



The one-hundred-and-second meeting of the Joint Nature Conservation Committee to be held at 0930 hours on 19 March 2015, at JNCC, Inverdee House, Baxter Street, Aberdeen, AB11 9QA

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Joint Nature Conservation Committee

Strategic evidence requirements for the living environment – a new vision

Paper by Paul Rose, Lawrence Way and Paul Robinson

1. Introduction

- 1.1. JNCC has a well-established role in coordinating long-term, UK-wide monitoring of terrestrial biodiversity, working in partnership with other organisations.
- 1.2. Monitoring data for the living environment are increasingly being used to meet a wider range of requirements than they have in the past, including more local issues, ecosystem services, natural capital, scenario modelling, predictive capabilities, environmental pressures, and services to other sectors such as development and health. There is also an increasing desire across governments to deliver evidence more efficiently through greater integration of requirements, more partnership working, more sharing of evidence, multiple use of evidence, and innovative use of new technologies.
- 1.3. There is an opportunity for JNCC, its partners and key stakeholders to offer solutions to these challenges. This paper provides a vision of how monitoring and the provision of evidence on the living environment might be delivered in a more strategic and efficient manner in future. The example of habitat mapping, including the future of Countryside Survey, is raised as an immediate and urgent opportunity to illustrate how this might be achieved in practice.
- 1.4. Marine monitoring is largely excluded from consideration in the paper but many of the principles apply equally to the marine environment.

2. JNCC's current role in terrestrial biodiversity monitoring

- 2.1. JNCC has a portfolio of long-term monitoring schemes for terrestrial biodiversity that it delivers through partnerships with the volunteer biological recording community. For more than 15 years, JNCC and its partners have refined and improved the monitoring schemes with the outcome that they are now highly acclaimed examples of some of the most efficient, high-quality monitoring of nature anywhere in the world.
- 2.2. JNCC's surveillance and monitoring programme budget in 2006/07 was £1,188k; in 2014/15 it is £1,133k. Despite this small drop in budget, delivery has increased substantially:
 - i. In 2007 the programme was able to monitor a range of breeding birds, wetland birds, some bats, and butterflies in higher quality habitat, and could provide population or distribution trend for around 200 species. In 2014 the programme monitors a wider range of breeding birds, wetland birds, more bats, butterflies at double the number of locations and in a way that is now representative of the countryside, and can provide population or distribution trend information for 3,000 species.
 - ii. In addition, the programme now supports a new plant surveillance scheme

which will contribute to understanding habitat condition, and has invested over the last three years in research to improve habitat monitoring by better application and analysis of remote-sensed data.

- iii. The increased scope and quality has been delivered whilst the staff costs of our partners have risen (the main cost in delivering the volunteer co-ordination needed).
 - iv. Efficiency savings to allow these improvements include statistical improvements, automation of statistical processing, on-line data entry, integrating co-ordination units, and on-line automated processing. For example, the UK butterfly monitoring scheme handled just under 1,000 sample locations in 2007 and now handles over 2,000 for the same co-ordinating cost; for the Wetland Birds Survey, online reporting has reduced the cost by 15% per annum.
- 2.3. The monitoring and recording supported by JNCC currently harnesses volunteer effort that at commercial rates would cost over £5 million per annum. This provides more than the essential minimum of evidence required but even the essential minimum would cost substantially more than the current cost and would be far less flexible to the accommodation of additional secondary use of the results.
- 2.4. Additional benefits of using volunteers are:
- i. far greater sample coverage than could be achieved by professionals, at far lower cost;
 - ii. ability to deploy lots of people simultaneously for short periods of the year;
 - iii. volunteers are based around the UK and sample locally (less need for extensive travelling);
 - iv. nationally organised local effort produces data that are directly useful for local decision making or provide the context for local decision making, in addition to contributing to national trends and analyses;
 - v. enhanced public enjoyment, valuing and knowledge of biodiversity, leading to increased desires and capacity to protect the natural environment;
 - vi. volunteers have often been shown to collect higher quality data than professionals.
- 2.5. UK and devolved governments use data from JNCC's terrestrial monitoring and surveillance programme for a wide range of purposes including:
- i. reporting and other statutory obligations;
 - ii. the production of biodiversity indicators;
 - iii. specific policy requirements for evidence such as impact assessments;
 - iv. invasive non-native species issues;

- v. site designation and casework;
 - vi. predictive modelling as undertaken to advise governments on the biodiversity impact of ash dieback (*Chalara*) spread.
- 2.6. The data are also used extensively by the research community, the private sector (industry and environmental consultants), NGOs and the volunteer recorders themselves.
- 2.7. Despite these successes, increasing constraints on JNCC resources have started to erode the scope of the work. The 2015/16 allocation for terrestrial biodiversity monitoring has been reduced, though care has been taken to protect volunteer-driven surveillance. Any further reductions in funding would make one or more of the component surveillance schemes no longer viable.

3. Identifying and dealing with strategic evidence requirements

- 3.1. There are many benefits that might arise from looking across evidence requirements and new techniques/technologies to identify where cross-cutting evidence delivery initiatives are worthwhile, and starting to plan and implement solutions. The aim would be to assess some major evidence requirements in a more integrated manner and to share much of the cost and utility of the solution across the organisations that will eventually benefit. The paper refers to this type of solution as “integrated evidence delivery”.
- 3.2. Integrated evidence delivery for the living environment would comprise the following roles:
- i. accommodating emerging evidence requirements for each country within the UK;
 - ii. maintaining an overview of new technologies;
 - iii. maintaining an overview of data and research;
 - iv. proposing and agreeing opportunities for integrated delivery;
 - v. brokering and establishing evidence delivery partnerships, including raising awareness of the benefits and potential savings;
 - vi. developing governance structures and implementation plans;
 - vii. leading UK-scale delivery when this is the preferred option.
- 3.3. Integrated evidence delivery would provide benefits to a partnership that is wider than the statutory nature conservation bodies. Drawing a line around something that is large enough to deliver significant efficiency savings, but small enough to be manageable, will be part of the service. Some obvious additional beneficiaries from integrated delivery of evidence for the living environment include the Ordnance Survey and its Northern Ireland equivalent, the agriculture sector, local government, the research community, and the public. Some of these beneficiaries would have resources to contribute to a shared service and many would have specific requirements. Others, such as the public, might be secondary beneficiaries by having access to what others have built.

- 3.4. The types of evidence requirement that are likely to benefit from integrated delivery would have one or more of the following characteristics:
- i. the scale of the solution is beyond all, or most, customers, e.g. as a result of cost, geography or expertise;
 - ii. the potential of the evidence to deliver savings or improvements to delivery (quality, quantity and scope) is large, under-exploited and/or poorly understood;
 - iii. specialist expertise is required that cannot (in the short term) be easily replicated and maintained in separate organisations;
 - iv. there are significant benefits from taking a consistent approach across organisations and/or geographical regions;
 - v. changes to practices and/or policy are needed to realise the benefits of more efficient evidence delivery;
 - vi. the approach is new and has an element of development or risk around it.
- 3.5. The long-term evidence issues that we would expect to solve include:
- i. relative prioritisation of drivers for evidence including balancing statutory requirements with strategic priorities;
 - ii. identifying UK-scale solutions when most of the planning and consideration is at country level;
 - iii. achieving increased collaboration across organisations that do not naturally work in partnership, i.e. inter-country, inter-sector and inter-disciplinary collaboration;
 - iv. providing access to evidence outside of the nature conservation partnership and at the most appropriate level of summary and interpretation;
 - v. making better use of unstructured biological recording (NBN and BRC).
- 3.6. Without doing much more work it is hard to substantiate the combined economic value of these benefits but for the remote sensing example it is probably in the order of £1 million per annum for the nature conservation community and over £10 million per annum for the statutory environmental sector.
- 3.7. Each country within the UK has processes for identifying and prioritising evidence requirements and some make recommendations regarding the scale of delivery (European, UK, country, local, etc). If handled carefully, there is no reason why evidence produced and funded at a UK scale cannot be delivered locally and support devolved policy implementation. UK-scale delivery has many potential advantages, including:

- i. economies of scale;
 - ii. ease of meeting European or global obligations;
 - iii. best use of scarce capabilities;
 - iv. a single point of contact for partners also working at a UK scale (industry, NGOs, etc);
 - v. no conflict of interest with operational or policy functions;
 - vi. JNCC already exists and is pre-designed to deliver shared services for nature conservation.
- 3.8. The future of Countryside Survey and use of remote sensing in the production of habitat maps is one example of a requirement that meets all of these characteristics and requires urgent action (see example in section 4). Other priorities include:
- i. a more structured and coordinated approach to citizen science, including standards, analytical tools, promotion and sharing of data;
 - ii. standards, tools and guidance for analysis and modelling of data on the living environment;
 - iii. application of data and evidence for the living environment to assess, map, and inform realisation of the benefits from ecosystem services and natural capital;
 - iv. marine evidence delivery;
 - v. efficient provision of access (data hubs) to evidence for the living environment and other sources of evidence that need to be integrated with the living environment (e.g. climate, geology, pressures, policy, socio-economic).
- 3.9. Without a more strategic, integrated solution to some evidence requirements, shrinking resources mean that we will inevitably produce less evidence, or lower quality evidence, that will lead to increased downstream costs. The remote-sensing example in section 4 illustrates this very well. The satellite data are available and many organisations are looking at how to use them, but with very little overview or coordination. If this continues, early and expensive stages of data summary and application will be duplicated at great unnecessary expense. These early stages only need to be undertaken once and shared in terms of costs and outputs.

4. The example of habitat mapping

- 4.1. Habitat maps are key for evaluating and managing biodiversity and are an important component of quantifying many types of ecosystem service, assessing natural capital, assessing flood risk, estimating nutrient loads in water, informing a multitude of processes around deciding and incentivising how land should be used, and much more. At present each separate requirement for a habitat map is attempting to build a map that best supports

a specific use, with very little coordination or join up. Solutions generally don't look to make use of other sources of data, are almost always insufficiently funded, and are dominated by field-based methods or visual interpretation of aerial photographs, both of which have a high cost per unit area compared to other methods.

- 4.2. JNCC has undertaken work to scope the future requirement for the Countryside Survey Land Cover Map¹, and has proposed a habitat map ("Living Map") as a generic shared product that would facilitate many secondary uses.
- 4.3. The availability of the Copernicus satellite data, free of charge, provides a huge opportunity to review a wide suite of evidence requirements and make savings and improvements to the way they are delivered. The first step is to deliver efficient access to the data through a data hub that meets hundreds, if not thousands, of user needs. Work on this aspect is ongoing. There still needs to be a decision on where this service is placed and who delivers it. Similar hubs will be required for soil data, biodiversity data, topographic data and so on to achieve maximal efficiency of use, or perhaps a single environmental data hub as proposed by CEH.
- 4.4. The second step after creating the access hub should be to create a single habitat map (Living Map) from which various specific requirements can be built. The methods for doing this have been developed and applied in Wales and then expanded by JNCC to successfully produce maps for Norfolk, the North York Moors and the Grampians. The Living Map uses automated processing to combine remote-sensed data with airborne data and targeted local/field validation of results. It is now in a position to roll out more widely to provide UK coverage of locally relevant maps but is likely to be beyond the budget of any individual customer.
- 4.5. The map would not provide all potential customer needs but would provide an extremely cost-effective foundation from which to build. For example, some priority habitats will be accurately mapped but for others locations will be predicted allowing fieldwork to be targeted much more efficiently than it could be without the Living Map. It would also be a relatively small step to move from the Living Map to detecting changes in habitat extent and even condition. Some of this could be undertaken remotely.
- 4.6. The cost of producing this type of Living Map is £30-£40 per square kilometre which is at least ten times cheaper than the most commonly used field methods and visual interpretation of photographs. To extend Welsh coverage to England, Scotland and Northern Ireland would cost approximately £10.4 million. This needs to be assessed against some of the current specific costs that could be substantially reduced. Most of these are hard to assess at the moment but some obvious savings are around the roughly decadal update of Countryside Survey Land Cover Map (£2 million), Rural Payments Agency's requirement for hedgerow maps (>£1 million) and visual air photograph interpretation to manage flood and coastal erosion in England (approximately £1 million pa).

¹ Countryside Survey is an audit of the UK's countryside that has been carried out at periodic intervals since 1978. The most recent Countryside Survey was in 2007. One of the outputs of the Countryside Survey is the Land Cover Map, a broad habitat map of the UK.

- 4.7. The Living Map would provide a series of objects representing parcels of land and an initial classification of those parcels. Some Annex I habitats² can be identified through the ecological rulebase approach but not all. The possible location of those that cannot be identified directly will be narrowed down by the mapping, thus enabling tighter targeting of more detailed approaches. An example of this is the manual interpretation of stereo colour infra-red images that SNH are utilising to map to Annex I habitats in the uplands. With the Living Map the deployment of this more detailed approach can be prioritised and targeted to ensure that it is cost-effective and has maximum impact. Results from the stereo analysis can also be fed back into the Living Map.
- 4.8. The key to success will be to develop the Living Map as a partnership of all organisations that can use it directly or indirectly to better target secondary uses or developments. At present this is not happening.

5. Options for integrated evidence delivery

- 5.1. There are several options for a shared service for the development and implementation of integrated evidence delivery for the living environment, but all depend on potential beneficiaries pooling funds in one way or another. Whether budgets are top-sliced or contributed to a partnership agreement, individual funders will lose a significant level of control and some flexibility around their budgets. This can make potential partners reluctant to engage with the idea of shared delivery.
- 5.2. The options are:
- i. *Central government delivery of the shared service.* This could be achieved by top-slicing and/or new investment and is probably favourable when a large and diverse range of bodies benefit, especially if beneficiaries include members of the public. This might be true for the remote-sensed data access hub but technical expertise and knowledge of subsequent use of the hub will be essential to its success and this expertise is not available in central government.
 - ii. *Delivery by a dominant beneficiary on behalf of others.* This is only likely to work if one partner really is so dominant that control of the funds becomes essential. It is then always uncomfortable for minor beneficiaries and potential conflicts of interest become very difficult to deal with. Very few, if any, examples exist of where this model has worked well.
 - iii. *Shared delivery across partners.* Shared delivery requires coordination and the whole service stops if one partner fails to deliver their delegated responsibility. The solution allows partners to retain control of budgets which is important but it inevitably complicates delivery and increases risks of failure accordingly. The option is more attractive when resources are scarce and staff time is the main contribution required. There are very few good examples of this nature.
 - iv. *Delegating/contracting delivery of the shared service to a neutral broker.* This option creates a small secretariat and the overheads that go with it but ensures representation of all partners' views without conflict of interest, ensures that the specialist skills and competencies required can be

² Habitats of European importance listed on Annex I of the EU Habitats Directive.

demanded from the shared service provider, and avoids tensions and competition between beneficiaries of the shared service. Many examples of this type exist, e.g. the Environmental Observation Framework, the National Biodiversity Network, and JNCC itself as a shared service to the country nature conservation bodies.

- 5.3. Delivery by a neutral broker (option 4) appears to be the most attractive option. JNCC is well suited to playing this role, as it has:
 - i. the ability to receive many financial contributions very efficiently as grant in aid;
 - ii. a statutory function to provide exactly this type of role;
 - iii. a broad overview and expertise of the living environment;
 - iv. specialist data handling, analysis and monitoring skills;
 - v. no conflict of interest with delivery or policy, at least terrestrially;
 - vi. the ability to work at large geographic scales (UK, Europe, global).which will often be most appropriate for strategic evidence delivery.
- 5.4. The disadvantages for JNCC might be:
 - i. the closeness of the relationship between JNCC and the country nature conservation bodies when wider partnerships are needed;
 - ii. a role restricted to the living environment;
 - iii. JNCC might not be able to offer the flexibility that some private sector shared service providers might be able to offer (year to year variations in the amount of service required for example) but JNCC would almost certainly be cheaper;
 - iv. JNCC would not be appropriate unless UK-scale solutions or at the very least solutions for more than one country were required
- 5.5. If JNCC were to consider providing this type of integrated evidence delivery service it might well take it beyond just supporting nature conservation delivery. However, this expansion of function could still be justified in terms of making nature conservation delivery more efficient.