Environmental Principles and Governance

A response from the British Ecological Society Scottish Policy Group to the Scottish Government's consultation.

The British Ecological Society: 'A world inspired, informed and influenced by ecology'

Founded in 1913, we are the world's oldest ecological society, with over 6,400 members worldwide. As the voice of the UK's ecological community, we communicate the value of ecological knowledge to policymakers and promote evidence-informed solutions.

The Scottish Policy Group (SPG) is a group of British Ecological Society (BES) members promoting the use of ecological knowledge in Scotland. We act as a focal point to provide robust ecological evidence to the Scottish Government, Scottish Parliament and wider society.

The BES Scottish Policy Group welcomes the opportunity to comment on the Scottish Government's consultation. Our approach to the consultation is in line with the BES position: *to make the best scientific evidence accessible to decision-makers* and is based on the expertise of our membership. As such, we have responded to a select number of questions where our answers can be supported by evidence. This response has been signed off by the BES Scottish Policy Group Committee.

Based on the evidence we have received we have answered questions 5 and 6 in Part 1- Monitoring, Measuring and Reporting. We recommend the answers to these questions are considered together as much of the evidence provided is relevant to both.

Part I – Monitoring, Measuring and Reporting

Q5. What do you think will be the impact of the loss of engagement with the EU on monitoring, measuring, and reporting?

Key points:

- Currently there are 161 environmental reporting obligations to European bodies that may no longer be reported after EU exit[1].
- If the Scottish Government remains committed to collecting data to monitor Scotland's environment this will enable government performance and standards to continue to be measured against other countries and regions, including the rest of the UK.
- There are opportunities to improve what is collected to inform policy - for example the monitoring of Scotland's soils.
- Even with assurances from the Scottish Government, there is a potential risk of funding cuts in the future for resource-intensive monitoring schemes, such as Site Condition Monitoring, which could have

[1] National Audit Office 2019. Environmental metrics: governments approach to monitoring the state of the natural environment.

cascading effects on other indices such as Ecosystem Health Indicators and the Natural Capital Asset Index.

Impact of loss of engagement – scenarios

Business as usual

If the Scottish Government sends a clear message that it still values and uses monitoring data – and specifies penalties/actions to be taken if data are not reported – this would ensure monitoring, measuring and reporting will be appropriate for comparing performance and standards with other countries, including the rest of the UK provided there is consistency in methodology between the regions (see also answer to Q6). This would also safeguard contributions that Scotland makes to data collated as part of the various European monitoring networks[2] (see also Q6 below) and for reporting to the Convention of Biological Diversity and on the UN Sustainable Development Goals.

Opportunities

There may also be opportunities to improve what is being monitored and how it is reported (see also Q6). For example, there is a lack of a coherent soil policy at EU level and this is reflected in the scarcity of harmonised soil data[3]. This is despite the fact that a suite of soil monitoring indicators have been previously identified in the EU Commission's Environmental Assessment of Soil for Monitoring project[4]. According to the Sustainable Soils Alliance monitoring of soil health through the current EU environmental framework has not been effective, leading to increasingly degraded soils across Europe[5]. Currently Scotland's Soil Monitoring Action Plan is developing tools[6] to improve Scotland's capacity for the sustainable management of soils which should lead to the better monitoring of Scotland soils, which will help the Scottish Government to report on Sustainable Development Goal 15 - targets on soil quality and soil contamination.

Improving and ensuring transparency in what is reported, ideally encompassing raw data as well as summaries will assist in safeguarding accountability for maintaining monitoring programmes.

Risk of less data collection and monitoring

Even with assurances from the Scottish Government, there is a potential risk in the future of less funding for monitoring becoming a reality as Scotland moves from having to carry out monitoring under EU rules, such as Article 17 in the Habitats Directive[7], to carrying out monitoring solely for the purposes of reporting to Scottish Government, its agencies and the Scottish Parliament. Although data will still need to be collected for reporting on international commitments such as the Convention on Biological Diversity and the UN Sustainable Development Goals.

Site Condition Monitoring (SCM) of internationally important sites is an example of monitoring that is driven in part by an EU requirement to monitor conservation status of Natura habitats and species under Article 11 of the Habitats Directive. SCM data is also used for other indices that incorporate it such as the Ecosystem Health Indicators[8] and the Natural Capital Asset Index (NCAI). The NCAI is one of the 81 national indicators which measures the performance of the Scottish Government against the National Performance Framework (NPF). The NPF directly links to the UN Sustainable Development Goals[9]. NCAI is also used to report on Aichi Targets 2 and 14 whilst targets 5, 11 and 12 use SCM data directly.

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[2] See for example European Environment Agency report: https://bd.eionet.europa.eu/activities/products/report_folder/monitoring.pdf

[3] European Environment Agency https://www.eea.europa.eu/themes/soil/intro

[4] See: https://esdac.jrc.ec.europa.eu/content/envasso-environmental-assessment-soil-monitoring

[5] Evidence submitted to the Environment Audit Committee http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environment-food-and-rural-affairs-committee/prelegislative-scrutiny-of-the-draft-environment-principles-and-governance-bill/written/97360.pdf)

[6] https://www2.gov.scot/Resource/0050/00504329.pdf

[7] http://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm

[8] https://www.environment.gov.scot/our-environment/state-of-the-environment/ecosystem-health-indicators/explore-ecosystem-health-indicators/

[9] See https://nationalperformance.gov.scot/sites/default/files/documents/NPF%20-%20%20A4%20Booklet%20-%2025_07_2018%20%28002%29.pdf

Changes to SCM are already happening. Although this cannot necessarily be attributed to Brexit per se it illustrates the effects of change. In 2019/20 SNH will be scaling back effort on SCM, limiting it to work required to inform casework or discussion with land managers, or where a site is judged to be under threat. In addition, Common Standards Monitoring which began in 1999, is currently under review by JNCC and an inter-agency working group comprising the four statutory nature conservation bodies[10]. Any changes in methods used in Scotland, and/ or consistency with the rest of the UK, will depend on the review, as well as on the conclusions of SNH's own work and the resources available.

In parallel, SNH aim to produce proposals for a fourth round of SCM. This will take a more risk-based approach that focuses survey effort on sites where there are problems, using where possible earth observation and other technologies instead of site inspections. Resulting data is therefore not an unbiased assessment of the condition of all sites and this make it less useful for assessing national performance.

There are cascading consequences of stopping or changing SCM monitoring procedure. For example, a report to SNH's Scientific Advisory Committee[11] analysed the data underlying NCAI and the authors highlighted concerns regarding potential changes in long-term monitoring schemes such as SCM and the impacts this would have on the NCAI, a key performance indicator. Their analysis shows SCM data provides three of the ten most influential indicators for the NCAI. Any changes in data monitoring for SCM would mean that the existing NCAI information published as part of the national indicators would potentially show different trends due to inconsistent data collection.

Q6. What key issues would you wish a review of reporting and monitoring requirements to cover?

Key messages:

- We recommend a comprehensive review of existing schemes in order to identify current gaps in the monitoring, reporting and presentation of environmental data.
- The review should also identify:
    - opportunities to use secondary data
    - how to reduce redundancy in data collection
    - if data collected supports European monitoring networks
- Monitoring systems to support decision making should be fit for purpose, adequately funded and outcomes focussed; Agri-Environment, Climate Change Schemes (AES) are an example of where monitoring could be improved to inform decision making.
- Indicators can measure progress and success of policies, as well as be an 'early warning system' in detecting problems.
- As part of the review, the current set of indicators could be re-assessed to determine if they match the criteria of successful indicators.
- Choosing environmental indicators and presenting data in a way that is easy to interpret is an important part of engaging the public on environmental issues.

The importance of monitoring to assess Government performance

In the National Audit Office's (NOA) report[12] to Defra on Environmental Metrics it is stated that: "*strong environmental monitoring is important in the context of the UK's exit from the European Union (EU), as it will enable stakeholders, Parliament and government itself to understand the government's performance against its commitment that leaving the EU will not mean environmental protections are diluted*."

This statement is equally valid regarding measuring the Scottish Government's performance in realising its environmental ambition of, amongst other things, "*maintaining and improving Scotland's place in the world as a*

[10] See: http://jncc.defra.gov.uk/page-2217,

[11] Natural Capital Asset Index: Analysis of Influential Indicators SAC/2019/03/Info03

[12] National Audit Office Report: Environmental metrics: government's approach to monitoring the state of the natural environment. January 2019. Available at: https://www.nao.org.uk/wp-content/uploads/2019/01/Environmental-metrics-governments-approach-to-monitoring-the-state-of-the-natural-environment.pdf

country willing to lead global action to address current and future environmental challenges. As well as wanting to continue to be a country which shows leadership and commitment on environmental protection."

Reporting and presentation

We would first recommend a thorough review of existing monitoring, reporting and presentation in order to identify existing gaps (see examples below – and soil example in Q5 above). Audit Scotland last scrutinised Scottish Government progress on the natural environment in 2010[13] and could be tasked with conducting a review of environmental reporting and monitoring, with a similar scope to that of the National Audit Office's report on environmental metrics in England[14].

Scotland's Environment (SE) Web is a useful repository for Scotland's environmental data. The site could be better designed so that the presentation of environmental trends are easy for the public to access and interpret**.** Some of the data are out-of-date (e.g. State of the Environment report was last updated in 2014), hard to find, captured under a theme that is too narrow in scope (e.g. habitat restoration only includes peatland), or there is no raw data.

Presentation of data and choosing environmental indicators that are easy to understand is an important part of engaging the public on environmental issues[15] (see also section on indicators below). This is a crucial step in reversing biodiversity decline, as consumer choices and actions can have dramatic impacts globally[16]. Education and engagement can empower people to make choices and act on sound science, with reliable recommendations[17]. As an example of good practice in presentation**,** the German government produces an annual environmental report that is transparent and easily accessible to the public: *Data on the Environment 2017*[18] reports on indicators using a happy/sad face rating system. This shows the likelihood of an indicator target being met by the target date. The results also explain in plain language, the importance of what is being measured, such as its impact on natural resources for humans.

Monitoring to support decision making

Monitoring systems to support decision makers should be fit for purpose and outcomes focussed where necessary, enabling a holistic and transparent approach to environmental management. To be effective in supporting decision making, this also means the Scottish Government needs to clarify what it wants to achieve by setting environmental targets and goals, backed by appropriate indicators and reporting timescales. Such an approach to setting targets is well understood and works for reporting on Government's progress in tackling climate change[19]. Reporting for reporting's sake should be avoided.

Agri-Environment, Climate Change Schemes (AES) are an example of where monitoring could be improved to inform decision making. Waylen et al (2017) looked at AES in terms of how they are monitored, and how results are used to update management across nine regional and national cases, including Scotland[20, 21]. It was found that for AES monitoring, data was always collected regarding how money was spent and what activities were carried out, but only rarely was data collected for appraising the ecological outcomes of the various schemes.

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[13] Audit Scotland 2010. Protecting and Improving Scotland's Environment.

[14] National Audit Office Report: Environmental metrics: government's approach to monitoring the state of the natural environment. January 2019. Available at: https://www.nao.org.uk/wp-content/uploads/2019/01/Environmental-metrics-governments-approach-to-monitoring-the-state-of-the-natural-environment.pdf

[15] Brooks & Bubb (2014). Key Knowledge for Successful Biodiversity Indicators. UNEP-WCMC, Cambridge

[16] M.J. Novacek (2008). Engaging the public in biodiversity issues. Proceedings of the National Academy of Sciences of the United States of America 105. pp. 11571-11578.

[17] *Ibid.*

[18] See: https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/2017_dzu-bericht_wf_en.pdf

[19] See also recommendations of National Audit Office National Audit Office Report: Environmental metrics: government's approach to monitoring the state of the natural environment. January 2019. Available at: https://www.nao.org.uk/wp-content/uploads/2019/01/Environmental-metrics-governments-approach-to-monitoring-the-state-of-the-natural-environment.pdf

[20] Waylen et al (2017). Policy-driven monitoring and evaluation: Does it support adaptive management of socio-ecological systems. Science of the Total Environment. 662. pp 373–384. https://doi.org/10.1016/j.scitotenv.2018.12.462

[21] Waylen et al. (2019). Data summarizing monitoring and evaluation for three European environmental policies in 9 cases across Europe. *Data in Brief*, *23* 103785. https://doi.org/10.1016/j.dib.2019.103785

The authors concluded, amongst other things, that: *"Monitoring of AES was usually the most limited and narrowly focused on reporting management activities with little monitoring of resultant ecological outcomes, i.e. checking the status of certain bird or plant species. There was considerable variation between cases: some such as Scotland carry out limited or no evaluation of the consequences of schemes."*

With regard to Scotland's AES monitoring budget the authors noted: "…*combining and comparing various pieces of information allows us to estimate that Scotland's budget for monitoring AES is less than 1% of its total budget for AES implementation*" This can be contrasted with a recommendation that 10% of management budgets should be reserved for monitoring [22].

Collecting data

The review should also identify:

- Opportunities to use secondary data from other policy areas, and from other sources (including non-statutory sources such as NGOs, interest groups and citizen sciences – see Scottish Biodiversity Information Forum review of biological recording below).
- Opportunities to reduce redundancy in data collection. Researchers have suggested indicator sets monitored under the Water Framework Directive could be reduced which could help free up resources to monitor new issues such as monitoring effects of management interventions[23]. For instance, several taxonomic groups must be monitored to comply with WFD even though they are likely to respond similarly to common pressures, such as eutrophication[24].
- The amount of resources devoted to monitoring – the literature suggests this should be 10% of overall management budgets[25].
- If the data supports European monitoring networks such as those reporting on biodiversity such as The International Mire Conservation Group - European Mires project which focuses on the extent and condition of peatlands and mires and covers all countries in Europe and European Important Bird Area (IBA) Programme, which focuses on species and sites (state of IBAs, pressures and conservation actions), with a pan-European scope[26,27].
- If environmental data is being collected to at least the same standards as the European Environment Agency for the European Union[28].

Biodiversity data – local to national collection

The Scottish Biodiversity Information Forum (SBIF) reviewed the biological recording infrastructure in Scotland[29]. The review investigated what is working well and less well across all sectors with an interest in biological recording. The review recommended funding for integrated local and national structures for collecting, analysing, and sharing biological data through the National Biodiversity Network Scotland. Multiple benefits identified would include:

- definitive open-access central data repository,
- underpinning of National Outcomes for Scotland,
- assisting public bodies in reporting on biodiversity duties,
- a single organisation that will have strategic oversight of the whole infrastructure.

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[22] R.G. O'Sullivan (2004). *Practicing Evaluation: A Collaborative Approach* Sage, London

[23] Waylen et al (2017). Policy-driven monitoring and evaluation: Does it support adaptive management of socio-ecological systems. Science of the Total Environment 662; pp 373–384. https://doi.org/10.1016/j.scitotenv.2018.12.462

[24] Waylen et al (2017). Policy-driven monitoring and evaluation: Does it support adaptive management of socio-ecological systems. Science of the Total Environment 662; pp 373–384. https://doi.org/10.1016/j.scitotenv.2018.12.462

[25] R.G. O'Sullivan (2004). *Practicing Evaluation: A Collaborative Approach* Sage, London

[26] Bubb et al (2011). National Indicators, Monitoring and Reporting for the Strategy for Biodiversity 2011-2020. UNEP-WCMC: Cambridge, UK.

[27] See: https://bd.eionet.europa.eu/activities/products/report_folder/monitoring.pdf

[28] This recommendation has been made by Westminster's Environment Audit Committee in its report to the UK parliament on *Scrutiny of the Draft Environment (Principles and Governance) Bill Contents.* See: https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1951/195111.htm

[29] Wilson et al (2018) .A Review of the Biological Recording Infrastructure in Scotland by the Scottish Biodiversity Information Forum: Enabling Scotland to be a global leader for biodiversity. Scottish Biodiversity Information Forum Commissioned Report No. 1.

Indicators

Indicators are a central part of effective decision making and adaptive management. They can provide measures of the progress and success of policies, as well as form part of an 'early warning system' to detect the emergence of problems. The IUCN defines biodiversity indicators as: *statistical measures of biodiversity which help scientists, managers and politicians understand the condition of biodiversity and the factors that affect it*[30].

The review should highlight the need to establish clear, relevant and evidenced indicators (for both national-level and international targets) based on the data that is currently available. It is also important to both improve the supply of biodiversity information and find better ways to connect this information to underpin more informed, effective and timely conservation decisions[31].

As part of the review the current set of indicators could be re-assessed to determine if they match the criteria of successful indicators[32, 33] such as being:

- cost effective
- scientifically valid
- providing reliable information on status and trends
- providing information at multiple extents and resolutions
- allowing frequent reporting
- meaningful to the public
- responding predictably to policy change

In addition, the issue of how to measure uncertainty around indicators results should be considered[34].

Global biodiversity monitoring and reporting - Essential Biodiversity Variables

The aim of Essential Biodiversity Variables (EBVs) is to find measures for all relevant components of biodiversity, to attain consensus on what to monitor, and, subsequently, to decide where to focus the limited monitoring resources[35,36]. The multiple dimensions of biodiversity is captured well in the Essential Biodiversity Variable Framework, which offers a standardised, cost-effective approach to global biodiversity monitoring, developed with global targets in mind[37].

The review could examine how well Scotland's current biodiversity indicators correspond with EBVs and are there gaps which need to be addressed for global reporting on international commitments – as has been done in Finland[38] (see last section for further information). The dimensions of biodiversity included in EBVs cover:

Genetic diversity

Genetic diversity is an important component of biodiversity that is often missing from data collection and is acknowledged as being challenging to monitor[39,40]. However, the Scottish Government has made progress in

[30] https://www.iucn.org/theme/species/our-work/influencing-policy/biodiversity-indicators

[31] Improving biodiversity observations to inform effective conservation action. Mike Gill (2015) Biodiversity , 2015 Vol. 16, Nos. 2–3, 55–56, http://dx.doi.org/10.1080/14888386.2015.1075904

[32] Jones et al (2011) The why, what, and how of global biodiversity indicators beyond the 2010 target Conservation Biology. 25 pp. 450-457

[33] Biodiversity Indicators Partnership. (2011) Guidance for national biodiversity indicator development and use.

[34] Burgass et al (2017). Navigating uncertainty in environmental composite indicators, Ecological Indicators, Volume 75, Pages 268-278, https://doi.org/10.1016/j.ecolind.2016.12.034.

[35] Vihervaara et al (2017). How Essential Biodiversity Variables and remote sensing can help national biodiversity monitoring. Global Ecology and Conservation. 10 pp. 43–59

[36] Pettorelli et al (2016). Framing the concept of satellite remote sensing essential biodiversity variables: challenges and future directions. Remote Sensing in Ecology and Conservation, 2.

[37] Pereira et al (2013). Essential Biodiversity Variables. *Science*, 339.

[38] Geijzendorffer et al (2015). Bridging the gap between biodiversity data and policy reporting needs: An Essential Biodiversity Variables perspective. Journal of Applied Ecology. http://dx.doi.org/10.1111/1365-2664.12417.

[39] Feld et al (2009). Indicators of biodiversity and ecosystem services: a synthesis across ecosystems and spatial scales Oikos 118 Pages 1862-1871 https://doi.org/10.1111/j.1600-0706.2009.17860.x

[40] Geijzendorffer et al (2015). Bridging the gap between biodiversity data and policy reporting needs: An Essential Biodiversity Variables perspective. Journal of Applied Ecology. http://dx.doi.org/10.1111/1365-2664.12417.

acknowledging the importance of the genetic component of biodiversity by designating the Beinn Eighe nature reserve as the first genetic conservation unit (GCU) in Scotland - to be part of the pan-European network of GCUs[41]. In addition, the Scottish Working Group on Aichi Target 13 has developed a new approach for integrating the conservation of genetic diversity into national biodiversity planning. Aichi Target 13 has been relatively well dealt with in agricultural species, and in some countries for forest trees, but has not yet been addressed for 'wild' species. Key limiting steps for wild species include lack of clarity about which diversity to conserve, how to measure it, and whether data are available. The approach developed in Scotland is designed to be useful in any country, on any continent, rather than simply technologically advanced countries. It is based around a simply implemented scorecard assessing the status, threats, management and long-term risk to genetic diversity for wild species. The approach has been endorsed by the IUCN Conservation Genetics Specialist Group, leading to submission of a joint paper recommending revisions to Aichi Target 13, or its successor, for the next CBD target period (2021-2030)[42].

Community composition

As environmental disturbance increases, rare species tend towards extinction, while globally common species multiply and spread: a process known as biotic homogenisation[43]. Measuring these changes in species is therefore important in understanding changes to ecosystem function and service. Changes is community composition of habitats is occurring in Scotland. For example, a long-term study, investigating the impacts of human-induced pressures (climate change, nitrogen pollution and grazing) on alpine vegetation found that common species are becoming more abundant, resulting in decreasing diversity within and between different alpine communities[44].

Although common species may be able to deliver similar ecosystem services under current environmental conditions[45], the loss of rarer species could threaten the resilience of ecosystem function and service provision under predicted future environmental conditions[46,47].

Functionality

With increasing environmental disturbance, the functional diversity of communities may change, impacting the services that ecosystems provide[48]. In fact, functional diversity has been argued to be the most effective measure for detecting positive effects of biodiversity on ecosystem service provision[49,50]. Currently, ecosystem function is a category in the suite of ecosystem health indicators in Scotland.

Remote sensing and EBVs

Satellite remote sensing (SRS) EBVs have been defined and a set of principles introduced to help space agencies and ecologists to agree on a list of EBVs that can be monitored from space[51]. The long-term coordinated action needed to deliver SRS EBVs needs to be supported by a clear and common platform for data providers, ecologists, environmental managers, policy makers and remote sensing experts to interact and share ideas.

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41 http://portal.eufgis.org/

42 In prep: *Conserving Genetic Diversity: Development of a model national approach to Aichi Biodiversity Target 13*. Aichi Target 13 – Genetic Diversity Maintained – Supplementary Report 2019.

43 McKinney & Lockwood. (1999). Biotic homogenization: a few winners replacing many losers in the next mass extinction. Trends in Ecology and Evolution. 14.

44 Britton et al (2009) Biodiversity gains and losses: Evidence for homogenisation of Scottish alpine vegetation. Biological Conservation [142] 1728-1739

45 Winfree et al (2015). Abundance of common species, not species richness, drives delivery of a real-world ecosystem service. *Ecology Letters*, 18.

46 Leitao et al (2016). Rare species contribute disproportionately to the functional structure of species assemblages. *Proceedings of the Royal Society B*, 283.

47 Oliver et al (2015). Biodiversity and resilience of ecosystem functions. Trends in Ecology and Evolution, 30. DOI: https://doi.org/10.1016/j.tree.2015.08.009

48 Cardinale et al (2012). Biodiversity loss and its impact on humanity. Nature. 486. pp. 59–67

49 Balvanera et al (2006). Quantifying the evidence for biodiversity effects on ecosystem functioning and services. *Ecology Letters*, 9.

50 Diaz et al (2006). Biodiversity loss threatens human well-being. PLoS Biology. 4 (8): e277. https://doi.org/10.1371/journal.pbio.0040277

51 Pettorelli et al (2016). Framing the concept of satellite remote sensing essential biodiversity variables: challenges and future directions. Remote Sensing in Ecology and Conservation. 2 pp.122-131.

Researchers examined the current state of biodiversity indicators in Finland and explored how they could be improved by applying the concept of EBVs and using remote sensing[52]. They found that monitoring EBVs such as ecosystem function, ecosystem structure, community composition and species traits could benefit substantially from the use of remotely sensed data on a national scale. However, the researchers also pointed out that while remote sensing data could bring many enhancements to the current monitoring situation, such as increased geographical coverage and repeated measures over time, it would still be important to have long-term surveys that incorporate field verification at the same time.

[52] Vihervaara. et al (2017). How essential biodiversity variables and remote sensing can help national biodiversity monitoring. Global Ecology and Conservation. 10 pp. 43-59.