carbon Guarantee in England and Peatland Action in Scotland that high levels of public funding can outcompete private investment, reducing the overall investment in biodiversity that might be available. It will be important to co-ordinate the design of future UK environmental policy with existing private ecosystem markets to ensure public money is used to leverage rather than out-compete private funding. We have analysed five different options for integrating public and private investment in biodiversity conservation, with one of these options, using private funding to "trigger" public investment being considered in the design of schemes under the Nature for Climate Fund. For more information, see the two reports at the bottom of the IUCN Natural Capital webpage.

Economics and biodiversity:

What are the possible approaches to balancing economic growth and conservation of nature and its contributions? Is there evidence these approaches work and can be implemented?

15. Private investment in natural capital alongside public funding can pay landowners more than the current public model, with the potential for profits to be reinvested in rural communities. We have reviewed evidence that this can work and be implemented, considering the most promising regional ecosystem markets that are already providing investment to rural communities for natural capital, in Gosal et al 2020.

Pairing nature-based solutions to climate change with biodiversity:

Which nature-based solutions are most effective in achieving both climate and biodiversity goals?

16. Nature-based solutions provide a diverse range of different benefits that meet current goals, however solutions work differently depending upon how and where they are deployed so cannot be easily quantified in this way – an example is tree planting which provides both carbon capture and storage and a more diverse habitat to support biodiversity, however in the wrong location tree planting can cause release of carbon from soils and can reduce the biodiversity on a site.

17. Policy needs to be integrated to recognise the multiple benefits that nature-based solutions and environmental management schemes can deliver to tackle the growing range of problems we

currently face. Landscape-scale thinking is critical in terms of delivering multiple benefits and implementing measures that tackle more than just climate and biodiversity goals.

18. iCASP is currently working on several Natural Flood Management (NFM) projects in the Yorkshire region. While a key aim of the projects is to develop robust monitoring processes to measure the impact NFM installations have, the projects look more widely at how an integrated approach can yield multiple benefits. For example, NFM measures are being deployed to help tackle flood risk, however they routinely deliver wider benefits than just the target flood alleviation: improved water quality, greater habitat connectivity, carbon sequestration and, related to this inquiry, improved biodiversity.

19. Peatland restoration is a particularly effective way of achieving both climate and biodiversity goals, given the cost-effectiveness of climate mitigation from peatland restoration, as assessed in the Committee on Climate Change's recent Land Use report, and the international significance of the biodiversity found in these habitats, which could be protected and enhanced via restoration.

20. Our Optimal Peatland Restoration project, for example, supports climate and biodiversity goals by providing peatland practitioners with a tool we have developed to measure and optimise ecosystem service delivery, assess how this will change with climate change and to help them develop robust business cases to secure funding for peatland restoration. Evidence shows that sediment release from bare peat has negative impacts upon peatland stream ecosystem biodiversity (Aspray et al 2017; Brown et al 2019) and damaged peatlands act as a source of carbon, emitting an estimated 4% of the UK's annual greenhouse gas emissions. Natural or restored peatlands provide multiple ecosystem services including acting as a carbon sink and as a biodiverse habitat. With just 20% of UK peatlands remaining in a near natural state there is massive potential to restore those that are damaged to address their carbon emissions and boost their aquatic and terrestrial biodiversity. Figure 1 shows an artist's representation of peatlands in different ecological conditions and some of the associated benefits that a peatland in good ecological condition can deliver; note that only in good ecological condition does peatland act as a carbon sink rather than source.

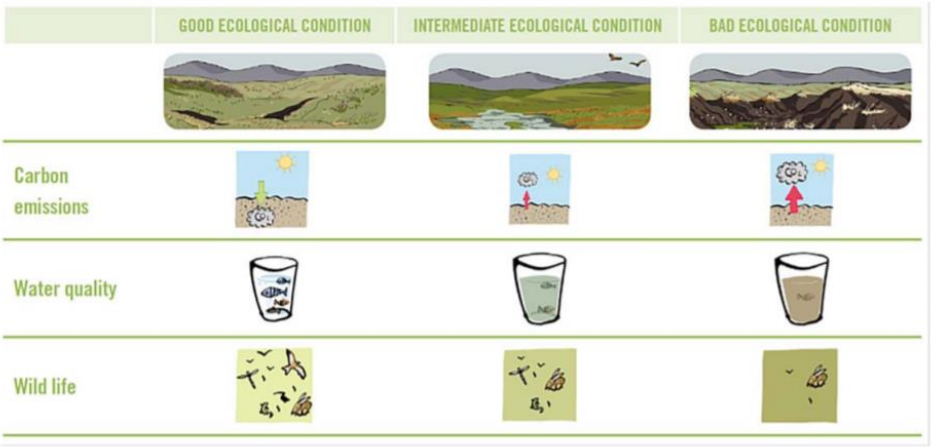

Figure 1: Peatland ecological conditions and the associated ecosystem services impacts. (Martin-Ortega et al 2017)

21. iCASP also contributes to the NERC Peatland project PROTECT-NFM which looks at gully blocking and revegetation to slow flow and provide NFM benefit. This connects with our earlier NERC work which has shown that these activities also enhance aquatic biodiversity through peatland pool creation and improved stream water quality (Brown et al 2016, Beadle 2015).

22. Our Don Catchment project produced Opportunity Maps to allow better decision-making about land management; this facilitates the planting of new trees – as a nature based solution to address flood risk which also provides carbon capture and storage, but also to improve habitat connectivity across the landscape which has beneficial impacts for biodiversity

How can funding be mobilised to support effective nature-based solutions to climate change? How can the private sector be encouraged to contribute to funding?

23. Environmental restoration and conservation challenges go beyond what can be financed publicly. Public-private financing of natural capital improvement presents an opportunity to increase the availability of funding. Public-private partnerships for the financing of ecosystem services is in its infancy in the UK (Gosal et al. 2020). Though there are several issues that exist, 'Additionality' presents a concern, with potential for private investment to stall if it is not possible to demonstrate (through evidence) that interventions would not happen without it (Gosal et al. 2020). New initiatives need to supply more evidence on achieving additionality, perhaps adopting similar additionality tests to that used by the Woodland Carbon Code and Peatland Code schemes (Gosal et al. 2020). Organisational structures that ensure transparency and reduce the potential for power asymmetries are important for successful implementation (Gosal et al. 2020). Explicit integration and consideration of the wider social distribution of ecosystem services in public-private partnership schemes has been found to be low and there is limited evidence that the ventures are actively considering the wider social distribution of the ecosystems services or defining wider beneficiaries of the public goods that they deliver (Gosal et al. 2020). Public-private partnership have been found to be mindful that binding legal arrangements (e.g. environmental covenants) can be a barrier to participation but recognised that contracts needed to be both robust and flexible, particularly in the case of long-term landscape interventions where suppliers and/or the interventions may change over time (Gosal et al. 2020).

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