Conference Report

2018 Biodiversity Science Conference

Biodiversity Conservation Post-2020: New Challenges and New Approaches

Royal Botanic Garden Edinburgh 5 - 6 November 2018

The run up to 2020 is a critical time for biodiversity conservation, both nationally and internationally. At this year's SBS Science Conference we assessed progress in delivering the Convention on Biological Diversity and the Scottish Biodiversity Strategy and looked ahead to what comes after 2020.

Species and habitat conservation face a wide range of well-known but also new and poorly-understood challenges. However, new initiatives and rapid changes in technology and thinking bring the promise of new solutions.

At this year's Scottish Biodiversity Strategy Science conference we considered some of the new challenges facing biodiversity conservation, and the novel and innovative solutions biodiversity science can offer.

The conference focussed on four main themes: Species health and management; Landscape scale conservation; Climate change; Public engagement.

Each session included an over-view keynote presentation, detailed talks on specific issues, and short speed talks allowing us to find out more about new ideas and approaches for biodiversity conservation. Sessions wrapped up with round table panel discussions allowing us to explore the session themes more broadly.

Here we provide overviews of the main themes/points arising during the round table discussion in each session, provided by our Session Chairs, along with the abstracts for presentations. The presentations themselves are available online at https://www.nature.scot/scotlands-biodiversity/news-and-events/biodiversity-science-conference .

The SBS Science Conference was supported by:

Reports on Round Table Discussions and Abstracts

Session 1 – Species health and management

Chair's Report – Ruth Mitchell, James Hutton Institute

We had a wide-ranging discussion covering ecological networks, plant diseases and Aichi Target 13. Many of the answers to our discussions require action on our behalf and these ranged from local exchange of information between consultants and researchers to influencing global policies.

We started our discussions by exploring the **National Ecological Network** and agreed that a strategic spatial planning tool would be helpful in implementing a biodiversity net gain approach. The consensus was that a biodiversity net gain approach needed embedding in all developments and within all organisations. Such an approach would need to work at multiple scales and to consider the views of the owner as parachuting in without consultation is not received well.

Our discussion over **plant pests/pathogens** centred around whether a comparison between the UK and other countries with more stringent controls had been made with respect to the number of new diseases arriving. It was thought that such a comparison of pathogens in the natural environment was probably missing; although we do have good data for key crop species such as potato. However, it was noted that even in countries like New Zealand which do have more stringent controls they still have new diseases establishing.

We then moved on to discuss whether the next CBD will expand to include more **conservation of wild species genetic diversity**. The panel were optimistic that it would. The critical issue of developing a method to assess genetic diversity of wild species has been achieved in Scotland and other groups around the world are raising the same issues and working on the same questions. However, the audience suggested that more than optimism and local initiatives were needed, that a UK push at the global level was needed to raise this issue up the CBD agenda. The panel suggested the best way of raising this as a priority was via JNCC and lobbying UK representation via Defra.

The final part of our discussion centred around creating **better linkages between consultants and researchers**. Researchers could use much of the data that consultants collect if better links were made. Ways to make this link included better use of the NBN platform which is set up to encourage the sharing of data. It was noted that the Scottish Biodiversity Information Forum would publish its report on a Review of Biological Recording Infrastructure in Scotland on the 14 November 2018. In addition, there was some discussion about consultants and contractors implementing the results from ecological research – e.g. the need for using trees grown in the UK to reduce the importation of new diseases. In such cases sometimes regulation is the best way forward as this creates a level playing field and ensures companies comply.

Keynote – Chris Quine, Forest Research

Current issues in species management, and managing for resilience

Species and their management have been at the centre of much nature conservation and biodiversity policy and practice. Apparent challenges have flexed over recent decades – in the light of greater understanding of ecosystem complexity, and in the face of emerging threats such as climate change. Favoured management actions have developed in response to these challenges – from protecting populations to restoration and re-creation of habitats. New threats continue to emerge – recently including to the health of key species – and have prompted some to focus on resilience rather than conservation. Does this necessitate major changes in how species are to be managed and what actions should be taken?

Gerry Saddler, Chief Plant Health Officer for Scotland and Head of SASA, The Scottish Government

Protecting plants in the natural environment; The Scottish Government's approach

The publication of The Scottish Plant Health Strategy in 2016 set out the Government's approach to the protection of plant health across agriculture, forestry, horticulture and the natural environment. The Strategy throws into sharp relief the importance of safeguarding Scottish plant health to protect and enhance the economy and natural environment, and committed the Government to appointing a Chief Plant Health Officer and commissioning a Centre of Expertise in Plant Health. This presentation will set in context Scotland's commitment to protecting plant life in the natural environment and will highlight current work and future priorities.

Rob Ogden, Edinburgh Centre for Conservation Science

Conservation of genetic diversity – can we measure progress?

The process of biodiversity loss occurs predominantly within species, through demographic declines and associated reductions in population genetic diversity. However, metrics of biodiversity conservation have traditionally focused on the species level, with survival or extinction of taxa used as broad indicators of success or failure. Aichi Target 13 of the Convention on Biological Diversity (CBD, 2010-20 targets) makes specific provision for the conservation of diversity within species, but provides little guidance on how this should be achieved at a national level by CBD signatories. This paper introduces a practical model designed to deliver Aichi Target 13 in Scotland and beyond.

Session 2 – Landscape scale conservation

Chair's Report – Zoe Clelland, RSPB

Our session began with a reminder of the **central role land managers play** in delivering landscape scale conservation and the fact there is often a disconnect between targets and delivery. The need for **funding, focus, facilitation and flexibility** was emphasised. We then heard about the need to understand the effects of fragmentation on rare plant populations across a landscape using an alpine flora example and the innovative uses that are being made of data and connectivity metrics in freshwater habitat network conservation and management.

The value of **facilitating cooperative approaches between land managers** was raised and the panel felt that a bolder approach and dedicated resourcing is required in Scotland. The panel were asked to speculate whether we have the right tools to affect change but are not deploying them at scale or whether a more radical approach is required. Some felt we need to be clear on the vision and explore with land managers how to achieve this. It was also emphasised that recognising a need does not ensure action – an incentive is required and in some cases, there is still a lack of knowledge about the effects, for example, the net biodiversity benefits of tree planting.

The paucity of examples of successful species conservation at a landscape scale, other than corncrake, was highlighted and the reasons questioned. The panel emphasised the need for **proper evaluation of agri-environment schemes** and monitoring of progress towards targets was called for, alongside flexibility on how to reach those targets.

A challenge was made to the ongoing use of species as the measure of success, rather than ecosystem function. The complexity of delivering meaningful messages about an ecosystem approach was noted as well as the value of maintaining long-term species based indices of change. When working with land managers, it was felt a species approach is also more engaging. We explored whether the focus should be on rare or common species and how we should prioritise. Both were felt to have merit as some **rare species are representative of a wider community** or ecosystem but **losing sight of the needs of common species is dangerous** as they may not remain common if measures are not targeted at their needs. SNH reported development of a tool to assist with prioritisation and the

point was made that brave decisions may be required in the face of climate change.

Throughout the discussion, strong themes emerged, including the need to be **clear on biological outcomes, to have ways to focus action and to be able to monitor and evaluate success**. Initiatives such as an effective **Land Use Strategy and National Ecological Network** were suggested as mechanisms to achieve this.

Keynote - Davy McCracken, SRUC

Working with land managers to deliver at a landscape scale

We can achieve biodiversity gains through appropriate action at the level of an individual farm, woodland or protected site. But in the vast majority of cases, to be really successful action is needed at a landscape scale involving multiple land managers. But to-date we have not engaged effectively with land managers. What needs to change to ensure that we get greater buy-in from land managers to deliver at a landscape scale? What data and tools are needed to ensure their management delivers for species, habitats and ecosystem services? What type of agri-environment approaches are need in future to allow all this to happen?

David Hetherington, Cairngorms National Park Authority

Mountain woodlands

Historical evidence points towards a more wooded past in the uplands of the UK's largest national park. Parallels with SW Norway, where climate and geology are similar, suggest that woodland here could be higher and much more widespread. There is an annual target of 1000 ha of new woodland for the national park, which is being steered by a Target Areas map linked to the Forestry Grant Scheme. The aim is to expand and better connect woodland for an array of vulnerable species, including capercaillie. Landscape-scale native woodland expansion is underway, particularly in the core of the park, much of it through natural regeneration.

Phil Taylor, Centre for Ecology and Hydrology

Connecting the Data Dots – from APIs to Hydroscapes

The UK has an extensive set of biological and terrestrial datasets that can aid conservation science, but these are rarely fully-utilised for landscape scale analyses. A number of recent efforts have been made to connect these datasets to help explore ecological response across a connected hydrological landscape – the 'hydroscape'. But with increased connectivity comes the potential for increased stress, and this balance of good and bad is being explored at both a national and landscape scale. One major question is being answered: Can increasing the connectivity of our data help explain the effect of connectivity on species biodiversity and abundance?

Session 3 – Climate Change

Chairs Report – Chris Ellis, RBGE

Using birds as its first example, the climate change session examined how it is possible to **project the climate change impact on UK resident species**, with models becoming more complicated for migrating species as these are subject to an increasing number of divergent constraints over time and space. Impacts on species scaled-up to community-level shifts, with expectation for high bird species turnover in north and western Britain. Conservation was thus challenged to develop policy for decision-making that balances species winners (expanding) and losers (declining).

This valuation was explored in more detail using an alpine lichen example to provoke the question as to whether we should intervene to translocate 'losers', using predictive models to reinforce their existing populations or moving species to track their shifting climate space. The study asked whether our best current models are capable of identifying suitable new habitat for translocation success, given that survival of many species depends on microsites within a broader macroclimatic setting. The session thus emphasised that **species biology is embedded within landscapes**, and an examination of coastal geomorphology served to demonstrate how extremely dynamic Scottish landscapes can be. This underlined the importance of **considering geomorphological change** as setting an overall scene for climate change risk, and studies on Scotland's peatlands further highlighted how condition assessment at a landscape or ecosystem scale can bridge between species/habitat conservation and functional value. Peatland conservation was thus linked to the national greenhouse gas inventory, and the session explored technological advances in how a condition assessment of Scotland's peatlands may be achieved using remote sensing.

Panel discussion led by audience questions focussed first on the **carbon balance of peatlands**, with respect to peat extraction and woodland planting. There was clarification that currently more peatland is restored than is extracted though a full carbon budget should account for imported peat. Also, that woodland soils store less carbon than peatlands while there may be more carbon in the above ground vegetation component of a woodland. The **long-term viability of grouse moors** was discussed, given projected negative climate impacts on red grouse. With sufficient management it should be possible to maintain sporting grouse moors, but climate change will make the burden of management intervention greater. Additional discussion strongly emphasised the continued **importance of protected areas for conservation** under climate change, and highlighted several new directions in climate change biology. The latter included suggestion for an improved understanding of local population adaptation, thereby allowing for an effective evolutionary response to climate change as part of landscape management plans. A final point emphasised **adaptive landscape management** and the opportunity to create positive impacts by releasing landscapes from their traditional engineered constraints, drawing on coastal systems as an example.

Keynote – James Pearce-Higgins, BTO

Climate change and conservation – should we hold back the tide or welcome invaders?

The climate is changing, with growing evidence for impacts on biodiversity around the world. Scotland has many northerly-distributed species which are potentially vulnerable to climate change, and therefore has a natural environment likely to change considerably in the future. Using a range of examples from Scotland and across the UK, this talk will illustrate how species have already responded to the impacts of climate change so far, and the sorts of changes that might be expected to occur by the end of this century. This information will inform a discussion of the implications for species conservation.

Nick Everett, SNH

Climate change adaptation for coastal habitats – learning from geodiversity

Areas of significant erosion risk for Scotland's 'soft' coast have been projected through Dynamic Coast (http://www.dynamiccoast.com). Where these include SSSIs and Natura sites, bio-geomorphological reasoning and predicted sea-level rise are being factored in, to establish scenarios of physical change to the sites' interests. Sand dunes, saltmarsh and vegetated shingle are mostly affected.
Building on previous work on habitat vulnerability, Adaptation Plans for Physical Coastal Change are being drafted for high-priority sites. The wide range of adaptation actions being considered is prompting re-evaluation of conservation practice. This will increase recognition of how many of Scotland's protected coastal habitats naturally defend valued assets against flooding and erosion.

Rebekka Artz, James Hutton Institute

Peatland restoration and climate change mitigation

Peatland restoration is included as part of the suite of measures to limit carbon emissions from Scotland's land use sector in the Climate Change Plan. These measures also intend to partly deliver Aichi target 15 to "restore at least 15% of degraded ecosystems". The Peatland Action programme, administered by SNH, is currently the largest initiative to deliver restoration on the ground, with over 30,000 ha of work completed to date. This talk will explore the challenges in defining a target state from the functional perspective of reduced carbon emissions and the hurdles that structural legacies cause in restoring peatland biodiversity.

Session 4 – Engagement

Chair's report – Chris Wernham, BTO Scotland

Our lively discussion around engagement covered both how to **encourage more of the Scottish public to get involved** in biodiversity conservation awareness and action, and how to ensure that the **information from monitoring activities reaches key audiences** to achieve maximum benefits in informing conservation and driving future action.

We explored the ease with which the public can be engaged with some topics (e.g. photographing puffins to record food loads) contrasted with potentially less charismatic topics (e.g. mud snail conservation) but how thoughtful design of citizen science projects (e.g. the hands on approach of the public rearing snails at home) could **motivate involvement and increase understanding** of the needs of a species and its wider environment.

We explored some **novel routes (e.g. using art) for engaging young people** in biodiversity issues and acknowledged that each individual will be motivated by slightly different things – approaches that provide a diverse range of ways of getting involved are likely to reap the greatest benefits.

We discussed the need to keep **citizen scientists** engaged once they have taken the step to take part in an initiative, and how organisations might better work together to provide joined-up opportunities for public engagement with biodiversity. We also discussed **how to get better engagement of society** with the outputs on the state of Scotland's biodiversity (e.g. the Ecosystem Health Indicators and the NBN Atlas Scotland), concluding that: it was important for those who collected the data to see the fruits of their labour (get timely feedback); being able to mine the information at local/regional level may encourage more interest and ownership; government websites (e.g. SEWeb) may not be proactively used by those that seek information; and whilst some people interested in technology and data may take a direct interest, others (including young people) may become interested in the outputs by first experiencing nature hands-on and helping to collect the information. We commended the review and business case to support integrated data pathways in Scotland being put forward by SBIF and called on the interested stakeholder community to help advocate the approach to Scottish Government.

Finally, we explored the need to have **biodiversity data sets and indicators** that are as up to date as possible, and how we get the buy-in from government and agencies to deliver this. There is often a trade-off between comprehensiveness of data sets (to allow regional disaggregation), funding and periodicity of data collection, and a need to be as creative as possible with data that can be collected regularly. The more we can demonstrate the value of data via products that are useful to the stakeholder community, the greater the justification for funding to update them regularly.

Keynote – Mhairi McCann and Rufus Sullivan, ReRoute

ReRoute: Engaging young people in Scotland's biodiversity

ReRoute, Scotland's Youth Biodiversity Panel, is a group of young volunteers from across Scotland

who are working in partnership with Young Scot and Scottish Natural Heritage. This talk will focus on the volunteers' work over the past three years from exploring young people's insights, understandings and opinions about Scotland's nature and biodiversity to creating key recommendations on how young people can be better engaged with nature. It will also discuss how, over the next year, ReRoute will work with SNH staff to implement the recommendations and make meaningful, lasting change for young people and nature in Scotland.

Ellen Wilson, Chair, Scottish Biodiversity Information Forum (SBIF)

SBIF integration - big data or more efficient data

Everyone interested in the conservation of biodiversity has a stake in public engagement. There are many brilliant examples of how to do it well but we haven't yet achieved the scale and impact needed to reverse species declines and the disconnection of people with nature.

This talk will share some of the recommendations of the SBIF Review to show how Scotland can facilitate the interest and involvement of the public for greater impact. It will explore the opportunities that adoption of SBIF's thinking on biodiversity data collection and data flows might offer for biodiversity conservation in Scotland post-2020.

Ellie Owen, RSPB

Being the Puffarazzi: Using digital photography and citizen science to describe spatial variation in puffin diet

Puffins are one of the most photographed of British birds but concern is mounting as low productivity and steep declines are recorded in former strongholds of their European range. Poor breeding success at some UK sites has been linked to low food availability but puffin diet data is only available for a handful of colonies. Smartphones and digital cameras have increased opportunities to take and share high quality photographs. We combined the people-power of visitors to puffin colonies with advances in camera technology by inviting citizen scientists to submit photographs of puffins carrying prey from colonies across the British Isles. We advertised the project over broadcast and social media and at colonies. Uptake was high with 602 "Puffarazzi" volunteers submitting 1402 pictures from 39 colonies and picture quality excellent with 97% of pictures useable for prey identification. A team of six interns identified the species and size composition of prey in each photograph and recorded their level of confidence associated with their identification. We present the resulting data, showing what coverage is possible using volunteers and providing the first UK scale assessment of spatial variation in puffin diet, and share our experience in citizen science projects using digital photography.