Cynulliad Cenedlaethol Cymru
National Assembly for Wales

Quick guide

Ecosystems and the Ecosystem Approach

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Introduction

In January 2012 the Welsh Government launched a consultation document 'Sustaining a Living Wales – A green paper on a new approach to natural resource management in Wales'. This quick guide explains some of the common terms that are used as part of the new 'ecosystems approach' to nature conservation and management.

What is an ecosystem?

The term ecosystem refers to a community of plants, animals and smaller organisms that live, feed and reproduce in a specific area and the way in which these communities interact with other non-living elements such as the weather, water and soils[1].

Ecosystems are usually defined in terms of their dominant vegetation or environmental features[2]. Describing and defining the natural world in terms of ecosystems allows us to **scale the environment to suit our interests**.

As such, ecosystems can **be of any size**[3] depending on the question being asked or the decision being made. They may be small and localised areas, such as ponds or hedgerows, medium-scale areas such as farms, lakes or grasslands, or very large-scale areas such as those identified by the Millennium Ecosystem Assessment[4]. These include:

> **Marine** – the ocean; **Inland Water** – permanent water bodies inland from the coastal zone; **Forest** – land dominated by trees; **Mountain** – steep and high lands; **Cultivated** – lands dominated by domestic plant species; and **Urban** – built environments with a high human density.

What is ecosystem resilience?

The resilience of an ecosystem is measured as the degree to which it can **respond to disturbance** by resisting damage and recovering quickly. Resilience is important as it helps reduce the potential negative effects of disturbance.

Disturbance covers a range of **natural and non-natural** events including, but not limited

[1] International Union for the Conservation of Nature, *About Biodiversity*, [accessed 15 February 2012].
[2] UK National Ecosystem Assessment, *Ecosystems*, [accessed 10 February 2012].
[3] *ibid*
[4] Millennium Ecosystem Assessment, *Ecosystems and Their Services*, [accessed 10 February 2012]. Initiated in 2001 and called for by the United Nations, the Millennium Ecosystem Assessment provides a comprehensive analysis of all of the world's ecosystems and the services they provide.

to, fires, floods, storms, deforestation, over-grazing, water abstraction or the introduction of non-native species.

Disturbances can lead to the introduction or loss of elements within the ecosystem, which can have dramatic consequences by causing the death or displacement of some species within the ecosystem, or by changing the way that parts of the ecosystem interact with each other[5]. These changes may be **irreversible** and can have knock-on consequences for the function of the ecosystem and its ability to provide key ecosystem services.

In Wales, the **main threats**[6] to ecosystem resilience are climate change, habitat loss and degradation, pollution, development, changes in farming practice, non-native invasive species and wildlife crime, all of which act to fragment habitats, reduce native wildlife populations and increase the vulnerability of these ecosystems.

What are meant by ecosystem services?

The UK National Ecosystem Assessment states that ecosystem services are '**the benefits provided by ecosystems that contribute to making life both possible and worth living**'.[7]

The concept of ecosystem services has been developed to improve understanding of the impact that ecosystems have on people's lives and to help guide human use and management of the earth's natural resources[8].

Ecosystem services are grouped into four main categories[9]:

- **Supporting Services** – not of direct benefit to people, but essential to the functioning of ecosystems and so indirectly responsible for all other services. Includes water cycling, nutrient cycling, soil formation and the processes of plant growth;
- **Regulating Services** –often not attributed real monetary value in conventional markets, but of direct benefit to people. Includes regulating climate, flooding, water quality, air quality, erosion and pollination;
- **Provisioning Services** – the supply of goods that are of direct benefit to people. Includes food, timber, fresh water, fuel and pharmaceuticals; and
- **Cultural Services** – non-material direct benefits of huge importance to the wider social and cultural needs of society. Includes recreational space, tourism, spiritual enrichment, inspiration, reflection and employment.

What is the ecosystem approach?

The ecosystem approach is a '**strategy for the integrated management of land, water and living resources that promotes conservation and sustainable land use in an**

[5] United Nations Environmental Programme, *Biodiversity, Ecosystems and Resilience: Governance for a future with Global Changes*, September 2009, [accessed 9 February 2012].
[6] Wales Biodiversity Partnership, *Current Threats*, [accessed 9 February 2012].
[7] UK National Ecosystem Assessment, *Ecosystem Services*, [accessed 10 February 2012].
[8] Ecosystems services: living within our environmental limits, *What are ecosystem services?*, [accessed 9 February 2012].
[9] Convention on Biological Diversity, *Factsheet on Ecosystem Services*, [accessed 9 February 2012].

equitable way'[10].

This approach explicitly makes the **link** between the services that support life and human well-being and the state of the earth's natural resources.

Welsh Government and natural resource management

The Welsh Government's '*Sustaining a Living Wales Green Paper'*, published in January 2012 proposes an ecosystem approach to natural resource management in Wales to meet the challenging goal of securing 'healthy, resilient and productive ecosystems that are managed sustainably and deliver for society as a whole, supporting employment and wellbeing'[11]. This approach allows for a **unification of natural resource management** from considering individual parts to considering the environment as a whole. It allows for a much **broader scope** to land use management and decision-making that goes beyond the natural environment alone and encompasses **social, cultural and economic factors that integrate, ecosystem services**[12].

What is biodiversity and how is it measured?

In essence, biological diversity refers to the **variety of life on earth** and includes all of the plants, animals, fungi and micro-organisms found on earth as well as the places they live. According to the International Union for the Conservation of Nature (IUCN), biodiversity refers to the 'wide variety of ecosystems and living organisms: animals, plants, their habitats and their genes'[13].

For the most part, biodiversity is considered as the number of species in an area. However, as stated above diversity within a species and the variation between ecosystems are equally as important[14]. Given this, there are three main measures of biodiversity:

1. **Species diversity** - the number and abundance of different species;
2. **Genetic diversity** - the variation between individuals of the same species; and
3. **Habitat diversity** - the variation in ecosystems.

Why does biodiversity matter to ecosystems?

According to the General Assembly of United Nations, biodiversity '**underpins ecosystem functioning and the provision of ecosystem services'**[15].

Every organism within an ecosystem has an important role to play and is connected to every other organism via a complicated network of interactions. Biodiversity boosts **ecosystem productivity**, maintains the **quality and range of services** that people receive

[10] Convention on Biological Diversity, *The Ecosystem Approach*, [accessed 10 February 2012].
[11] Welsh Government, *Sustaining a Living Wales Green Paper*, 30 January 2012, [accessed 10 February 2012].
[12] POST note, *The Ecosystem Approach*, May 2011, [accessed 10 February 2012].
[13] International Union for the Conservation of Nature, *About Biodiversity*, [accessed 15 February 2012].
[14] United Nations Environmental Programme, *Biodiversity, Ecosystems and Resilience: Governance for a future with Global Changes*, September 2009, [accessed 9 February 2012].
[15] General Assembly of United Nations, *High Level Meeting of General Assembly as a contribution to the International Year of the Biodiversity*, 22 September 2010, [accessed 10 February 2012].

and ensures that ecosystems are more **resilient** to disturbances.

Loss of biodiversity can have huge consequences for human well-being and for the services that people rely on, such as threatening food supply and tourism, as well as interfering with essential ecosystem functions that provide many of the underlying supporting services[16].

Can ecosystem services be valued?

A study in 2001 by the Countryside Council for Wales and the National Trust estimated that the environment contributes **9% of total welsh GDP**, directly supplying **£8.8 billion** worth of goods and services, **1 in 6 jobs** and wages worth £1.8 billion[17].

Cultural services provided by ecosystems are one of the easiest services to which to attribute a value due to the direct income received from tourism and recreational activities. The UK National Ecosystem Assessment Technical Report[18] states an average of **£753 million per year is brought to Wales through tourism** alone, with the wider impact of tourism estimated at around £4.2 billion in 2007 and supporting around **78,000 jobs**[19]. Recreational angling alone is valued at over £100 million to the Welsh economy.

Further information

For further information on Ecosystems and the Ecosystem Approach, please contact **Nia Seaton** (**Nia.Seaton@wales.gsi.gov.uk**), Research Service.

See also:

- Convention on Biological Diversity
- UK National Ecosystem Assessment
- Millennium Ecosystem Assessment
- Wales Biodiversity Partnership
- Welsh Government, Environment and Countryside

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[16] Convention on Biological Diversity, *About Biodiversity: Value of Biodiversity and Ecosystem Services*, [accessed 10 February 2012].
[17] UK National Ecosystem Assessment: Technical Report, June 2011, Chapter 20, [accessed 15 February 2012}
[18] *ibid*
[19] UK National Ecosystem Assessment: Technical Report, *Chapter 20 Status and Changes to the UK Ecosystems and their Services to Society: Wales*, [accessed 15 February 2012].