



**Defra:
Evidence Investment Strategy**

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From the Science Director

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By email

Dear Bob

DEFRA'S EVIDENCE INVESTMENT STRATEGY (EIS)

Many thanks for inviting us to comment on the development of the next *Defra Evidence Investment Strategy*; we look forward to contributing to this process through both this response and future events and opportunities.

We welcome Defra's Big Challenges and the continued move towards interlinking policy and research disciplines under the umbrella of an ecosystem approach. We believe that understanding how the key drivers of environmental change impact upon ecosystems and the goods and service that they provide is crucial, and that this requires the collection of an appropriate range of environmental data and effective knowledge exchange approaches. In particular, we believe that these activities should be informed by policy needs, in the context of both immediate and future societal needs, and that they should generate evidence that is suitable for the development of effective policies and actions. At the heart of this way of thinking remains the fundamental need to understand the role that biodiversity plays in creating and maintaining our environment and thus providing the goods and services on which we depend.

Key Evidence and Innovation Priorities

1. Maintenance of a suitable range of high quality **long-term environmental observation programmes** to allow research on ecosystem processes and services, status and change. The data derived from long-term observation programmes have proven, and will continue, to be essential for detecting and understanding ecosystem change, especially in relation to understanding goods and services. Evidence from observations programmes, alongside that from research, is fundamental to meeting all of the Big Challenges that you have already identified. The UK Environment Observation Framework (EOF) will make a significant contribution to ensuring that the most suitable long-term data are being collected, either directly through government initiatives or in partnership through citizen science and non-governmental

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The Joint Nature Conservation Committee (JNCC) is the statutory adviser to Government on UK and international nature conservation, on behalf of the Council for Nature Conservation and the Countryside, the Countryside Council for Wales, Natural England and Scottish Natural Heritage. Its work contributes to maintaining and enriching biological diversity, conserving geological features and sustaining natural systems.

organisations. There will be challenges ahead in maintaining and extending critical data series, and rationalising others, for which innovation and a clear understanding of requirements will be needed. Biodiversity surveillance will continue to be critical component of EOF.

2. Development of **novel methodologies for utilising earth observation and long-term environmental datasets** to improve our understanding of ecosystem status and functions and of how environmental change is being driven by a range of pressures, including climate change. Remote sensing of both terrestrial and marine ecosystems offers unprecedented opportunity to rapidly track, describe and forecast change, but equally presents a challenge in interpretation that requires innovative analytical tools. Beyond the science, an important challenge is our ability to make these new sources of evidence work well for us on the ground; there is a need to effectively support the global and local exchange of knowledge on practical uses.
3. **Innovation in the ways in which knowledge is obtained, communicated and used** to inform policy development at national and international levels is required. This requires a fuller understanding of the effectiveness of existing mechanisms and exploration of alternatives. This includes: the accessibility and re-use of data, models, and results; systematic reviews of evidence and assessments; as well as, the functioning of different elements of the science-policy interface.
4. Research that helps us to understand the **changes in ecosystems being driven by climate change** and that will generate knowledge on adaptation and mitigation possibilities, and provide appropriate testing of these possibilities and their potential environmental impacts. Whilst, the research should improve understanding of how ecosystem change will affect services such as water cycling, food production (from wild stocks and farmed systems), and influences on human and animal health, it should also address the aesthetic, spiritual and cultural services that ecosystems provide, including the intrinsic value of biodiversity. Practical solutions for adapting to change in order to secure the full range of services that ecosystems provide should be investigated, including in particular socio-economic and behavioural aspects.
5. Research on **marine biodiversity and ecosystems** requires a re-focusing of effort towards understanding of all components of the ecosystem, the full range of goods and services, and the impacts of all aspects of marine exploitation and management. This should include filling the gaps in understanding of distribution, status and trends of species and habitats. The role of marine ecosystems in influencing atmospheric chemistry requires further study, which will contribute to understanding climate change and both the adaptation challenges and opportunities that will arise from it. Effectiveness of different policy mechanisms and management approaches such as Marine Protected Areas need to be tested and assessed, including the regulatory framework, incentives, socio-economic and behavioural aspects.
6. **Invasive alien species** (non-native species) have serious economic and social impacts, in addition to threats to native biodiversity. Research that improves our understanding of impacts on ecosystem processes, and goods and services, is required, including urgently within the UK Overseas Territories. Research is also required on routes of introduction and vectors of spread, especially in light of potential climate

change effects, and modelling needed to help improve prediction of significant introduction events. The need for a better understanding of the ecology and ecosystem impacts of invasive alien species cuts across the three Big Challenges, with potential for significant impacts on water quality, food security, and the security of ecosystem goods and services more generally, all of which may be exacerbated by the effects of changing climate conditions. Lessons need to be learnt from effective and ineffective management responses.

7. **Pollution** remains a serious threat to ecosystem processes; both air pollution (nutrients, climate change and ground-level ozone) and novel materials (chemicals and nanomaterials). Research that improves our understanding of pollution effects on biodiversity, ecosystem processes, and goods and services, is needed, especially in the context of economic implications. Again, this cuts across all of the Big Challenges.
8. Much of the evidence mentioned above is focussed on ecosystem process and the goods and services provided by them, but without **better tools for valuing goods and services** we are struggling not only to achieve an ecosystem approach, but to be able to show society what this means for well being. Past experience suggests that we can expect significant new opportunities for technological innovation to develop out of a greater understanding of ecosystem services. Research that further develops micro and macro metrics of the benefits provided by biodiversity and related ecosystem services is still needed. In addition, the development of socio-economic risk assessments of significant change to ecosystems (crossing limits of ecosystem tolerance) is required; this remains one of the largest gaps in understanding and applying the ecosystem approach, and we need innovative research tackling real world examples at large scale. Multi-disciplinary research with fuller integration of social science, to complement ecosystem valuation, needs greater support and encouragement so that we can better understand the role of human behaviour in driving change.
9. Enhanced support for the full range of **evidence needed to aid the UK Overseas Territories and Crown Dependencies** achieve sustainable development goals, develop and apply understanding of ecosystem goods and services that have a significant impact on their economies, such as fisheries and tourism, and to meet their commitments to conserve biodiversity.
10. Research that specifically tests the **outcomes of changes in policy**, both environmental and other policies, is still lacking and hinders our ability to model scenarios around both policy change and subsequent societal behavioural change.

Working with others to achieve strategic aims

Our view is that Defra works well through a number of means to gain insights from a wide range of cross-sectoral stakeholders, both here in the UK and in Europe; we would encourage the Department to continue to support those mechanisms that are essential for applying an ecosystem approach and achieving cross-sectoral involvement, supporting those that are most effective and redirecting efforts where objectives are not being made. The challenge of multi-disciplinary work is a particular area where new and innovative ways of seeking advice

and collaborating may be needed; there are several successful models on which to build, such as the Rural Economy and Land Use Programme.

Further steps should be taken to derive better benefit for Defra's policy objectives from investment in research and science infrastructure via the European Commission and in collaboration with other Member States. There are some good examples where Defra investment has secured significant added-value and provided direction to European projects, including the ERA-Net for biodiversity – Biodiversa. However, there are other areas where European investment is not closely aligned with UK priorities and benefits for the UK may be difficult to obtain.

Investment in the evidence base is of limited benefit to Defra unless that evidence is used effectively in policy development. This means that mechanisms need to be available, at the project, programme and cross-programme level within Defra, to translate research findings into policy applications, to draw in evidence from other sources and also to direct or influence research to address policy requirements. Similar activities are required involving other strategic partners and stakeholders at national, European and global levels to achieve wider transformational objectives. Investment is necessary to create, maintain and review these elements of the science-policy interface, including for example current proposals for establishment of an Intergovernmental Platform for Biodiversity and Ecosystem Services.

The Joint Nature Conservation Committee remains committed to working closely with Defra and the devolved administrations, through our statutory functions, to aid in defining and delivering evidence needs for biodiversity conservation as a contribution to broader environmental objectives.

Yours sincerely