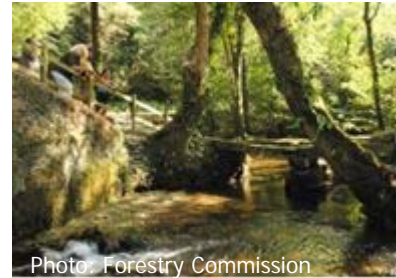


Biodiversity and Climate Change Glossary



'Biodiversity' is generally defined as the variety of all living things. Biodiversity can be measured on a number of levels ranging from genetic diversity within a species to the variety of ecosystems¹ on Earth, but the term most commonly refers to the number of different species in a defined geographic area.

Habitats and species are often precisely adapted to their climatic environment and, thus, climate change poses a major challenge for biodiversity. Changes in temperature, rainfall, sea levels, and the magnitude and frequency of extreme weather events will have a direct impact, but indirect impacts will also arise from increased pressures on the natural environment as human society adapts to climate change. We need to help biodiversity adapt to these impacts, in order to conserve environmental assets and the social and economic benefits they provide.

Climate change, and what it means for biodiversity is a complex issue, with understanding, policy and practice in this area continuously evolving. It can be difficult for non-experts to understand the specialist terminology that is often used in information sources and by practitioners. This Glossary is intended to give an overview of some of the key terms that are commonly used in relation to biodiversity and climate change adaptation. For each term a brief definition is given, along with an explanation of how it relates to climate change adaptation and is followed by an example of relevant work in the South West. The following terms are covered in the document below:

- Climate change adaptation
- Climate change mitigation
- Climate space
- Ecological network
- Ecological resilience
- Ecosystem services
- Habitat connectivity
- Landscape permeability
- Landscape scale
- Managed realignment
- Spatial targeting

¹ NB: An ecosystem is an area, with no precise boundaries, where living organisms (i.e. plants, animals and bacteria) interact with themselves and their non-living environment (i.e. soil, climate, water and light)



Climate change adaptation

Definition – Climate change adaptation is the means of addressing the impacts and opportunities resulting from a changing climate. The Intergovernmental Panel on Climate Change (IPCC) define adaptation as “adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderate harm or exploit beneficial opportunities”².

The extent to which plants and animals can move in order to adapt to the effects of climate change, and indeed any other type of environmental change, will be an important factor in their survival at specific locations.

For biodiversity, adaptation requires maintaining robust species populations and building resilience to climate change impacts. Maintaining and enhancing the habitats that species depend on is key to achieving this.



Example – The Parrett Catchment Project has been developed to help manage deep and prolonged flooding, which is likely to become more frequent with climate change, in the River Parrett area in Somerset. A key objective of the project was to create new wet grassland, fen, reed beds and wet woodland, which help to restore the natural role of the catchment in holding back flood waters. These sites provide new and improved habitat, thereby benefiting biodiversity and enabling species to move

through the landscape in response to climate change. For further details see the project’s website www.parrettcatchment.info and the SWCCIP case study at <http://www.oursouthwest.com/climate/sr-biodiversity.htm>

Climate change mitigation

Definition – Climate change mitigation is the attempt to reduce the rate at which greenhouse gases are accumulating in the atmosphere, thereby minimising climate change and its effects. This may involve reducing greenhouse gas emissions or enhancing carbon sinks to help absorb carbon (e.g. trees, peat bogs).

Example – The Exmoor Mires Restoration Project is re-wetting and restoring the blanket bog peatland of Exmoor by blocking ditches with bales of hay and creating dams from wood and peat. Peatlands are important carbon sinks, absorbing carbon dioxide from the atmosphere and acting as huge carbon stores. However, blanket bogs, including those on Exmoor, have been degraded over the centuries by moorland reclamation, agricultural drainage and domestic peat-cutting. Damaged areas actually release carbon dioxide into the atmosphere through oxidation processes. Restoration can therefore play a major role in mitigating climate change.



www.exmoor-nationalpark.gov.uk/index/looking_after/looking_after_landscape_moorlands/moorlandinitiative/mire.htm

² IPCC 4th Assessment report: www.ipcc.ch/ipccreports/ar4-wg2.htm

Climate space

Definition - The area of land which is climatically suitable for a particular species or habitat.

The space in which a particular species/habitat can survive will change (both in location and size) with a changing climate, forcing many species to relocate. Adaptation will, therefore, require facilitating the movement of species into these new climate spaces.

Climate can vary over very short distances and a single site can have numerous microclimates (e.g. north-facing slopes will have different conditions to south-facing slopes). Expanding wildlife sites to offer a wider range of microclimates and ensure a diversity of habitat patches will provide more opportunity for species to respond to climate change by relocating within their landscape.

Other species, however, will need to move greater distances in order to find suitable climate space in the future. Improving existing habitats and their [connectivity](#), and creating new habitats will help to facilitate this movement.³



Example – Goss Moor National Nature Reserve in Cornwall is a unique combination of wetland and heathland habitats. It is home to a wide variety of species and, in particular, is the main breeding site in England for the scarce Marsh Fritillary butterfly. The old route of the A30 ran straight through the area, which is a Site of Special Scientific Interest (SSSI), fragmenting the habitats and disturbing the wildlife. However, through working in partnership with the Highways Agency, Natural England (which manages the site) succeeded in getting the new dual-carriageway A30 realigned around the northern edge of the moor. This reconnected two sites to create a single 711 hectare wetland. This, along with

additional work to improve the Marsh Fritillary's habitat, has expanded the climate space available for this species and increased the robustness of its population. For more information about Goss Moor National Nature Reserve visit:

www.naturalengland.org.uk/ourwork/conservation/designatedareas/nnr/1006062.aspx

Ecological network

Definition – The connections between different habitats and species in an ecosystem or across the landscape.

Ecological network and [habitat connectivity](#) are two sides of the same coin. Creating and extending ecological networks that improve connectivity between habitat patches will allow species to disperse over larger areas and will encourage larger, more diverse populations, thereby increasing [ecological resilience](#) and the probability of species surviving.

Example – The Somerset Mendip Hills project is one of the Wildlife Trust 'Living Landscapes' projects. The project aims to restore, link and re-create local wildlife sites and farmland habitat across more than 130 square kilometres. This will create expanded habitat and [climate space](#) for key species such as horseshoe and pipistrelle bats, great crested

³ See principles 3a and 4 of Defra's (2007) report, [Conserving biodiversity in a changing climate: guidance on building capacity to adapt](#)



newts, skylarks and nightjars, thereby increasing the robustness of the ecological network. Over the last two years the project has worked with 81 farmers, surveyed 6,200 ha of land, found almost 1,100 ha of nationally important wildlife habitats and nearly 100 days have been spent surveying and helping to manage land for wildlife.

www.somersetwildlife.org/pdf%20library/Mendip_update_email.pdf



Ecological resilience

Definition – The extent to which an ecosystem can tolerate disturbance. A resilient ecosystem can withstand shocks such as fire, pollution or flooding, and rebuild itself.

In the context of climate change, ecosystems will need to be resilient to environmental change, including changes in temperature, water availability, and the increased presence of non-native invasive species. This relies on maintaining a diversity of habitats in the landscape and having a strong [ecological network](#) in place.



Photo: Butterfly Conservation

Example –The Adonis Blue butterfly is a species of chalk downland butterfly, which is at its northern climatic limit in the UK, where it is found only in isolated pockets with warm microclimates. The chalk scarp slopes of the Dorset Downs have a variety of aspect, altitude and soil, and significant patches of chalk downland, scrub and woodland remain, providing suitable habitat for the Adonis Blue. The butterfly is very sedentary, moving no more than 250m in a season and has only a single larval foodplant (horseshoe vetch).

This can restrict Adonis colonies to very small areas of suitable habitat and leaves them vulnerable to chance extinctions. For example, the severe drought of 1976 wilted the horseshoe vetch and the population dipped. In the Dorset Downs, suitable habitat management can help make Adonis Blue populations more resilient, as they will be able to move the short distances between suitable patches of habitat as conditions change.

Ecosystem services

Definition - *Ecosystem services* are (by recent convention) the *goods* (e.g. food, fibre and clean water) and the *services* (e.g. water purification, pollination and climate regulation) which are provided by ecosystems and sustain human well-being.

An ecosystem is an area of land or water with interacting living and non-living components. Ecosystem services are, therefore, the products of this interaction. An important aspect of an ecosystems approach to conservation is that it aims to treat the natural environment holistically.

The term 'ecosystem services' recognises the benefits that humans demand from natural products and functions. This differentiates it from other ways of thinking about the environment, as it recognises this value for human survival. Ecosystem services can be subdivided into five categories: provisioning (e.g. food production), regulating (e.g. climate,



flood and disease control), supporting (e.g. crop pollination, nutrient cycling), cultural (e.g. recreational, spiritual benefits) and preserving (e.g. maintaining species diversity)⁴.

Ecosystem services are maximised in large and/or well connected natural habitat of high quality.

The ecosystem services concept has its origins in the 1970s but has risen to prominence following the publication in 2005 of the UN sponsored *Millennium Ecosystem Assessment (MA)* www.millenniumassessment.org/en/Index.aspx

The Department for Environment, Food and Rural Affairs (Defra)'s 'Ecosystems Approach Action Plan' sets out a strategic approach to policy and delivery on the natural environment. It sets out a number of actions to enable Defra, key partners and stakeholders to work together in applying an ecosystem approach to conserving, managing and enhancing the natural environment in England www.defra.gov.uk/wildlife-countryside/natural-environ/eco-actionplan.htm

Example – The Somerset Levels is an internationally important wetland, comprising large areas of unimproved grazing marsh. The ecosystem services provided by the area include: food and fibre in the form of beef, sheep, thatching reed and horticultural peat; climate control through carbon-rich peat and wet woodland and flood water storage; recreation, wildlife watching, wildfowling; and knowledge of our past.



Habitat connectivity

Definition - The interconnection of different habitats to allow species movement. This includes creating and managing habitat corridors and buffers, as well as preventing further fragmentation of habitats by development and other unsympathetic land-uses.

Increasing habitat connectivity assists species to adapt to climate change by enabling them to move into new [*climate spaces*](#).



Example - The Severn Vale Biodiversity Project is being run by the community development charity, Stroud Valley Project. It aims to restore, create and enhance the different habitats, including farmland, ditches and grassland, across parishes in the Severn Vale area. This creates a network of wildlife rich sites and corridors along which numerous species are able to travel, allowing for species movement in

response to climate change.

www.stroudvalleysproject.org/SevernValeBiodiversityProject.htm

⁴ Source: [Wild Somerset \(2008\)](#)



Landscape permeability

Definition – The extent to which species are able to move through a landscape, unrestrained by barriers.

The term is intended to be a more accurate and less restrictive description than ‘habitat corridor’ for the need to facilitate the fluid movement of species across the landscape. Landscape permeability describes a sympathetically managed landscape that increases the ability of species to disperse across unsuitable habitats.

See the Forestry Commission’s Research webpage on habitat networks and, in particular, the paper, ‘Evaluating Biodiversity in Fragmented Landscapes’ by Kevin Watts *et al* paper at www.forestry.gov.uk/fr/INFD-673ER6

Example - The Brue Valley Project started in January 2009 as one of the Wildlife Trusts’ ‘Living Landscape’ projects. It is part-funded through the European ‘Water Adaptation is Valuable for Everybody’ (WAVE) project and focuses on two of Somerset Wildlife Trust’s key nature reserves in the Brue Valley; Westhay Moor and the Catcott Complex.



Westhay is the largest piece of remnant lowland mire (peat bog) in the South West and both Westhay and Catcott consist of a dynamic mosaic of Biodiversity Action Plan (BAP)⁵ habitats, including floodplain grazing marsh, lowland meadow, purple moor grass and rush pasture, reedbed and wet woodland.

The aim of the project is to restore, revitalise and reconnect habitat, improving landscape permeability and ensuring wildlife is capable of sustaining itself in the face of climate change. In the long term it is planned that a mosaic of wetlands in the Brue Valley area will be created to ensure the survival of wetland species and help wildlife and people adapt to the effects of climate change www.somersetwildlife.org/landscape_brue_valley.php

Landscape scale

Definition - A holistic, multi-functional approach to biodiversity conservation that looks at a wide range of habitats rather than at specific species, and considers local economic and social issues related to biodiversity. Key sites are identified and opportunities to create, enhance and link sites are sought.



The scale of the landscape can be seen at a functional level and will thus be different for different habitats or river catchments. This term tries to capture a move towards thinking in larger, less site specific, terms.

Example - The South West Regional Biodiversity Partnership has developed a “South West Nature Map” identifying Strategic Nature Areas in which to conserve, create and connect wildlife habitats at a landscape scale. www.biodiversitysouthwest.org.uk/

⁵ For information about the UK Biodiversity Action Plan (BAP) see www.ukbap.org.uk



Managed realignment

Definition - A 'soft' engineering option for coastal planning based on the principle of working with nature, rather than against it. Managed realignment usually involves the intentional removal of an existing coastal defence to allow the land behind to be flooded, creating saltmarsh, mudflats or lagoons.

As well as providing habitat for coastal species, the vegetation disperses wave energy and reduces erosion rates, thereby reducing the risk of flooding in nearby areas.

Example - Mansands Beach is located approximately 1.5km south of Brixham on the South Devon coast and is owned by the National Trust. In 1985 the National Trust installed steel mesh gabions, two deep, along the whole of the beach to provide a defence against sea incursions onto the farmland behind. By 2001, however, it was obvious that these gabions were deteriorating due to sea action and vandalism. Rather than replacing them, it was agreed to remove the sea defences. A concrete drain was also removed, resulting in flooding of the fields behind. This has resulted in the creation of more varied habitats, including a shingle bar, reedbed, open freshwater and wet unimproved grassland. For further details, see the [Mansands case study](#), available via the SWCCIP website.



Spatial targeting

Definition – The focus of conservation actions across a particular spatial area. This could involve focussing on key sites for biodiversity, but within a broader [landscape scale](#) approach.



Example (i) - A targeting exercise has been carried out by the Forestry commission to identify core areas of ancient woodland networks in the South West where [landscape connectivity](#) and [permeability](#) offer the best opportunity to link and extend ancient woodlands, either through new native woodland planting or through the management or creation of other semi-natural habitats.

By working on a [landscape scale](#) the Forestry Commission aims to increase the resilience of these habitats to climate change. 4 priority areas have been identified within; Exmoor, Dartmoor, the Cotswolds and Cranborne Chase and grants have been made available to support this work www.forestry.gov.uk/forestry/INFD-7BCJ6R

Example (ii) – Natural England has produced a set of targeting maps to increase the environmental benefits delivered through Higher Level Stewardship. These maps will help secure the most appropriate management in geographic areas where environmental outcomes are likely to be greatest. The targeting maps are the first systematic joining together of information on biodiversity, landscape, natural resource protection, public access and historic interests. The regional targeting statement for the South West can be found at: www.naturalengland.org.uk/images/hlstrating/South_West.pdf

