



CLIMATE CHANGE GROUP

BRITISH ECOLOGICAL SOCIETY

General considerations of adaptation indicators: an outline for policy and practice

This briefing summarises the key findings of a two-day workshop on adaptation indicators held in Cambridge in November 2018, organised by the [British Ecological Society's Climate Change Special Interest Group](#) with the BTO, Climate Resilience, the Committee on Climate Change, Natural England and the RSPB.

The BES Climate Change Special Interest Group helps foster a vibrant community of ecologists who are all working on climate change issues. This includes a full range of climate change impacts, adaptation and mitigation and related topics, relevant to ecology.

Be realistic about the challenge. Measuring the impacts of climate change is difficult, yet assessing progress with climate change adaptation is even more challenging.

Successful adaptation requires both maintaining interests against climate impacts and developing different outcomes which are compatible with new climatic conditions. This fundamental complexity defies simple, reductive, over-arching assessment. Indicators of both resilience against and accommodation of climate change are needed.

Attribution adds a further complication: both in defining the climate contribution of, for example, poor species status, and the adaptation component of conservation action. There is also an element of uncertainty that is unavoidable across all aspects of climate change. It may be difficult to define these aspects quantitatively – nonetheless in such circumstances, qualitative indicators of change are useful.

Don't overcomplicate. Almost in contrast to the above, indicators should be as simple as possible, and be understandable and able to resonate widely beyond the technical experts. They should be practical and 'do-able' in both compilation and application. Good adaptation indicators should not be overlooked in the pursuit of perfect indicators, provided that they are effective.

Be specific yet widely informative. Successful indicators usually have a clear focus, e.g. on a particular ecological outcome – there is no 'one-size-fits-all'. Adaptation indicators may assess the success (or otherwise) of a programme or project's objectives, outputs and outcomes. Consideration should also be given to assessing and informing wider aspects of adaptation, including: ecosystem services and the benefits of adapting the natural environment for people; value-for-money of funding and investment (including donors); and knowledge gained from adaptation processes and implementation.

Adopt other common requirements of successful indicators. Adaptation indicators should use accessible and reliable data. Data acquisition may involve citizen science.

Indicators need to track the delivery of an adaptation action over long periods of time, from a project's inception to its eventual outcomes - and be replicable in future time periods and in different locations. The requirements for, and of, indicators needs to be realistic. Developing indicators with stakeholders and user-groups will benefit their design and uptake.

Indicator objectives and priorities

Wide scope for adaptation indicators. Assessing progress and success of adaptation for the natural environment requires a range of indicators. These should track the different stages in the development and delivery of adaptation action, and hence cover process, progress and outcome aspects of adaptation.

Successful adaptation indicators will require objectives for an action to be clearly identified – both for implementation before and after tipping points for particular vulnerabilities. Monitoring and evaluation will need to identify tipping points and reflect objectives before and after tipping points are reached.

Focus on adaptation priorities. The indicators should cover the key aspects of the natural environment at medium to high vulnerability to climate change. The timescale for implementing successful adaptation actions should be included in prioritisation - e.g. aspects with high likely vulnerability in the longer term future may require much earlier action.

Cover a core range of adaptation actions. The indicators selected should reflect the range of types of adaptation actions required for the natural environment. These are likely to include facilitating population movement; increasing ecological connectivity; increasing microclimate heterogeneity; water management; habitat condition; ecosystem community resilience and change; ecosystem function; etc.. Each of these may be assessed for its contribution to either building resilience or accommodating change – or indeed, to both at the same time.

Potential resilience indicators for habitats include the size of protected sites and the area with natural (or near natural) hydrological or coastal processes. Favourable condition and connectivity need to be assessed carefully and are not necessarily indicators of resilience. These aspects may also contribute to accommodating nature to changing conditions.

Indicators of success in accommodating to change include the geographical shift of species populations, the advent of species new to an area, and the continuation of ecological processes and maintaining overall biodiversity with changing species composition. Ecosystem service indicators are also needed (e.g. for carbon sequestration, natural flood management, and drought resilience).

Defining adaptation outcomes is complex. Adaptation indicators should assess the effectiveness of actions that are particular to addressing the climate change components of nature conservation activity. These may be difficult to define within broader conservation activities, programmes and outcomes: attribution (both to climate change and to action) needs to be considered carefully.

Counterfactuals are therefore important in assessing outcomes, as they help determine what would have happened if adaptation hadn't taken place or hadn't been successful.

Assessing policy measures. National Adaptation Programme (NAP) objectives need to be measurable if they are to be successfully assessed. Indicators for the natural environment aspects of the NAP require policy-makers to set clear priorities for adaptation, with measurable objectives and a focus on the core set of policies and implementation activities that will deliver the most benefit. Early effort should be taken to establish a strong *ex ante* baseline.

Cover all aspects of implementing adaptation. The assessment of adaptation programmes and projects requires monitoring and evaluation of processes, progress and outcomes. Indicators can usefully be split accordingly to determine whether effective adaptation is taking place – the process of implementing adaptation actions, progress in the delivery of outputs, and the achievement of defined outcomes.

Data and monitoring

Use existing monitoring and data wherever possible. Existing monitoring and data sources can contribute to indicators for biodiversity, habitat and wider land and water aspects. Available datasets and data collection may need to be augmented as local and national adaptation programmes and projects become more prevalent. Data need to be replicable over time and also have development potential as the trajectory of climate change progresses, and tipping points for changing objectives are passed.

Effective monitoring will require qualitative and quantitative data and information, with robust baselines and ongoing time-series from multiple sources.

Developing new approaches. More innovative approaches and novel metrics are likely to be required. New opportunities for indicators may arise from new datasets and collection methods, including new and developing technologies, as well as from greater utilisation of existing datasets. Remote sensing provides one such opportunity, as does the greater use of citizen science as interest in climate change and its impact on the natural world grows.

New approaches to data and monitoring will doubtless develop alongside new ideas for adaptation indicators; as a relatively new discipline, adaptation can be expected to develop new requirements and opportunities for both monitoring and evaluation.

The science community has a key role in monitoring and evaluation. This includes the provision of knowledge, evidence, simulations and other tools for use across scales (e.g. historical trend data, seasonal predictions, multi-annual/decadal projections, and early warning of potential climate-related impacts); and translation of research findings into practical outputs to inform adaptation monitoring and assessment.

Effective policies and uptake. Process and progress indicators tended to be relatively easy to measure, with indicators tracking the existence of required policies, their uptake and funding, to progress in delivery.

The policy community thus has a key role in monitoring and evaluation. This spans the development and delivery of multi-scale climate change adaptation policy (international, national, provincial and local); inputs to capacity development, education and awareness programmes; and securing resources (human and financial) and support mechanisms (institutional and governance) to facilitate adaptation actions.

Indicators in use

Integrate into natural environment planning and delivery. Measuring adaptation uptake, progress and success must be a key, integrated part of natural environment delivery across relevant geographical scales and timescales, compatible with the trajectory of climate change as relevant to different nature and natural environment interests and vulnerabilities. It should be properly resourced and funded, with development of the necessary scientific expertise and frameworks, both currently and forward into the future, and integrated through the 25 YEP.

Indicators need to be part of a wider evidence base, dedicated to the understanding of change.

Practical aspects in measuring and interpretation. Problems commonly encountered in monitoring and evaluation of climate change adaptation include: availability, access to and heterogeneity of data from different sources; variability in baselines, time-series and reporting protocols; difficulties in interpreting data provided; and outcomes being seen as 'end points' (which may never be reached) rather than 'milestones' in the adaptive management cycle.

Care needs to be taken when interpreting the results from certain measures. The same actions may be either both positive and negative for adaptation (e.g. whether objectives are for building resilience or accommodating to changing conditions; the number of drought measurement plans in place can provide both a positive and negative indication of CCA). Metrics may measure an outcome, but attributing that outcome to change driven by an adaptation action may be less clear cut.