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Developing a climate change risk-based assessment for notified features in Scotland

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March 2016

Project Aim

This project was designed to developing a process for assessing the risk posed by climate change to notified features of protected areas (SSSI, Ramsar and Natura sites) in Scotland.

Background and context

Many conservation activities involving protected areas are focussed around notified features. These are the specific features, for example the occurrence of a particular habitat, species or earth science feature, for which a site is designated. The condition of notified features is used as the measure of success of conservation efforts. For example, site condition monitoring assesses features as being in 'favourable' or 'unfavourable' condition.

Notified features, rather than sites, are clearly a sensible target for assessing possible climate change impacts and for considering what adaptation measures might be put in place to address those impacts.

This work relates directly to key **policy drivers**, including the Biodiversity Sector Action Plan for the Scottish Climate Change Adaptation Framework (soon to be updated by the Scottish Climate Change Adaptation Programme). Under this plan there is a call for increasing knowledge and understanding with respect to the detected and possible future impacts of climate change. This is linked to Scottish Natural Heritage's climate change action plan[1], specifically to "Identify the consequences of climate change for protected [areas] and put in place adaptive measures."

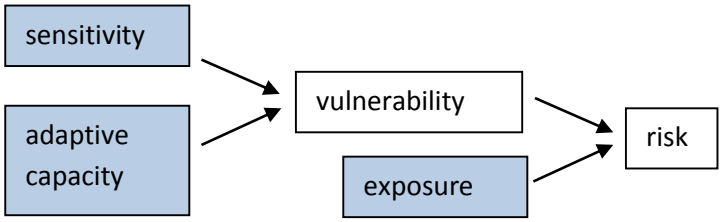
What we have been doing

The project's work plan was developed jointly by the ClimateXChange team and staff from Scottish Natural Heritage (SNH). To date the project was undertaken in four phases.

Phase 1 (2012-2013) focussed on developing a basic framework for the assessment process, bringing together relevant data to test the feasibility of the approach, and applying it to the full list of notified features in Scotland. The underlying conceptual framework is the same as that adopted in many other studies, and categorised available data into one of three types: sensitivity, vulnerability and exposure.

[1] Climate change and nature in Scotland, http://www.snh.org.uk/pdfs/publications/corporate/ClimateChangeNatureScotland.pdf

The data were then combined as follows to give a final overall score:



For biodiversity features, feature sensitivity was assessed using expert opinion via a questionnaire process; adaptive capacity was assessed using a combination of feature condition (from site condition monitoring), connectivity indices and site size data; exposure was assessed using climate zone data and a set of downscaled climate projections.

During Phase 1 possible improvements to the analytical approach were suggested, as well as avenues for developing the work to make the outputs more readily accessible and useful. Some of these proposals were the focus of **Phase 2** of the project, which ran from April 2013 to March 2014.

The ClimateXChange team reported to SNH on the analytical approaches adopted and the results of the analyses from Phases 1 and 2. These were substantial reports, recording all of the detail of the work undertaken, and were unsuitable for widespread circulation beyond the project team. However, it is important that the existence, aims and outcomes of the work are easily accessible, and to this end we produced a **Summary Report**, and made this available via the CXC website in December 2014. The Summary Report briefly describes the analytical approaches finally adopted (with separate approaches being applied to earth science and biodiversity features) and summarises the outcome of our analyses.

At the end of Phase 2 we had results of assessed risk for all notified features, including both Earth Science and Biodiversity features. However, we did not propose that our analyses or results represented a final 'answer' as to which features are most at risk from climate change, but instead indicated that they should represent one part of a process aimed at identifying 'at risk' features, and then targeting adaptation action.

We then needed to ask:

1. Despite the acknowledged caveats associated with the various datasets, do the overall patterns of results appear sensible?
2. If the results are sensible, then what climate change adaptation actions might be applied?

Answering the second of these two questions necessitated 'drilling down' into the data for individual features to ascertain why they had a high risk score. For example, was it due to poor connectivity in the landscape? Or was a feature vulnerable due to already being in poor condition? If the latter seemed to be the main factor, then the exact reason for a poor SCM status could be explored and assessed with respect to whether it really represents a risk from climate change.

To enable us to work through this process, we ran a series of workshops during **Phase 3** (April 2014 and March 2015) with two groups of experts (for Freshwater & Wetlands and Earth Science features). This work continued during **Phase 4** (April 2015 to March 2016) through additional discussions with experts for Woodlands and Uplands features. These workshops provided some valuable insights and were an

excellent opportunity to acquire feedback, in particular on the biodiversity features assessment process developed under Phases 1 and 2 of the project.

Some common themes emerged:

1. It is important to emphasise that the analysis is not claiming to provide a final answer in terms of identifying the most "at risk" features. An appropriate framing needs to be provided for the work, highlighting that it is part of a process by which features might be selected for climate change adaptation action. This process also includes expert judgement.

2. There were some queries about particular datasets used in the analyses. Suggestions as to how the data can be further improved have been collated.

3. A key step in the prioritisation process is to move from a long-list (resulting from the analytical procedure) to a short-list. This step is undertaken using experts, and enables them to selectively change the ranking of features based on their own opinions concerning the quality or importance of some of the underlying data.

The workshops also provided some important suggestions as to how the analytical procedure might be further developed. For example, these included mapping "at risk" features so that key catchments or protected areas might be identified where management actions might have benefits for multiple "at risk" features.

Beyond modifications to the analytical process, other themes emerged concerning the future use of the data. These included taking the results of the analyses and using them to get targeted action for climate change adaptation on the ground. There was general agreement that this would be best achieved by linking the results of the analyses to ongoing activities such as the development of National Nature Reserve management plans or the Delivering Favourable Condition process.

In addition to pursuing the development and roll out of the analytical process, in the light of the funding for this work drawing to an end the project was handed over to SNH staff. This included providing them with a full set of the data and a full record of the work undertaken during the project, as well as training in the analytical procedure so that the risk assessment analysis can be updated and improved as required and as new data become available.

Further information

The project team was made up of members from across ClimateXChange's partner organisations including the James Hutton Institute, the Royal Botanic Garden Edinburgh, University of Glasgow, University of Edinburgh, University of St Andrews, and Dundee University.

If you would like further information about this work please contact Rob Brooker (rob.brooker@hutton.ac.uk) or Stewart Pritchard (stewart.pritchard@snh.gov.uk).