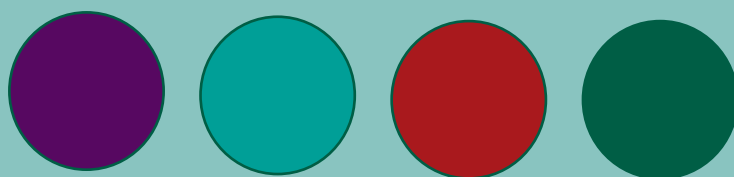


Biodiversity Adaptation



Best Practice in
Wales

Noddir gan
Lywodraeth Cynulliad Cymru
Sponsored by
Welsh Assembly Government



Cyngor Cefn Gwlad Cymru
Countryside Council for Wales

Biodiversity and Adaptation



Biodiversity Adaptation: Best Practice in Wales

Purpose of this document

The need to adapt to our changing climate is recognised as perhaps globally the greatest challenge of the 21st Century. While future climate impacts can be minimised by rapid reduction of present and future greenhouse gas emissions, due to the long-acting timescales that govern atmospheric processes, further warming is inevitable. Despite an imperative for action, climate adaptation has received less attention than greenhouse gas mitigation. This is in part due to uncertainty of the best approaches to use in adapting to a changing climate. This uncertainty derives from the novelty of the challenge and the long time-scale required to monitor the effectiveness of approaches.

Notwithstanding these conceptual challenges, guidance on adaptation approaches for the natural environment has been developed, largely based around enhancing ecosystems resilience to a range of perturbations, including climate change (e.g. *Conserving Biodiversity in a Changing Climate* www.ukbap.org.uk/library/BRIG/CBCCGuidance.pdf). Resilience-enhancing measures are likely to offer considerable synergies with other natural environment management objectives, as well as facilitating the continued delivery of a range of valuable ecosystem goods and services. Much of the challenge now lies in the more widespread incorporation of such guidance into management plans for the natural environment and those societal systems that directly depend on the ecosystem goods and services that the environment provides.

Scope of this document

What follows is a compendium of projects in Wales that can potentially strengthen environmental resilience and help secure the ecological and societal benefits that derive from it. The projects cover a variety of approaches and settings, from urban community projects to rural landscape-scale initiatives. It is not by any means an exhaustive list: new projects are being initiated on a continual basis and there may be a need for a review of this sort to be updated regularly in the future. But it is hoped that bringing

these particular projects, at this point in time, together in one document will serve as a waypoint that can be used to point others in the direction of those already taking action. In this manner a greater understanding of action on climate adaptation and the natural environment can be fostered.

Conserving biodiversity in a changing climate will encompass a variety of measures ranging from local or site-based adaptive management and on-the-ground environmental enhancements, through to wider-scale spatial planning and connectivity enhancements. Consequently the projects outlined in this compendium have been split into four sections:

- **Enhancing resilience** at a local or landscape scale
- **Monitoring and projecting impacts**
- **Understanding and awareness** of adaptation issues
- **Emissions reduction projects** with synergy for biodiversity adaptation

This review primarily deals with adaptation, but land management for delivering greater biodiversity resilience can also deliver substantial emission reductions by conserving and adding to natural carbon stores. These synergistic projects have been included in the final category.

Lastly, as climate change biodiversity adaptation is an emerging field, it is anticipated that over the coming months other initiatives will be developed and existing ones fine-tuned. It is envisaged that an updated version of this document will be produced in the future. Our thanks go to all those that have contributed to this compilation. Please send contributions for consideration in future versions to climatechange@ccw.gov.uk

Enhancing resilience

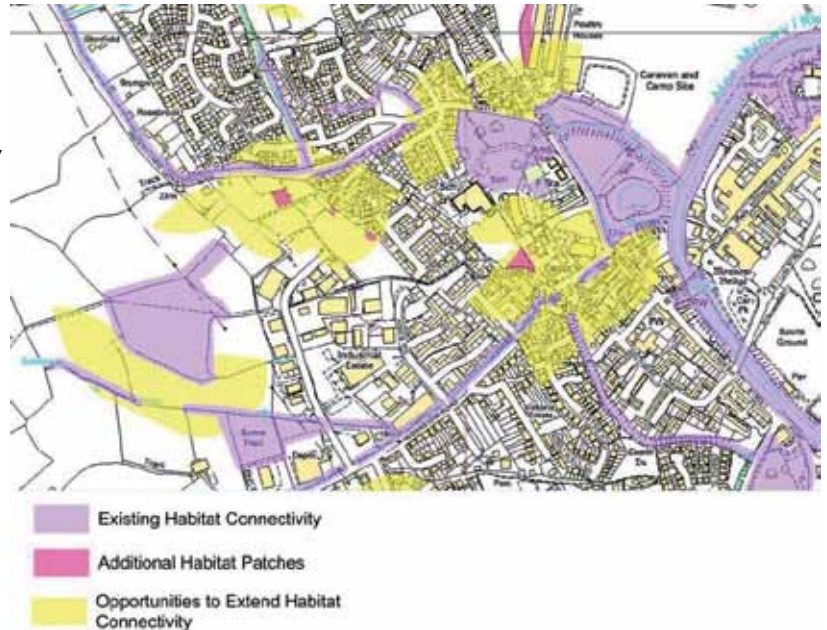


Connectivity Study of the Settlements of Monmouthshire

Location / Lead Organisation: Monmouthshire / Monmouthshire County Council

Aims: To inform the Local Development Plan and to be a tool for developers, and forming part of a wider Green Infrastructure strategy delivered by the local authority.

Timescale: Report completed in December 2009. It is intended for it to be used as an ongoing toolkit used to inform development. Performance could be reviewed regularly as a sustainability indicator.



Partner organisations:

Gwent Wildlife Trust, Monmouthshire Biodiversity Partnership

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Conserving the Park: Pembrokeshire National Park Management Plan

Location / Lead Organisation: Pembrokeshire Coastal National Park / Pembrokeshire Coastal National Park Authority

Aims: Working with partners, Pembrokeshire Coastal National Park Authority (PCNPA) wants to optimise conditions for wildlife and lessen the impact of climate change, habitat fragmentation and neglect within the Pembrokeshire Coastal National Park. The aim is to reinstate the network of wildlife friendly corridors and to manage and enlarge the key wildlife habitats that make up the fabric of the countryside. This could give species the chance to establish larger, more sustainable populations, and to establish new populations. PCNPA also aim to contribute to the reduction in greenhouse gas emissions from land use systems, and reduce the potential for the oxidation and release of the stored carbon in the organic soils of the park's semi-natural habitats.

Timescale: Report to be completed in December 2009. It is intended for it to be used as an ongoing toolkit used to inform development. Performance could be reviewed regularly as a sustainability indicator. By 2007 PCNPA were actively working on 90 sites over 1000 hectares of land annually. By 2009 this had increased on 170 sites on 2000+ hectares of land annually. The project is ongoing and continues to grow in size.

Results so far: The evidence base is varied in quality and quantity. Preliminary data from the Pembrokeshire Bird Atlas suggests that whilst many species of birds are continuing to decline on intensively managed highly productive agricultural land, the marginal (semi-natural) land is supporting increasing numbers, due in part to PCNPA positive management. Skylarks are thriving in these areas. The chough population continues to grow steadily as much higher quality feeding habitat is created by traditional grazing and vegetation management on the coastal slopes.

Vegetation structure and habitat diversity on the vast majority of these sites has improved greatly, as has species diversity (particularly plants). Despite this, many species of butterflies, for example, continue to be conspicuous by their absence.

Overall habitats are in much better condition and linkages within and beyond the site boundaries are much improved. The coastal corridor around the Pembrokeshire coast is now an excellent example of a functioning 'green highway'.

Partner organisations:

The National Trust, Wildlife Trust West Wales, CCW, MoD, Pembrokeshire Biodiversity Partnership

Contact details of lead officer:

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Web links: www.pcnpa.org.uk

Ecological Connectivity Toolkit ('EcoNet')

Background: A central element to the BAP guidelines "Conserving Biodiversity in a changing climate" is the enhancement of ecological connectivity. An understanding of how isolated or connected areas of habitat are can be used to design measures to increase this connectedness. Such enhancements will better facilitate the redistribution of species through our landscape under the influence of a changing climate.

Location / Lead Organisation: The Connectivity Toolkit was developed by a consortium of local authorities in SE Wales working in conjunction with CCW and consultants Baker Shepherd Gillespie.

Aims: The Toolkit is designed to provide a practical framework for assessing existing ecological connectivity and identifying / prioritising connectivity enhancements. It enables a range of users ranging from Local Authority ecologists and planning authorities to planning applicants and the general public, to identify existing and potential connectivity across a range of habitats within a given area. Users can undertake an opportunity analysis to identify potential enhancements.

Result so far: The Toolkit was formally launched in August 2009. Case studies on its use have been undertaken in Tofaen, Caerphilly and Swansea. A trial web interface is available for the project (see web address below). It is hoped that, subject to suitable local data, the approach can be expanded into other areas of Wales. Feedback from a user community workshop has been gathered and will be used to refine the user interface and guidance further.

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The Neath Port Talbot County Borough Council Connectivity Project

Location / Lead Organisation: The Neath Port Talbot Borough Council

Aims: To assist the biodiversity of the County Borough to adapt to climate change by identifying key linkages between areas of valuable habitat and, where appropriate, informing management of key sites.

Timescale: Survey and report have been completed. Identified work areas are under discussion.

Result so far: The report has identified current and potential habitat linkages within the County Borough and is presented in GIS format. Key issues include ground-truthing of the data and management proposals for

the site. This information will be used to inform the forthcoming LDP. The sites are being looked at for inclusion in the County Borough's Conservation Verges scheme and where possible, community projects are being focused in these key areas. A trial expansion of the Conservation Verges scheme will inform management of land under the local authority's Parks department in order to enhance their value for biodiversity. If successful, the resulting Conservation Areas scheme will be the first stage in enhancing the connectivity of biodiversity habitats in the County Borough.

Partner organisations:

Countryside Council for Wales

Contact details of lead officer:

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Managing Change Together - Brecon Beacons National Park Management Plan

Location / Lead Organisation: Brecon Beacons National Park / Brecon Beacons National Park Authority (BBNPA)

Aims: Climate change should be built in as a cross-cutting theme throughout the National Park Management Plan. Each of the Plan's policies should be developed with resilience to climate change in mind. The plan will feed into the Local Development Plan.

have been used to optimise action on climate change within the Park. The Plan's policies, in turn are providing a strategic framework and an evidence base for incorporating climate change adaptation and mitigation as key themes in the Local Development Plan.

Result so far: The development of the Plan has been guided by regulatory assessments (Strategic Environmental Assessment, Sustainability Appraisal, and Habitats Regulations Assessment). These assessments

Contact details of lead officer:

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Weblinks: www.breconbeacons.org

Pontbren Farmers

Location / Lead Organisation: Pontbren, Powys / Coed Cymru

Aims: The project was conceived by a group of neighbours who have worked together since 1997 to develop a more viable system of farming in the uplands of Montgomeryshire. An important part of the project involves planting shelterbelts and restoring hedgerows to allow hardy breeds of sheep to lamb outdoors. It soon became apparent that the new plantings offered significant flood run-off benefits, as well as providing a network of habitat corridors for wildlife. The catchment is now monitored closely to study the effects of plantings on peak water flow through the catchment. The project aims to provide a sustainable future for the consortium of farmers that live within the catchment.

Result so far: Over 16 miles of new hedgerow have been planted. There has been a decline in peak stream flows in those areas of the catchment that contain established shelterbelts. Biodiversity benefits have included the reestablishment of otters in the catchment,

measurable increases in many other species of birds, small mammals and beetles. The new plantings absorb over 200 tonnes carbon dioxide per annum. Processing of forest products yields woodchip bedding for cattle, while 33 agricultural contractors jobs have been protected by the project.

The Pontbren project is a powerful example of the potential for carefully considered land management to deliver a number of important ecosystem goods and services.

In order to determine the best locations for shelterbelt positioning and to model the potential benefits for flood management and other ecosystem good and services the University of Bangor have developed in conjunction with the Pontbren Farmers, a spatial model that represents the land use synergies and trade-offs within the catchment. This decision making tool is now being applied to other catchments (see Cambrian Mountains Initiative)

Primary Partner organisations:

Floodrisk Management Consortium, Countryside Council for Wales, Coed Cymru, Forestry Commission, Environment Agency, Centre for Ecology and Hydrology, University of Wales, Bangor.

Contact details of lead officer:

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Developing South East Wales as a Networked Environmental Region (NER)

Location / Lead Organisation: South East Wales / Wales National Steering Group for Networked Environment Regions

Aims: The Networked Environment Region is an exciting concept aiming to develop a coordinated approach to regional spatial planning in Wales that strengthens and exploits 'green infrastructure', resulting in sustainable delivery of regional development objectives, while preserving and enhancing the environment.

The concept has been developed in South East Wales where the NER aims to deliver improvements in health, education, employment, land values, inward investment, biodiversity, ecotourism and other ecosystem goods and services that are dependent on a flourishing green infrastructure. Specific social objectives include:

- Expand cycleways and links to sustainable transport
- Create an attractive environment that is healthy to live in and attracts appropriate redevelopment investment
- Enhance opportunities for leisure and tourism use of the environment
- Conserve the historic environment and make it more accessible
- Strengthen the regions sense of character and identity.

These objectives will be delivered by green infrastructure enhancements. Underpinning this approach is an analysis of the ecological connectivity of the South East Wales region. By understanding the current fragmentation of natural habitats and seeking to decrease fragmentation in such a manner that ecosystem goods and services are enhanced, social and ecological resilience should be enhanced which will offer powerful synergies with climate change adaptation and mitigation objectives.

Result so far: SE Wales Scoping study completed in March 2009. National Steering Group established to develop approach in other Wales Spatial Plan regions. Dialogue established with Valleys Regional Park, Local Authorities and other key stakeholders.

Timescale: Over the coming year a toolkit is being developed that will translate overarching vision and connectivity maps into relevant actions for public and private sector stakeholders in South East Wales. The National Steering Group will continue to develop the concept for use in other spatial plan areas.

Primary Partner organisations:

Welsh Assembly Government, Countryside Council for Wales, Wales Environment Link, Environment Agency Wales.

Contact details of lead officer:

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E-mail: c.newberry@ccw.gov.uk

Web links: www.walesregen.co.uk/presentations/bs12_huwbrodie.ppt

Gwent Grasslands Initiative (GGI)

Location / Lead Organisation: Gwent, Gwent Wildlife Trust

Aims: The GGI aims to identify areas of species rich grassland, advising and supporting landowners, providing contacts for contract work such as hedgelaying and identifying areas suitable for wildflower meadow restoration or creation. These grasslands provide refuges for flora and fauna and create a network of sites acting as corridors for migration and dispersal. Such sites enhance the resilience of the landscape to climate change impacts.

Result so far: Working with over 180 landowners on 135 local wildlife sites to deliver the aims of the project.

Timescale: 1st phase of project completed in 2007.

Primary Partner organisations:

Monmouthshire Meadows Group, Gwent Wildlife Trust, CCW, Monmouthshire County Council, Blaenau Gwent County Council

Contact details of lead officer:

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Cambrian Mountains Initiative

Applying biodiversity adaptation principles to an upland farmed landscape



Location / Lead Organisation: Cambrian Mountains / Countryside Council for Wales

Aims: The Cambrian Mountains Initiative is a cross-cutting partnership that aims to help promote rural enterprise, protect the environment and add value to products and services in Mid Wales. The project was inspired by HRH The Prince of Wales who, as the Cambrian Mountains Initiative President, wishes to help sustain traditional upland farms and rural communities.

The initiative has secured Defra funding for a pilot study to assess the potential to integrate the biodiversity adaptation principles outlined in the *Conserving Biodiversity in a Changing Climate* guidelines into a wider land-use prioritisation framework for the Cambrian

mountains, including flood risk management, water quality, agricultural activity and carbon management. The Polyscape modelling tool previously used at Pont Bren has been used in this catchment.

Result so far: Development of the Polyscape tool to incorporate measurable metrics to measure the delivery of the Conserving Biodiversity in a Changing Climate guidelines is continuing. A range of land use scenarios have been developed, which Polyscape has optimised. Habitat information is being supplied through a revised Phase 1 habitat classification, derived from remote sensing data.

Primary Partner organisations:

LUC (Land Use Consultants); Bangor University; CCW

Contact details of lead officer:

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Coastal change at Traeth Lafan

Background: Traeth Lafan Local Nature Reserve covers an area of 9.5 kilometres between Bangor and Llanfairfechan along the north Gwynedd coast. The Local Nature Reserve includes a mix of shoreline habitats, and approximately 2,500 hectares of intertidal sand and mud flats which are exposed at low tide.

Having been designated with a number of conservation designations including Site of Special Scientific Interest, Special Protection Area, and Special Area of Conservation, the flats and surrounding lands are important areas for a number of species, especially birds. During the autumn and winter months, the sands are home to the largest



known population of moulting great crested grebes in Britain, as well as large flocks of oyster catchers, red breasted mergansers and golden eye.

Aims:

Stage 1: To identify the likely impact of sea level rises, coastal erosion and climatic / weather changes over the next 50 years; to establish the potential impacts of sea level rise and coastal erosion on land-based assets (property / infrastructure); to identify the impact of sea level change and weather impacts on BAP habitats and species, especially Lapwing and salt marsh. Make reference to the predicted impact sea level rise to maximise the public access and enjoyment opportunities of the site, compatible with achieving conservation objectives.

Stage 2: Based on the predicted scenarios for sea level rise to consider and recommend the mechanism by which public and private landowners can develop land management systems within the study area for the benefit of wildlife and to sustain viable farming enterprises. The project aims to consider the potential for economic benefit arising from the successful delivery of the above and recommend mechanisms for optimising such benefits.

Timescale: Stage one due for completion early Summer 2010; Stage 2 to follow.

Partner organisations:

Gwynedd Council, Conwy County Borough Council, Environment Agency Wales, Countryside Council for Wales, North Wales Wildlife Trust

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Monitoring and projecting impacts



Changing Climate Changing Places

Location / Lead Organisation: Gwynedd County Council, Flintshire County Council, Cardiff Council, Rhonda Cynnon Taf County Borough Council / Welsh Local Government Association in conjunction with local authorities.

Background: In response to the climate change agenda, all 22 unitary authorities in Wales plus Fire and Rescue and National Park Authorities signed the Welsh Commitment to Address Climate Change which was launched in April 2006. This document commits each authority to take action to address the impacts of climate change through adaptation and mitigation activity. The Changing Climate, Changing Places project is helping support the commitment to address adaptation through the development of an approach with several Local Authorities.

It brings together expertise from Environment Agency Wales, Countryside Council for Wales, WLGA and UK Climate Impacts Programme to support four authorities in Wales, to pilot strategic and practical approaches to climate change adaptation. These organisations, together with the local authorities, hold a wealth of scientific, technical and policy expertise that can be used to provide an evidence base to address this agenda.

Aims: This project is being developed to improve the resilience of local communities in Wales to the impacts of climate change. It will improve the capacity of local authorities in Wales to address this issue. Strategic planning and service delivery will be enhanced by developing detailed local climate impact profiles and identifying appropriate policy and adaptation responses.

The project will help answer the basic questions: What does climate change mean for our community?

- What risks and opportunities does climate change represent to services and particular localities?
- How can we adapt now and in the future? Green infrastructural measures involving land use and biodiversity considerations are likely to play an important part in adapting our communities.

The pilots will be used to test and demonstrate best practice, and encourage action across all authorities. The local authorities, EAW, CCW, WLGA and UKCIP will work together to:

- develop more integrated strategic planning for adaptation (and mitigation) at a Local Authority level including for individual service areas
- achieve a greater understanding of likely impacts, level of risk and appropriate responses from the UKCP09 scenarios
- share data and information to inform decision-making
- use specialist local and scientific knowledge to inform policy and practice
- 'climate proof' strategy and practice for key issues like flood risk and water resource management, spatial planning and consider how service areas like education and social services will need to respond to the changing climate and the new challenges this will bring
- identify knowledge gaps and research needs to inform future climate change adaptation

- develop understanding among decision makers, policy officers and members of climate change adaptation and its impacts on strategy and service delivery.

Results so far: Each of the four Local Authorities has produced a Local Climate Impacts Profile (LCLIP) report for their area. The LCLIP reports are being used to influence and make the

business case for adaptation action within each local authority. An interim report on further progress in all the Local Authorities has been produced in 2010. In the mean time, each local authority has tested parts of its services and infrastructure using the UKCIP BACLIAT tool to analyse vulnerabilities and resilience and are currently integrating these into their organisations risk register.

Partner organisations:

Environment Agency Wales, Science Shop Wales and Countryside Council for Wales

Contact details of lead officer:

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National Trust Coastal Risk Assessment Pilots: Llandanwg & North Gower

Location / Lead Organisation: Llandanwg & North Gower / National Trust

Background: The National Trust (NT) owns 230 kilometres or one sixth of the coast of Wales. In 2007 NT published the Shifting Shores report explaining how much of this coastline, including its biodiversity, may be affected by climate change. Since Shifting

Shores, NT have since been working to better understand how the coast will change, what is at risk and how they can work to address it. This means changing the way NT manage the coast and plan for the future. The Coastal Risk Assessment highlights challenges which NT needs to tackle in partnership with others.

Aims: The Coastal Risk Assessment will be used to provide the information to help plan adaptation measures. This means building information on coastal risk into existing management and planning processes. Coastal change will be incorporated into standard risk management processes. Where very complex or inter-related issues have been identified NT will work with stakeholders to develop a Coastal Adaptation Strategy. This will provide a practical approach to managing coastal change, setting out actions to manage specific risks. This will be piloted at two sites in Wales: North Gower and Llandanwg, Harlech. Crucial to this work will be engagement with local communities to help understand the issues and to work with them to develop solutions. The assessment will be kept under review to ensure it is based on the most up to date prediction of climate change impacts.

Results so far: NT have assessed exactly which buildings, habitat sites, historic features and access routes are at risk at each coastal site and can act accordingly, starting with the two pilot sites, Llandanwg and North Gower

Llandanwg: We are already working to maintain a healthy dune system by planting marram grass and defining footpaths. In the longer term, NT and other local stakeholders aim to agree an approach to managing this section of coast which creates the best possible future for people and the environment. NT will start by developing a Coastal Adaptation Strategy for the site and working with the relevant Shoreline Management Plan.

North Gower: We are already working to understand the natural processes and work with them. Work includes:

- Monitoring and maintaining the medieval sea wall which separates Cwm Ivy Marsh from the sea.
- The volunteer accommodation at Cwm Ivy Marsh needs extensive renovation and rebuilding but this has to be in light of the location's vulnerability to sea level rise. To plan the approach NT will develop links with stakeholders and the local community, a key element of developing a Coastal Adaptation Strategy.

Partner organisations:

Welsh Assembly Government, Cadw, CCW, Environment Agency Wales

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Development of flood risk scenarios on Cors Fochno National Nature Reserve

Location / Lead Organisation: Cors Fochno National Nature Reserve / Countryside Council for Wales

Background: Although reduced in size by drainage and reclamation, the remaining expanse of mire at Cors Fochno comprises one of the largest actively growing raised bogs in the lowlands of Britain, and accounts for around 4% (200ha) of the total British resource of raised mire. The site has a complex hydrology that has been extensively modified in the past. Its proximity to the coast, low elevation above sea level and the presence of canalised river channels mean that it is potentially highly sensitive to climate change impacts.



Aims: A research programme has been set up to determine the degree of vulnerability of the raised bog habitat to future changes in hydrology and to explore ways in which this vulnerability could be reduced by soft and hard flood control methods.

Results so far: Hydrological modelling: A full set of hydrological investigations and associated modelling work has been conducted with particular reference to the impact of marginal drainage. The analysis also presented a number of costed options for mitigating the impact of drainage and of climate change/ sea-level rise.

During the last 5 years CCW have installed 175 dams across an area of peat cuttings spanning around 80ha, adjacent to the uncut central dome. Most of the dams, which are constructed from 1-1.5m lengths of interlocking recycled plastic piling, are over

7m long, and have been very successful in restoring active bog vegetation to the dry, moribund peat ridges between the shallow cuttings. Vegetation monitoring indicates that in addition to re-activating the cut-over area large areas of adjacent primary bog have also seen marked increased *Sphagnum* cover due to the improved hydrological conditions.

Preliminary work aimed at reducing the soil nutrient status and controlling invasive rushes, have been carried out at Glandwr, an area of 'archaic' bog at the northern edge of Cors Fochno. Groundworks, including levelling of uneven ground, filling or blocking ditches and building shallow bunds is due to start soon. This will complete the first phase of a re-wetting programme aimed to expand reedswamp and restore sphagnum rich mire communities.

Timescale: Ongoing. CCW and EA Wales have agreed a strategy for working together on a stakeholder process which will focus initially on water level management around Cors Fochno but set in the context of likely sea level rise implications.

Work took place in winter 2009/2010 along two large ditches cut into the western side

of the bog back in the 1960's. Although these ditches are already dammed the peat dams would be vulnerable to damage and erosion in the event of tidal flooding from the canalised river Leri. A number of dams will be strengthened and enlarged to further restore adjacent bog and increase flood resilience.

Partner organisations:

Leeds University, Halcrow, Environment Agency Wales, Countryside Council for Wales.

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Biodiversity monitoring on Valleys Cycle Network

Location / Lead Organisation: South Wales / Sustrans

Background: The Valleys Cycle Network project aims to create 40km of multi-user path linking into the existing National Cycle Network (NCN) routes as part of a coherent and attractive alternative transport network in South Wales. The objective is to achieve up

to 20% modal shift from car-based modes by 2012, based on 2007 levels. It will provide new green corridors to link people to sites for nature. Sustrans and partners are working to determine the impact these corridors have on local biodiversity.

Aims: Sustrans are working with volunteers called 'Wildlife champions' to monitor and record the biodiversity along traffic-free stretches of the National Cycle Network (NCN) - these greenways provide habitats for a surprising amount of biodiversity, and are of particular benefit in urban areas; providing greenway wildlife corridors. The records obtained from surveys will be submitted to the South East Wales Biodiversity Records Centre, to provide tangible data on local biodiversity. The project will also promote the importance and understanding of wildlife and the natural world to local communities.

Results so far: The project is being piloted in SE Wales and Sustrans aspire to work in partnership with a variety of organisations to support volunteers to undertake surveys of habitats and species on allocated sections of path.

Timescale: Currently a pilot in SE Wales. In the long term, Sustrans aspire to secure funding to roll this project out across Wales.

Partner organisations:

A number of organisations have assisted the project including Countryside Council for Wales, Rhonda Cynon Taf & Cardiff Local Authorities, the National Museum of Wales, South East Wales Biodiversity Records Centre, Groundwork Wales and British Trust for Conservation Volunteers.

Contact Details:

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Weblinks: www.sustrans.org.uk/sustrans-near-you/wales

Understanding the effects of coming environmental change on Bosherton Lakes as a basis for a sustainable conservation management strategy

Location / Lead Organisation: Bosherton Lakes, Pembrokeshire / Countryside Council for Wales

Background: Bosherton Lakes Special Area of Conservation (SAC) is a very shallow, artificially-created lake system, lying close to the sea in Pembrokeshire, Wales. It is designated for its internationally important lake ecosystem dominated by stonewort (*Chara* spp.) vegetation. The lakes are fed by a combination of surface flow and groundwater. At present, Bosherton Lakes is in an unfavourable condition due to a combination of historic eutrophication from a sewage treatment works and ongoing diffuse pollution from agricultural activities in the catchment. Climate change scenarios for the UK (UKCIP02) suggest that winters will be warmer and wetter, while summers become warmer and drier, with sea level rise and an increase in extreme events contributing to impacts on the Lakes in future.

Three main threats to the lakes have been identified in the future:

Sea level rise causing overtopping of the dam and a change to a saline environment

Saltwater ingress via the aquifer

Ecosystem-level change due to other climatic effects such as increased sedimentation, temperature increase or drying out in summer.

The potential threat from sea level rise has led to the suggestion that the site will not be viable as a freshwater lake in future. As a result of the perceived vulnerability of the SAC to climate change, research was undertaken to assess the risk and develop an approach to future management (Holman *et al.*, 2009).

Results: The assessment of the impacts of climate change using the UKCIP02 scenarios and monitoring data for water temperature and salinity, and tidal heights suggested that at least up to 2050, climate change will largely increase most of the pre-existing pressures on the site, such as droughts, sediment input and eutrophication, rather than introduce new pressures. The risk of saline intrusion via the aquifer was modelled and assessed as very low. The risk of overtopping of the dam was assessed as somewhat greater, especially during early autumn when lake levels are low but a combination of rising sea levels and storm surges combined with high spring tides could potentially transport seawater into the system.

As a result of considered analysis of the modelling and monitoring data for the site, it was recognized that a phased adaptive

management approach to adaptation was required:

- In the short-term further action to enhance the current conservation interests by reducing other sources of harm e.g. continuation of extensive catchment and in-lake work to improve the water quality and reduce eutrophication were identified as the priority.
- In the medium term - activities that will increase the resilience of the system to future change are required, such as an alien species management warning system or raising spring lake water levels to reduce the risk of summer drought impacts, along with improvements in coastal protection infrastructure, e.g. ensuring maintenance of the coastal dam and developing a surge management plan to block ingress of seawater at times of high risk (for example by installing tidal flaps on the outflow).

- In the long-term, probably beyond the next 50 years, a potential managed transition from freshwater lake to a brackish lagoon should be considered in part of the site, although this will need to be reviewed as new evidence relating to sea-level rise and the extent of its likely impacts become available.

There was a risk that climate change would be seen as justification for abandoning the management of Bosherton Lakes despite the lack of any analytical evidence to justify this. The research assessment for this site has demonstrated that no immediate or dramatic change to site management is required at

present. The study also provides support for further work to tackle the eutrophication problem at the site. There is also a potential benefit in terms of reassurance of the local community that no dramatic impacts or action are required in the short-term.

Further information: Holman, I.P., Davidson, T., Burgess, A., Kelly, A., Eaton, J. and Hatton-Ellis, T.W. (2009). Understanding the effects of coming environmental change on Bosherton Lakes as a basis for a sustainable conservation management strategy. CCW Contract Science Report No. 858. Countryside Council for Wales, Bangor, UK.

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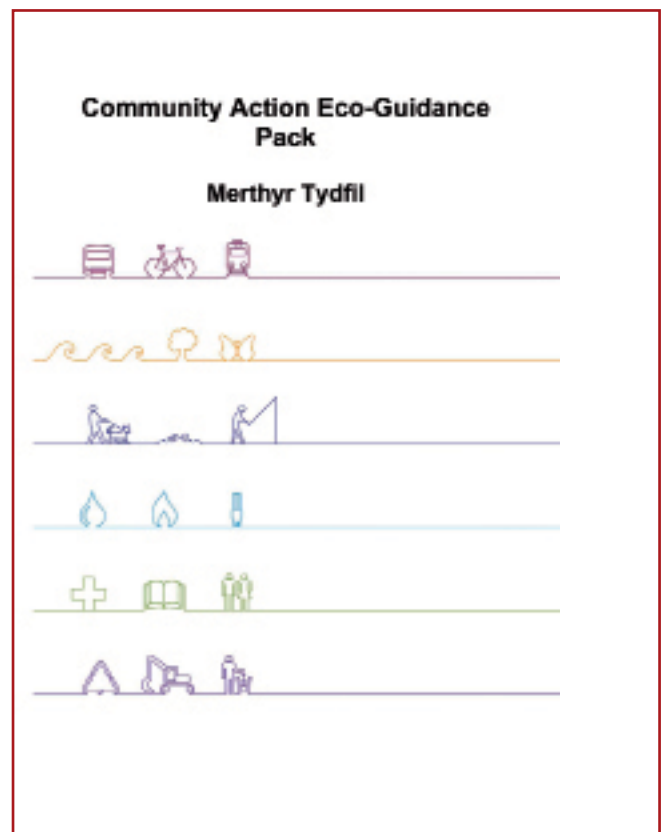
Understanding and awareness

Merthyr Eco Guidance

Location / Lead Organisation: Merthyr Tydfil / Environmental Guidance Group, Merthyr Tydfil County Borough Council, Countryside Council for Wales

Aims: Framed under the question of “Do you want to know how to improve your local environment?” this pack provides users with a range of information on the types of support communities can benefit from. It also points users in the direction of organisations who might be able to help to address a whole range of environmental issues and concerns. For example, what you can do to improve your local park or play area, how to setting up a community woodland project or how to get involved in a community farm or garden. These activities will enhance connectivity, reduce non-climate sources of environmental stress, and foster societal resilience to climate change impacts.

Results so far: The pack was launched in 2009 and is being promoted in Merthyr and beyond by CCW & Communities First.



Partner organisations:

Countryside Council for Wales, Communities First, Merthyr Tydfil County Borough Council.

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Swansea Sustainability Trail

Location / Lead Organisation: Swansea / Sustainable Swansea

Aims: This project is a public awareness initiative that includes climate change mitigation and adaptation projects alongside other sustainability issues. The Swansea Sustainability Trail is a series of locations, organisations and activities in and around Swansea that help demonstrate what sustainability means in practice. Biodiversity conservation and climate change issues are at the heart of the trail.

Each site on the trail welcomes visitors and helps foster understanding of the links between biodiversity, climate change, community, energy, food, transport water and waste.

Results so far: An extensive program of visits for community groups, Further Education groups, and other interested parties has raised awareness of sustainability issues and good practice across Swansea and beyond.

The Trailblazers Summer Scheme has been running for three years providing fun, environmentally-based activities at locations on the Trail for 8–14 year olds, primarily from Communities First areas. From this grew the Trailblazers II project; developing and promoting volunteering and training opportunities at Trail sites to young people aged 14-25. The Trail has been recognised by the Welsh Local Government Association in their Excellence Wales scheme.

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Emissions reduction projects



Blanket bog restoration at Trawscoed, Llanuwchllyn

Location / Lead Organisation: Trawscoed, Snowdonia National Park / Snowdonia National Park Authority (SNPA)

Aims: Restoring afforested blanket bog at Trawscoed through plantation removal and ditch blocking, yielding biodiversity and carbon storage benefits.

Timescale: Work was conducted between March 2006 - January 2007

Results so far: Spruce trees were felled on 9ha of blanket bog on privately-owned land on the Migneint-Arenig-Dduallt SSSI, SPA & SAC. Brash was placed in drainage ditches and grips running throughout the site. Work was done by chainsaw to avoid damaging the sensitive habitats with heavy forestry machinery. Upland vegetation is now re-establishing on site, and *Sphagnum* mosses growing over some of the brash placed in the wetter grips.



Partner organisations:

Countryside Council for Wales

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The Green Valleys

Location / Lead Organisation: Brecon Beacons National Park / Brecon Beacons National Park Authority (BBNPA)

Aims: The community-led Green Valleys project is working to develop the UK's first carbon negative valley in the Brecon Beacons National Park that surveys suggest may have the capacity to provide five times more energy than the area needs from micro-hydroelectric schemes alone. The project aims to raise awareness, audit carbon emissions, prepare for and implement renewable energy installations and to generate income to be reinvested in other projects. These include habitat management (e.g. upland bog restoration which itself has benefits in terms of conserving water for hydro-electricity) woodland management for biofuels and local food production via newly established community allotments.

The initiative is driven by the simple idea that providing an alternative revenue stream from the uplands will dissuade farmers from wanting to drain the uplands or maintain existing

moorland grips because conserving and restoring the upland, carbon-rich and water-rich bogs and soils will provide them and their communities with an intrinsic value outside of agriculture. This can guarantee them a secure income, provided by nature, irrespective of future agricultural trends. Other reasons to reverse upland drainage include improvements to water quality and water conservation and the potential to reduce lowland flooding.

Results so far: BBNPA staff have provided support and advice to several community ventures. Dyffryn Crawnnon Valley in the National Park is on its way to being the UK's first carbon negative community. The valley's first 3.7kW hydroelectric project was installed in 2008 and a 17 kW community owned hydroelectric generator built in spring 2010. It will generate 190% of the valley's electricity needs and reduce the entire community's carbon emissions by



42%. With five other streams already surveyed to supply a further 33kW it will eventually lead to a 94% reduction in carbon emissions making it a forerunner to become the UK's first carbon neutral valley.

From a total of 86 potential small scale hydro-electricity sites surveyed to date, 63 have proven to be feasible. These 63 viable schemes equate to 532 kW installed capacity, which will power over 1,100 homes and equates to nearly 12% of the domestic electricity requirements of the entire National Park. The net effect on the local economy is already nearly £1.5 million per year additional income, earned from the Park's natural resources; ecosystem services providing a direct income. If everything goes according to plan, in ten years time the area could be producing £30 million pounds worth of energy.

These initiatives are also creating local employment by training community members within the Green Valleys area to become hydroelectricity installers. One farmer already generates at least 16kw and another earns as much from his hydro-electricity payback as he does from his hill sheep enterprise. Another aspect of the initiative, the community schemes shared ownership and responsibility, will discourage farmers from wanting to drain the uplands because this would cause the whole community to suffer an economic loss, as well as the farmer.



The Green Valleys project beat stiff competition from 350 entrants in 2008 to become Wales' only finalist in NESTA's Big Green Challenge climate change competition, submitting grand plans to combat rising fuel costs and tackle climate change.

In the Brecon Beacons National Park 11 communities have already signed up for the Green Valleys with another 7 communities in the process of joining. They are all volunteers and community members that are working on various projects which aim to reduce emissions and also make their communities more sustainable.

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Weblinks: www.thegreenvalleys.org

Berwyn & Migneint LIFE Project

Location / Lead Organisation: Migneint-Arenig-Dduallt, and the Berwyn and South Clwyd Mountains / RSPB

Aims: The project aims to deliver practical peatland habitat restoration targets for the site, resulting in the significant improvement of large areas of blanket bog within the Special Areas of Conservation. Activities are particularly focussed on removing obstacles to the habitat returning to or remaining in favourable conservation status. They should also increase the habitats ability to cope with predicted future climate change, both by mitigating against negative impacts of these changes and allowing adaptation to future change.

The increasing awareness of the importance of uplands, and blanket bog in particular, for multiple gains such as water quality, carbon storage, flood risk management etc has meant that the LIFE project in Wales has received a large amount of attention both nationally and internationally. The hydrological monitoring work being carried out by the LIFE project into the impact of drain blocking means that the project has relevance to the EU Water Framework Directive, as well as the EU Habitats and Birds Directives.

Results so far: The LIFE Project started in August 2006 and to date has :

- Blocked over 83,300m of drainage grip at on the RSPB reserve at Lake Vyrnwy.
- Mown more than 194 hectares of moorland at Lake Vyrnwy to reduce the risk of fire damaging the blanket bog and create the heather bales used for blocking the grips.
- Installed the stock fence at Penaran and introduced Welsh Black cattle to graze the site from June - October each year.
- Removed trees from 250 hectares of blanket bog at Penaran.

- Blocked 130,000m of forestry plantation ditch at Penaran.
- Removed more than 11,294 self-seeding trees from 5,846 hectares of moorland at Lake Vyrnwy.

Part of the work the project is doing in the local community involves providing information and events about the project. As of April 2009, the project has:

- Installed two information panels, one at Lake Vyrnwy and one on the Migneint to inform locals and visitors alike about the project.
- Undertaken 33 guided walks and events at Lake Vyrnwy with over 490 people participating.
- Given 29 –illustrated talks to more than 600 people from various groups, including local RSPB groups, garden clubs and Local Access Forums.
- Visited eighteen primary schools within the project area October and December 2007, with 369 pupils participating in classes. Of these visits, 13 were to Welsh language classes (217 pupils) and the remaining five English language classes (152 pupils).
- Produced the project video, leaflet and newsletters, which can be downloaded from the publications page.

The monitoring of the impact of the restoration work began in the summer of 2007 and will take place until March 2011 at least. So far, the project has:

- Completed the first two vegetation surveys at Lake Vyrnwy in 2007 and 2008.
- Completed the first vegetation survey at Penaran, in 2008.

- Carried out eighteen months of hydrological monitoring at Lake Vyrnwy.
- Carried out the first two years of tick monitoring at Lake Vyrnwy.

The project is very keen to advocate best practice for blanket bog management through the project areas. To achieve this the project is talking to local landowners and inviting them to come and see the project first hand.

Newsletters have been produced for 2007, 2008 and 2009 and were distributed to all landowners within the Project area. You can download the newsletters on the Publications page.

Landowners within the Berwyn and South Clwyd Mountains and Migneint-Arenig-Dduallt have been invited to visit the project. These visits are currently on-going.

The Berwyn Society Management Committee visited the project in March 2008.

Montgomeryshire Young Farmers Association visited the project in January 2008.

The project was represented at the 2008 Royal Welsh Show where the DVD was launched and information provided to any individual interested in the project or blanket bog.

Partner organisations:

Countryside Council for Wales, Environment Agency Wales, Forestry Commission Wales.
Stakeholder: Severn Trent Water, United Utilities and Snowdonia National Park Authority.

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Abergwesyn Commons Project

Background: Abergwesyn is a significantly important store of carbon, one of the largest of its kind in National Trust ownership in Wales, and has the potential to become a nationally important carbon sink if an appropriate management regime is identified and implemented.

The management of Abergwesyn cannot be seen or implemented in isolation from the wider Cambrian Mountains area – and particularly the adjoining land owned by Welsh Water Elan Valley Trust and the area

that makes up the Elenydd SSSI, SAC and SPA. Abergwesyn forms an important and integral part of the farming system for a large number of farms with commons rights. This project aims to identify solutions to managing contiguous large upland areas involving grazing, habitats, soil (peat) and water management and will seek funding and support (including from external agencies) to work in partnership to improve the environmental quality of Abergwesyn, encouraging mixed stock grazing and shepherding.

Aims: Production of an options appraisal, identifying options for the sustainable management of Abergwesyn and the wider Elenydd SSSI; development and implementation of a Fire Protection Plan; initiation and assessment of the restoration of *Molinia* - dominated blanket bog; initiation of the protection and restoration of eroded and bare peat.

Timescale: 2009-2012

Results so far: Established contact with commoners, key stakeholders and neighbouring land owners, site monitoring.

Partner organisations:

Countryside Council for Wales, Funding from Biffa

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