
	<p align="center">BIOSPHERE RESERVE NOMINATION FORM</p> <p align="center">Final version dated 28 January 2008</p>	
	<p align="center">Biosffer Dyfi Biosphere</p>	

PART I: SUMMARY

The 'Dyfi Biosphere Reserve' currently covers only 44.26 sq km and does not contain human settlements. In order to comply with the Seville criteria, the Dyfi Biosphere Partnership proposes extending the Biosphere beyond the estuary area, to include the entire catchment area of the river Dyfi and the communities that interact with it.

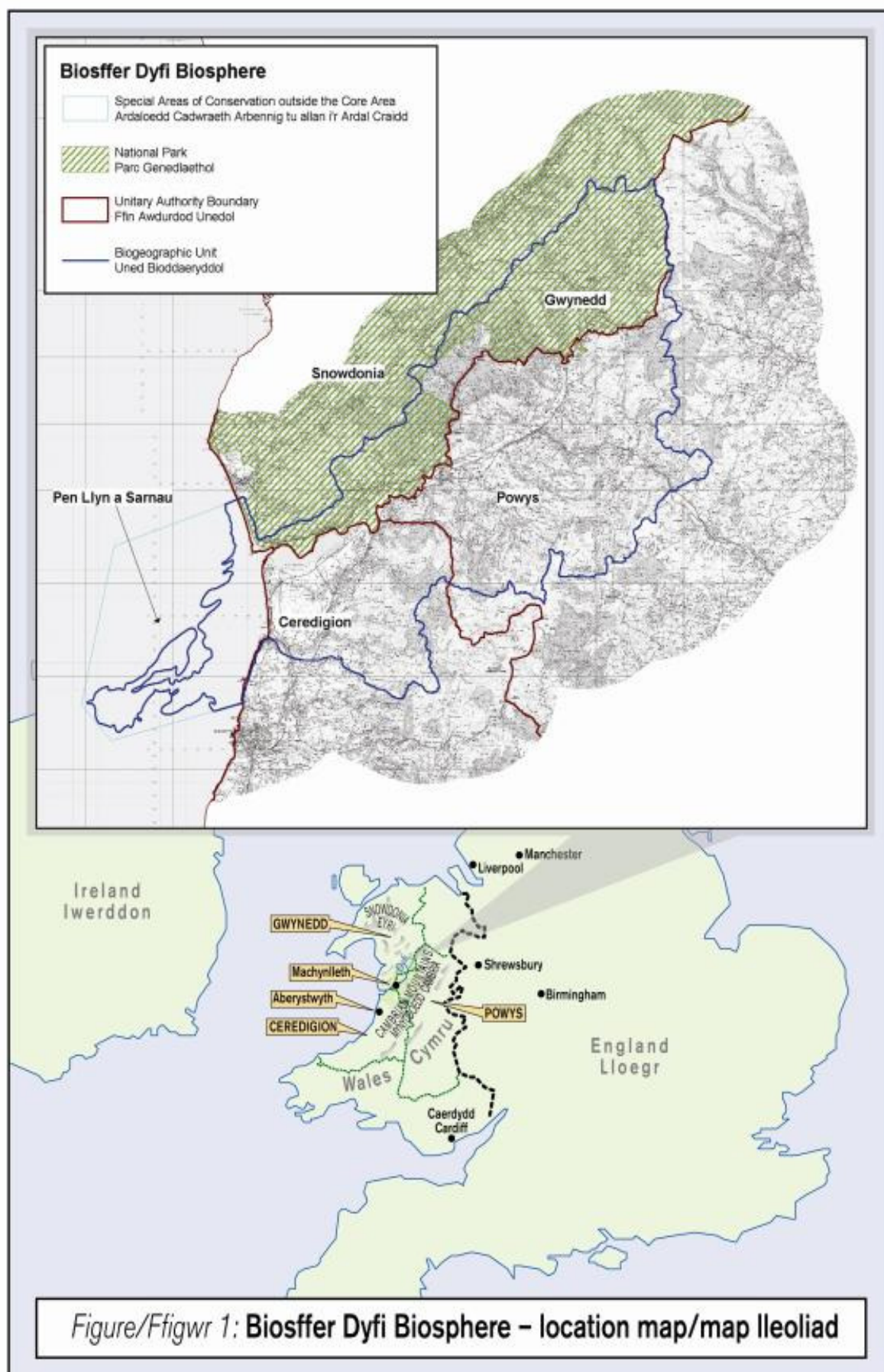
It will incorporate towns, villages, forests, moorland and farmland, and stretch into Snowdonia National Park. The revised site will now extend westwards into the Irish Sea to encompass more of the Penllyn a'r Sarnau Special Area of Conservation.

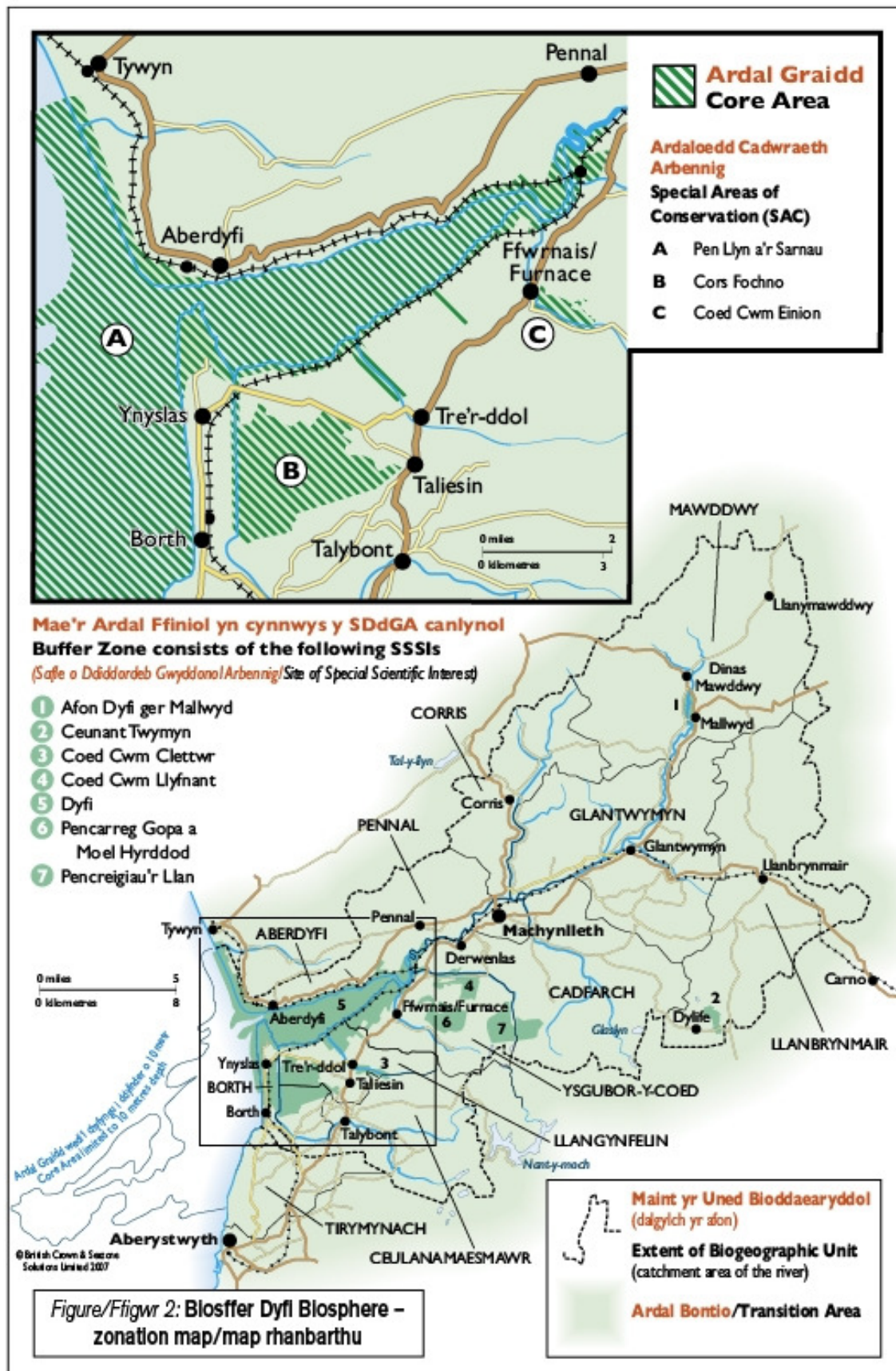
This extension fundamentally alters the character, management needs and priorities of the initiative, and makes a change of name appropriate. The Welsh language is a strong cultural asset to the area and therefore has been incorporated into the new name: 'Biosffer Dyfi Biosphere'.

We believe that this initiative 'for people and place' has the potential to contribute significantly to Wales' ambitions to be at the forefront of sustainable development and that lessons learnt will be useful to the rest of Wales and beyond.

Activities carried out under this banner are as likely to be concerned with the sustainability of local heritage, culture and economy as with the natural environment, since the Partnership is taking an integrated view of what is important to the people of the Dyfi Valley and worthy of attention. While the initiative is rooted in biodiversity and habitat, aspects of our intangible cultural heritage are also valuable and fragile.

Our intention is that the Dyfi Biosphere will be recognised and respected internationally, nationally and locally for the diversity of its natural beauty, heritage and wildlife, and for its people's efforts to make a positive contribution to a more sustainable world. It will be a self confident, healthy, caring and bilingual community, supported by a strong locally-based economy.





1. PROPOSED NAME OF THE BIOSPHERE RESERVE:

Biosffer Dyfi Biosphere

2. COUNTRY:

Wales, United Kingdom

3. FULFILLMENT OF THE THREE FUNCTIONS OF BIOSPHERE RESERVES

3.1 "Conservation - contribute to the conservation of landscapes, ecosystems, species and genetic variation"

The proposed Biosffer Dyfi Biosphere covers an area at least 759 sq. km in size, incorporating towns, villages, forests, farmland, mountains and coast. A significant proportion is in the Snowdonia National Park. The biogeographic unit concerned (the river catchment of the Dyfi) extends from Cardigan Bay at the mouth of the Dyfi estuary to the mountains on the eastern side of Snowdonia. The whole area is very diverse with contrasting landforms and many different habitats.

The following is a brief account of the most important nature conservation features:

Post-glacial geology:

The coastal and estuarine sediments together with a submerged fossil forest, and a 7m archive of continuous peat accumulation, combine to form a unique, and nationally important geological record, providing information on sea level, climate, vegetation and other environmental change during the last 7000+ years.

Marine & Estuary:

The coastal – marine area forms part of the very extensive Pen Llŷn a'r Sarnau marine Special Area of Conservation (SAC), designated under the European Union Habitats Directive. This is a multiple interest site and the qualifying features present in the Biosphere area are:- Estuaries, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), *Salicornia* and other annuals colonising mud and sand), and Mudflats and sandflats not covered by seawater at low tide. Otter *Lutra lutra* is a qualifying species.

Dyfi is one of the best examples in the European Union (EU) of a low-nutrient, in-filling, sandy estuary with a sediment bar or spit at the mouth, and well developed funnel-shaped profile, tidal meanders and tidal delta. Although the estuary has been modified and constrained by past land reclamation, adverse impacts of human development are relatively low and environmental quality relatively high. An extensive area of intertidal sand and mudflats are present, with a wide diversity of sediment-dwelling invertebrate communities. These, along with the saltmarshes, support important migratory bird populations.

The estuary is a vital nursery area for juvenile sea-bass and mullet species, and helps support other important migratory fish, including salmonid populations.

The Dyfi is a regionally important wildfowl refuge. It qualifies as a Special Protected Area (SPA) under the EU Birds Directive because the saltmarshes and wet grasslands of the estuary continue to support a small flock of the greenland white-fronted goose *Anser albifrons flavirostris* at its only regular wintering site in Wales and England.

Sarn Cynfelin, south of the Dyfi estuary, is one of three very unusual shallow subtidal reefs, which extend many kilometres from the coast into Cardigan Bay. The Sarnau are glacial moraines. Fast tidal streams and strong wave action have a profound influence on the marine communities present, and the reefs are characterised by a large number of species resistant to scour and sand cover.

Sand Dunes:

The dune systems of Ynyslas and Aberdyfi display a succession of vegetation types ranging from newly formed embryo dunes to much older, mature dune grassland communities. Ynyslas is an actively growing system and has a significant expanse of young, mobile and semi-vegetated dunes with abundant marram grass. The range of dune depressions or slacks is also special, and along with the marram dunes supports high concentrations of rare and uncommon plant and invertebrate species. The sand dunes are nationally important for fungi, mosses, liverworts and invertebrates.

Estuarine raised bog:

Cors Fochno (Borth bog) is a rare and distinctive feature of the estuary floodplain. Although reduced in size by past reclamation it covers over 650ha and forms one of the largest lowland bog areas in Britain.

The central bog dome of c200ha is the largest area of primary raised bog in lowland Britain, and is surrounded by a further c450ha of modified bog, much of which has active peat growth restored. Rare maritime transitions occur, and the site is described as the 'locus typicus' of estuarine raised bog. The international importance of Cors Fochno is recognised in SAC and Ramsar status.

The central bog dome has a characteristic patterned surface of hummocks, hollows and lawns, and the botanical composition of the site reflects its oceanic location.

The site supports many rare and scarce species and is particularly important for populations of: mosses, liverworts, birds, otter and an outstanding range of invertebrates.

Cors Fochno is a key site for research related to raised mire eco-hydrology, palaeo-ecology and climate inter-actions.

Broadleaved Woodlands:

Broadleaf woodland is an important feature of the valley slopes of the Dyfi and its many tributaries, although coniferous plantations now dominate large areas. Some of the valley sides have fragments of ancient semi-natural woodland dominated by sessile oak, others are more mixed with ash, downy birch, rowan and alder in wet places. Many have an understorey or shrub layer of hawthorn, hazel, blackthorn and with more open areas dominated by bracken and gorse.

The most undisturbed ancient woods have characteristic species of plants and invertebrates that are not found in younger woodlands. Dead wood is an important feature of some sites as it provides habitat for fungi, specialist invertebrates and lichens.

Coed Cwm Einion SAC is notable for its ash woodland containing abundant small-leaved lime. The bryophyte and lichen flora is particularly rich, with large numbers of Atlantic species, of which several are rare on a UK basis. The lichen *Parmelia robusta* occurs here in its only known British locality. Dormice have been recorded on this site and are present in a few other woodlands in the area.

The upper reaches of the Dyfi and its shady damp woods along the tributaries have notable Atlantic bryophyte communities of European significance.

Moorland:

There are several outstanding examples of upland moorland. It comprises mixtures of acid grassland, blanket bog and dwarf shrub heath or heather moorland. Some examples form part of extensive unenclosed uplands but others survive in unplanted areas of young conifer forest. The

blanket bogs are a prime feature dominated by *Sphagnum* mosses and there is a wide range of plant communities including those typical of crags and screes, with some rare species. The southern tip of the Berwyn SAC lies within the Biosphere area. The Berwyn is an area of open moorland of national and international importance for its breeding birds and vegetation..

Farmland:

The Dyfi catchment area cradles the boundaries of Ceredigion and Powys, two of the most predominant agricultural counties in Wales. Thus, farmland makes up a substantial proportion of the catchment area, and agriculture has played a significant part in forming the character of the surrounding landscape.

The area is predominately associated with livestock farming, specialising in beef and sheep production, although there are a few dairy farms in the area. The old system of Hafod and Hendre farming is still practiced in the area. Under this system sheep are brought down from the mountains to lower ground during the winter and sent back to the mountains in the spring with their lambs. Lambs are also fattened on the Dyfi saltmarsh, to produce the flavoursome 'saltmarsh lamb.'

Vegetation cover is made up of predominantly high-nutrient, competitive grass species, with low species diversity, used to graze livestock. However, within the agriculturally improved areas, remain a few pockets of semi-natural habitats, which can be of significant conservation value. These include a number of unimproved pastures with a rich abundance of flora species, and many farms have numerous features such as hedgerows, dry stone walls, small woods, streamside corridors, and patches of rough grazing with bracken or gorse etc., which have great significance for the overall quality and diversity of the landscape and surrounding wildlife.

This wider farmland matrix supports a range of farmland bird species, many of which have suffered widespread decline in Wales, due partially to the decline in arable production (Yellowhammer), and a move towards intensive silage cropping in preference to traditional hay-making in recognition of the changing climate resulting in wetter summers. The farmscape also helps maintain native Bat populations, of which twelve of the UK's seventeen species occur within the transition area of the Dyfi Biosphere.

3.2 "Development - foster economic and human development which is socio-culturally and ecologically sustainable"

Biosffer Dyfi Biosphere has a distinctive culture and pattern of human activity, derived from its geographic, linguistic, social and historic development. The pattern of settlements developed as a result of maritime, industrial and agricultural activities. The advent of the motor vehicle has meant that many people live away from their place of work, changing local communities through migration. This has also led to an economy which is increasingly reliant on the motor vehicle for all its basic needs.

Global developments during the 20th century undermined much of the traditional role of the area. Consequently the area now faces significant economic and social challenges. The rapid growth of major towns and cities elsewhere has led to people seeking a slower and less congested pace of life which they now find in rural communities. This in-migration has resulted in greater diversity in the social and cultural make up of the area.

The combination of the area's environmental and social characteristics does however provide a unique opportunity to integrate economic and social development which is truly sustainable.

Potential for taking advantage of Biosphere status, through the development of a unique brand in Wales, has already been identified for:

- The tourism industry
- Local food producers
- Environmental research establishments
- Green technology development
- Developing jobs directly linked to more sustainable management of the environment
- Promoting the development of sustainable methods for delivering public services
- Promoting the Welsh language and contemporary culture
- Linking heritage and the natural environment
- Increasing community cohesion

Historically, hill sheep farming has been particularly important in this area. However, with the economics of farming changing dramatically, some farmers are now looking at different forms of economic activity, particularly those which build on local agricultural traditions but which ensure that the revenues can be more easily retained in local communities.

During the 1970s, Mid and West Wales attracted a large number of young people searching for alternative lifestyles. In the Dyfi area in particular, these people have subsequently helped to generate a strong community interest in environmental issues and sustainable living. There is now a significant development in businesses supporting renewable energy technologies.

It is anticipated that the enthusiasm created by Biosphere status will stimulate local people to put their own ideas into practice and generate new economic and social activity.

3.3 "Logistic support - support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and sustainable development"

The estuary is unusual in being so active, with no significant impediments to flows of water and sediments. As a result, it is one of the most studied river catchments in the UK.

There is a long history of research and monitoring in the area. The Dyfi National Nature Reserve (NNR) in the Core Area is visited by 3-4,000 students every year, including considerable local use by Aberystwyth University. The Countryside Council for Wales (CCW) operates a schools liaison and booking service, with the main school users being at secondary (=high school) level.

CCW has a wide range of monitoring projects in place. A field studies centre is based at Borth Youth Hostel, close to the Dyfi NNR. A variety of talks and workshops are run by the CCW, for both associated professionals/specialists and interested local people and visitors. Because of the habitat importance of the area, there is a high degree of interest from bird watchers and naturalists. There are well-developed facilities at the Ynys-hir RSPB reserve (Royal Society for the Protection of Birds – one of the largest environmental Non Governmental Organisations in the UK), and a permit system is operated by CCW for visits to the Cors Fochno raised bog.

The Centre for Catchment and Coastal Research (CCCR) brings together complementary expertise in terrestrial and marine research from the University of Wales, Aberystwyth and the University of Wales, Bangor. CCCR began a major programme of research on the Dyfi in July 2007 – the biggest of its kind in the UK.

The internationally-renowned Centre for Alternative Technology (CAT) is 3 miles north of Machynlleth. In addition to its public display circuit, information and consultancy services, courses and publications, it is currently constructing the Wales Institute for Sustainable Education, scheduled for completion during 2008. This will include a 200-seat lecture theatre, workshops, seminar rooms, restaurant, offices, accommodation, and a laboratory, significantly improving conference and residential facilities for local and non-local clients.

A prominent example of local involvement in sustainable development in the area was the establishment in January 1997 of the Dyfi Eco Valley Partnership (now known as ecodyfi), with objectives that stress the sustainable use of natural resources and community-based economies. Ecodyfi brought together representatives from the community, business and public sectors and is now an independent entity. Ecodyfi's past work includes a community renewable energy project, developing demonstration projects that use small-scale hydro, solar and wind power.

A collaborative process known as the "Geographic Pathfinder" is underway, with the aim of improving the economic sustainability and relevance of post 16 learning pathways in Machynlleth and its hinterland. The intention is to bring the governance of the schools closer together and to improve interaction with the rest of the community over lifelong learning. This process may prove helpful to the Biosphere initiative by making it easier for local people to access training relevant to environmental management and in delivering education for sustainable development.

The Communities First initiative (operating in the Powys part of the Biosphere) brings together a wide variety of interests to address social deprivation. It focuses on social cohesion by involving people in developing the capacity of the community to become resilient to change. As the Welsh Assembly Government's key initiative for community regeneration, its presence will also be extremely helpful to realizing the logistic and development functions.

A significant amount of the proposed Biosphere area is within the Snowdonia National Park, providing further support and assistance to local communities and businesses through advice and funding.

A number of establishments have expressed interest in being part of a future network of interpretive, education and display sites spread throughout the valley. Potential participants include Ynyslas Visitor Centre (CCW), Borth Youth Hostel, Ynyshir Visitor Centre (RSPB), Dyfi Furnace (CADW), Machinations (Llanbrynmair), CAT, Museum of Modern Art Wales and the several Tourist Information Centres.

Potential researchers have much to gain from formal association with, and approval from, the Biosphere co-ordination mechanism. This would include endorsement of their work, links into wider UNESCO structures and full co-operation from stakeholders and existing researchers.

However, in return for this they would be required to:

- ✓ engage with the community research forum that is emerging, and
- ✓ agree to any guidelines that may be developed covering contact with the public and other local stakeholders.

4. CRITERIA FOR DESIGNATION AS A BIOSPHERE RESERVE

4.1 "Encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human intervention"

The upper parts of the Dyfi river catchment, beyond the normal limits of agricultural enclosure, have considerable areas of unimproved dry acidic grassland, purple moor-grass and rush pasture which has replaced blanket bog, due to drainage attempts. These open landscapes are extensively sheep grazed. Only small areas of blanket bog and upland heath (moorland) remain, whilst large areas have been converted to coniferous forestry plantation.

Enclosed farmland predominates at lower altitude, with improved grassland the most frequent land cover in the valley bottom and extending across all but the steeper valley slopes. Field size is however, quite small (< 4-5ha) and the farmland landscape is generally a mosaic, with small blocks and ribbons of woodland and hedgerow field boundaries.

Broadleaf woodland is a feature of steeper valley slopes, and bracken and gorse now occupy a proportion of formerly grazed hillsides.

Water and wetlands are an important feature of the area. The drainage network links all parts of the catchment and has a major influence on land-use, settlement and ecology in different sectors of the valley. Upland oligotrophic lakes (e.g. Glaslyn and Creiglyn Dyfi), reservoirs and bogs feed the tributary streams of the River Dyfi. The lower part of the valley in contrast sees the floodplain widen and tidal influence become stronger. Within the estuarine unit there is an exceptional diversity of natural coastal wetland habitats as described below. Here the dynamic natural processes, and relative remoteness of major urban population, have acted to limit the severity of human intervention.

The Dyfi estuary is representative of the bar-built estuaries of north-west Wales. There is a continuous gradient between the clean sands near the entrance to the sea and the mud or muddy sands in the sheltered extremes of the estuaries. The intertidal sandflats support communities of burrowing invertebrates, including dense populations of polychaete worms, crustaceans, bivalve molluscs and gastropod molluscs. Saltmarsh fringing the shores of the estuaries, and the saltmarsh creeks and pools, are important habitat features for juvenile fish.

4.2 "Be of significance for biological diversity conservation"

The estuarine unit of the Dyfi (the original Dyfi Biosphere Reserve as designated in 1976), together with the adjacent sea area, comprises a unique complex of coastal wetland habitats. This includes sub-tidal waters and sand banks, inter-tidal sediments, saltmarshes, shingle, sand dunes, raised bog, fen and reedswamp, fresh and brackish aquatic habitats, and woodland.

Cors Fochno is a very rare and extensive example of raised mire (bog) developed in a coastal, estuarine floodplain location. The site is a priority habitat 'active raised bogs' under the Habitats Directive (92/43/EC) and as such is designated as a Special Area of Conservation (SAC). Also, under the Directive, parts of the SAC constitute 'Rhyncosporion pools' and 'Degraded raised bog capable of natural re-generation'.

The central bog dome (c200ha) constitutes around 8% of the UK resource of primary raised mire and exhibits well-developed hummock and hollow topography characteristic of the wettest parts of relatively undamaged sites. The raised bog also exhibits a good range of vegetation transitions to both fresh and brackish lagg fen/swamp habitats. The maritime transitions to sand dune and saltmarsh are exceptionally rare.

The estuary is one of the best examples of a sandy, drying, nutrient-poor estuary and forms part of the Pen Llyn a'r Sarnau marine SAC. The estuary is a nursery area for commercially important sea bass and mullet species, and the river supports traditional salmon and sea trout fisheries. The saltmarshes (550ha) are the largest in mid-Wales and have grown significantly in extent over the last half-century.

The sand dunes are species rich calcareous systems, and are actively accreting with good early seral communities. The humid dune slacks habitat, though small in extent, is scarce in Europe. Parts of the estuary and surrounding grazing marsh support the only regular wintering population of Greenland whitefronted geese in Wales or England, for which they are designated SPA. Regionally important concentrations of breeding waders also occur.

Each of the following species or species assemblages occurring in the estuarine unit reach qualifying levels of national importance: dune fungal assemblage (10 red list); dune and mire bryophyte assemblages (3 red list); Petalwort *Petalophyllum ralfsii*; higher plant assemblage; wintering European wigeon and Greenland whitefronted geese populations; breeding populations of lapwing, redshank, snipe and curlew; breeding bird assemblages of woodland and of lowland open waters and their margins; Otter population; reptile assemblage; dune and mire invertebrate assemblages (18 Red list); Rosy marsh moth; large heath butterfly; bog bushcricket; *Heliophanus dampfi* salticid spider; *Agroecina dentigera* hunting spider; and *Colletes cunicularius* Welsh vernal mining bee. No endemic species occur.

Much of the Dyfi catchment has a moderately good cover (5-25ha or more habitat per 1km square) of semi-natural broadleaved woodland cover. Upland oakwood and upland mixed ash wood make up most of this. Coed Cwm Einion SAC is notable for its range of woodland types, especially its ash woodland with abundant small-leaved lime. The bryophyte and lichen floras of the valley woodlands are particularly rich, with large numbers of Atlantic species, of which several are rare in the UK. The lichen *Parmelia robusta* occurs here in its only known British locality. Rich invertebrate faunas occur in the broadleaved woodland including UK BAP priority species such as the weevil *Procas granulicollis*. Breeding bird populations are locally or regionally important and include: red kite, raven, pied flycatcher, redstart, and wood warbler. Notable mammals present include lesser horseshoe bat, hazel dormouse, and polecat.

The river Dyfi and its many tributaries, farmland habitats and upland moorland add further to the biological diversity. This is exemplified by the catchment bird fauna, which contains 18 red and 62 amber status species, and the bat fauna, with 12 of the 17 UK species thought to be resident.

The Dyfi SSSI at the lower end of the valley, and the rest of the estuary, are important for their geological (pleistocene/quaternary) and coastal morphology.

4.3 "Provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale"

As the only Biosphere in Wales currently, Dyfi offers an exciting opportunity for the nation. It can be a living workshop for the development of new ways of working and living in balance with the natural environment. The development of innovative mechanisms for integrating conservation and management will build upon the longstanding local interest in promoting sustainable lifestyles.

A mechanism for co-operation between citizens and local and regional government has been initiated already through the community consultation process of Biosffer Dyfi Biosphere. This will be built upon in the coordination of the Biosphere to ensure best practice is identified and disseminated. The formal structures exist within Wales for promoting co-operation among public agencies and cross border working as a result of the Wales Spatial Plan and other regional initiatives. Wales is in a prime position to take advantage of the opportunities presented by Biosphere status due to the statutory duty of the Welsh Assembly Government with regards to sustainable development.

At a meeting of the Dyfi Biosphere Partnership in October 2007, the Minister for Environment, Sustainability & Housing, Jane Davidson, expressed full support for the initiative and commended the aspiration to be an exemplar area for sustainable development. She considered this to be a unique opportunity here and commended the Centre for Alternative Technology, its new Wales Institute for Sustainable Education and its report Zero Carbon Britain.

She saw good synergy between the Dyfi Biosphere's Principles and Assembly Government strategies. She drew attention to the current review of her Government's Sustainable Development Scheme, in pursuance of its statutory duty to promote sustainable development.

4.4 "Have an appropriate size to serve the three functions of biosphere reserves"

The existing Dyfi Biosphere Reserve currently covers only 44.26 sq km. However, in order to comply with the Seville criteria, it is proposed to extend the Biosphere beyond the estuary to include the catchment area of the Dyfi river and the southern reaches of the Pen Llyn a'r Sarnau SAC. The minimum size of the Biosphere Reserve on land is proposed to be 680.8 sq. km, which is the area of the river catchment. Adding the 77.86 sq km marine element of the proposed Core Area brings the size of the biogeographic unit to 758.66 sq km. In addition, the maps show the Transition Area fading out, with an aureole 4 km around the biogeographic unit.

It should be noted that representatives of the nearby communities of Aberystwyth, Carno, Abergynolwyn and Tywyn have every opportunity to be key stakeholders in the Biosphere as well, since the Transition Area does not have a fixed boundary.

4.5 Through appropriate zonation:

"(a) a legally constituted core area or areas devoted to long term protection, according to the conservation objectives of the biosphere reserve, and of sufficient size to meet these objectives"

Legal status of the Core area Conservation designations:

i) Special Areas of Conservation (SACs)

Special Areas of Conservation are designated under the **Habitats Directive (Council Directive 92/43/EEC of 21 May 1992)**.

In the UK the Directive has been transposed into national laws in England, Scotland and Wales by means of the **Conservation (Natural Habitats, & c.) Regulations 1994 (as amended)**. These are known as 'the Habitats Regulations'. Most SACs on land or freshwater areas are underpinned by notification as Sites of Special Scientific Interest (SSSIs).

ii) Special Protection Areas (SPAs)

Special Protection Areas, established to protect wild birds, are designated under the **Birds Directive (Council Directive 79/409/EEC of 2 April 1979)**, commonly known as the 'Birds Directive'.

In England, Scotland and Wales, the provisions of the Birds Directive are implemented through the **Wildlife & Countryside Act 1981 (as amended)** and **The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)**. The 'Habitats Regulations' apply to the UK land area and its territorial sea (to 12 nautical miles from the coast), and are supported by government policy guidance

iii) Ramsar

'The Convention on Wetlands of International Importance especially as Waterfowl Habitat' (Ramsar Convention or Wetlands Convention) was adopted in Ramsar, Iran in February 1971 and entered into force in December 1975.

Generally Ramsar sites are underpinned through prior notification of these areas as Sites of Special Scientific Interest (SSSIs). Therefore, these receive statutory protection in Wales under the **Wildlife & Countryside Act (WCA) 1981**. In England and Wales, further protection is provided by the **Countryside and Rights of Way (CROW) Act 2000**. Government in England and Wales has issued policy statements relating to the special status of Ramsar sites. This extends the same protection at a policy level to listed Ramsar sites in respect of new development as that afforded to sites which have been designated under the EC Birds and Habitats Directives as part of the EU Natura 2000 network.

There will be three elements to the 10,880 ha Core Area:

- A. Cors Fochno Special Area of Conservation (SAC)
- B. That part of Pen Llyn a'r Sarnau SAC that is the Dyfi estuary and shore, and that continues out to sea up until the 10 metre bathymetric contour line
- C. Coed Cwm Einion SAC

A. The 653 ha **Cors Fochno SAC** supports the largest expanse of primary near-natural raised bog in an estuarine context within the UK. Extensive areas of patterned mire include occasional hummocks of the bog-mosses *Sphagnum fuscum* and, more rarely, *S. imbricatum* ssp. *austinii*, with hollows supporting *S. pulchrum*, greater sundew *Drosera anglica*, white beak-sedge *Rhynchospora alba* and bog-rosemary *Andromeda polifolia*. The extensive cover of bog-myrtle *Myrica gale* and maritime margins with black bog-rush *Schoenus nigricans* are distinctive features of this site in an England and Wales context. Areas of domestic peat-cutting peripheral to the dome are now actively regenerating and support a significant area of active bog vegetation.

Substantial areas of degraded raised bog occur peripheral to the active raised bog. Included here is a range of vegetation types in which peat formation has been arrested as a consequence of intensive drainage followed in places by peat removal and/or agricultural management. The vegetation cover of these areas is varied and includes grazed and ungrazed *Molinia* – *Myrica* swards, reed *Phragmites* stands, rush *Juncus* pasture, wet woodland and scrub, drier areas of acid grassland and bracken *Pteridium aquilinum*, and improved grassland over archaic deep peat.

Sphagnum bog and related peat-forming habitats require water levels close to the ground surface throughout the year. The peat shrinkage, oxidation and cracking, which accompany drainage, have a far-reaching and progressive effect on the surrounding habitat. Reversal of such damage is required: i) to replace carbon loss to the atmosphere with a long-term net accumulation; ii) to prevent deterioration of the peat archive and its scientific value; iii) to ensure maximum peat growth and the elevation of the bog surface relative to sea level; and v) to counteract vegetation changes/ habitat degradation induced by past drainage and peat cutting. Shoreline management / flood defence management is also of great importance to conservation of the raised bog. Whilst it is desirable to restore transitions to tidal marsh it is of greatest importance to prevent uncontrolled tidal flooding of the active raised bog from the artificial channel of the River Leri, cut through the bog in 1820.

B. The whole of the estuary and surrounding in-shore waters (10,206 ha) are part of the Pen Llyn a'r Sarnau European Marine Site (SAC & SPA) and are subject to the provisions of Regulation 33 of the Conservation (Natural Habitats, &c.) Regulations 1994. Dyfi is one of the best examples in the EU of a low-nutrient, in-filling, sandy estuary with a sediment bar or spit at the mouth, and well developed funnel-shaped profile, tidal meanders and tidal delta.

There is a continuous gradient between the clean sands near the entrance to the sea and the mud or muddy sands in the sheltered extremes of the estuaries. The intertidal sandflats support communities of burrowing invertebrates, including dense populations of polychaete worms, crustaceans, bivalve molluscs and gastropod molluscs. Saltmarsh fringing the shores of the estuaries, and the saltmarsh creeks and pools, are important habitat features for juvenile fish.

The character of the estuary and the associated dune systems is determined by, and dependent upon, the continuing supply and accumulation of sediment from a seaward source. In the current scenario of climate change and sea level rise, it is imperative to fully examine 'managed retreat' options, for even with continued sediment supply, saltmarsh and inter-tidal sediment habitat may be lost unless they are enabled to roll landwards.

C. The 21 ha Coed Cwm Einion SAC is an example of *Tilio-Acerion* woodland in the extreme west of the habitat's range. This small but unusual wood extends up a steep gorge, and has a canopy with much ash *Fraxinus excelsior* and good representation of small-leaved lime *Tilia cordata*. The ground flora is diverse, and includes an exceptional Atlantic bryophyte and fern flora. Notable species include Tunbridge filmy-fern *Hymenophyllum tunbrigense*, hay-scented buckler-fern *Dryopteris aemula*, the nationally scarce liverwort *Plagiochila atlantica*, and the Red Data Book lichen *Parmelia robusta*. The southern side of the SSSI is covered by Forestry Commission plantations mainly composed of beech, Douglas fir, Sitka spruce, Japanese larch and Lawson cypress. They help maintain shade and high humidity in the valley.

Past clear felling, planting and coppicing activities have resulted in an even-aged canopy with poor crowns. This, coupled with a high percentage of non-native species, and heavy grazing by sheep in some areas, has inhibited the natural regeneration of native trees and shrubs and ground flora. The conifer plantations are being progressively reduced through a mixture of sensitive clearing and thinning whilst ensuring the maintenance of high humidity levels essential to the lichen and bryophyte communities. Some planting has extended tree cover into the bracken dominated areas but generally there has been no woodland management to the north of the river. In places there are large quantities of dead timber. Some control of Rhododendron has commenced. Sheep graze the entire northern side of the site, with severe effects on the ground flora and erosion of steep slopes.

The main conservation objective involves expanding the area of *Tilio-acerion* woodland within the site through natural regeneration, and reaching a stage with varying age structure within the canopy, thus allowing the ground flora to flourish and maintaining the humid conditions favourable for the lichen and bryophyte communities.

"(b) a buffer zone or zones clearly identified and surrounding or contiguous to the core area or areas, where only activities compatible with the conservation objectives can take place..."

Legal status of SSSIs –

Sites of Special Scientific Interest (SSSI) are selected and notified by Countryside Council for Wales (CCW) under Section 28 of the Wildlife and Countryside Act 1981 (as amended). The Act states

“where CCW are of the opinion that any area of land is of special interest by reason of any of its flora, fauna, or geological or physiographical features, it shall be the duty of the Council to notify that fact.” Notification of an SSSI forms the statutory bedrock for protecting land to conserve its natural features. When notifying an SSSI CCW must legally serve notice on all owners and occupiers of the land and numerous public bodies. The notification documents comprise of a citation, map, list of operations likely to damage the special interest (OLDSI list) – a list of operations which owners and occupiers must consult CCW upon prior to commencing the operation, and a site management statement (SMS). The SMS is the Council’s views about the management of the land (including any views the Council may have about the conservation and enhancement of that flora or fauna or those features). Under the Wildlife and Countryside act 1981 CCW is also responsible enforcing the legislation relating to SSSI.

All seven elements of the Buffer Zone are designated under UK legislation as Sites of Special Scientific Interest (SSSIs). They are as follows:

- The Dyfi SSSI – this surrounds the Dyfi NNR and includes all the Dyfi SPA, but it does not include all of the land that borders Cors Fochno
- Coed Cwm Clettwr
- Coed Cwm Llyfnant
- Pencreigiau'r Llan
- Pengarreg Gopa a Moel Hyrddod
- Ceunant Twymyn
- Afon Dyfi ger Mallwyd

• **DYFI SSSI**

This site is of special interest for both its geological and biological features. Situated on the coast of Cardigan Bay it covers an extensive low-lying area straddling the districts of Ceredigion, Meirionnydd and Montgomeryshire. Included are an outstanding west coast estuary, sand dunes and foreshore at Ynyslas and Aberdyfi, woodland, lowland grass and mire, and Cors Fochno (Borth Bog) – one of the most extensive tracts of unmodified, actively growing raised bog in Britain. The site has important populations of invertebrate species and has a wide range of breeding and wintering birds. (Special features of the Dyfi, and the current management practices, will be elaborated further in Part 2).

• **COED CWM CLETTWR SSSI**

Coed Cwm Clettwr is of special interest for its semi-natural broad-leaved woodland. The woodland has developed on steep valley-sides along a section of the Afon Clettwr. It is a good example of ancient semi-natural mixed broadleaved woodland with a variety of native tree species of which sessile oak dominates. Part of the woodland extends along a band of calcareous rock where it shows different types of vegetation with trees such as ash, small-leaved lime and occasional aspen appearing more frequently. About 140 species of flowering plants have been recorded here and the woodland is recognised to be important for the variety of ferns, lichens and mosses it supports.

As well as the features listed above the nationally rare and critically endangered lichen *Parmotrema robestum* has found a suitable place to grow on at least one of Cwm Clettwr’s rock faces and a sub-

species of the wood stitchwort, known from only one other site in Ceredigion and just nine sites in Britain, occurs here. The toothwort is of particular interest for its rarity (found at only two other places in Ceredigion) and its special habitat requirements. It is a parasitic plant that grows on the roots of mature trees such as elm and hazel. This plant is generally confined to ancient woodland sites with high levels of moisture, suggesting that it has a limited ability to disperse and a low tolerance of drought. It is also a significant site for invertebrates in Ceredigion, and the Afon Clettwr provides diversity to the site as a habitat for plants, insects and small birds.

The conservation objectives for the site are to actively manage the broadleaved woodland to facilitate natural regeneration and promote a diverse range of age groups within the canopy layer. Also in order to maintain species diversity, the site requires control over the number of non-native species within the woodland. Managing the site also requires a sensitive approach to the conservation of the humidity of the areas harbouring interesting communities of mosses, liverworts, lichens, ferns or patches of toothwort. Current management includes the erection of stockproof fencing around the woodland to exclude stock from grazing the site, which has led to the previous impoverishment of the ground flora.

- **COED CWM LLYFNANT SSSI**

The site consists of the middle section of the steep-sided valley of the Llyfnant River and contains remnants of ancient woodland displaying numerous biological features with a western oceanic element. On the upper slopes of the south side of the valley is an area of cliffs and scree of huge boulders, with several interesting ferns and mosses reflecting the extremely humid conditions.

The sessile oakwoods *Quercus petraea* have a shrub-layer of hazel *Corylus avellana* and mountain ash *Sorbus aucuparia*, whilst bands of ash *Fraxinus excelsior* are associated with localised outcrops of middle Llandoveryan mudstones and slates. The richer substrate supports a calcicolous flora of dog's mercury *Mercurialis perennis*, sanicle *Sanicula europaea* and woodruff *Galium odoratum*. Wood stitchwort *Stellaria nemorum* ssp *glochidisperma*, in its only known locality in Ceredigion, occurs on wet dripping rocks in one of these patches of ashwood. A diverse snail fauna is present in these flushes and includes the ancient woodland indicator species *Acicula fusca*, *Limax cinereoniger*, and *Spermodea lamellate*.

Although Cwm Llyfnant is an excellent place for wildlife it will only remain so if the necessary management continues. The main management requirements are to maintain the existing habitats (i.e. broadleaved woodland, the upland heath and acid grassland) in the proportions they currently occupy but with the native broadleaved woodland replacing the conifer plantation. Rhododendron, laurel and conifers will be progressively eliminated over time and any recolonisation controlled. Management will involve direction of natural processes and limited intervention, mainly by controlled grazing by livestock to the south of the river.

- **PENCREIGIAU'R LLAN SSSI**

An extensive area of upland plant communities lying at 300-500 metres (985-1640 feet) above sea level on Silurian shales forming the northeastern corner of the upland plateau of north Ceredigion. All of the main types of upland vegetation characteristic of the area are well represented, including acidic heath, acid grassland, blanket mire, basin mire, cliff and scree.

On north-facing slopes the topography, high rainfall and lack of intensive grazing have resulted in deep status of heather *Calluna vulgaris* on bog-mosses *Sphagnum* spp. Lesser twayblade *Listera cordata* occurs here at its only known site in Ceredigion. Elsewhere, extensive areas of blanket mire are dominated by purple moor-grass *Molinia caerulea*, cross-leaved heath *Erica tetralix*, deergrass *Tricophorum cespitosum* and cottongrasses *Eriophorum* spp. and are traversed by mineral-rich flushes containing flea sedge *Carex pulicaris*. On drier parts, sheep's fescue *Festuca ovina* and mat-

grass *Nardus stricta* are dominant in some areas; heather, bilberry *Vaccinium myrtillus* and crowberry *Empetrum nigrum* in others. A large basin mire has bog rosemary *Anndromeda polifolia* frequent on bog-mosses, and bottle sedge *Carex rostrata* forms extensive stands by water channels. A smaller basin mire with several pools is rich in dragonflies typical of oligotrophic waters, including common hawker *Aeshna juncea* and black darter *Sympetrum danae*. East-facing cliffs at the head of Cwm Llyfnant are dry and support few plant species, but a colony of the scarce hawkweed, *Hieracium argenteum*, is present. Ring ouzel, wheatear and redstart are known to breed here.

The habitats present at this site have been shaped by traditional forms of management, in particular grazing, except for the very steep slopes, which have developed more naturally with little or no deliberate management. Although Pencreigiau'r Llan is an excellent place for wildlife it will only remain so if the necessary management continues. CCW is actively involved in managing the site with local landowners through managing grazing arrangements, controlling burning practices, managing the soil fertility levels, invasive species and drainage, and mitigating the impacts of acidification and pollution in order to reach an optimum condition for the habitats at Pencreigiau'r Llan.

- **PENCARREG-GOPA A MOEL HYRDDOD SSSI**

An area of upland, ranging in altitude from 230-447mm (755-1467ft), supporting luxuriant tussocky blanket mire and dwarf-shrub heath communities, as well as an area of sessile oak woodland. There are four types of blanket in the site, mainly clothing the eastern half, which includes the two hills, Moel Hyrddod and Pencarreg-gopa. The mire types are characterised by the following broad plant associations – heather-cottongrass rich in bog mosses; heather-cottongrass-bilberry and heather-deergrass. Plants such as cross-leaved heath *Erica tetralix*, crowberry *Empetrum nigrum*, bog asphodel *Narthecium ossifragum* and round-leaved sundew *Drosera rotundifolia* are found with a diverse moss and liverwort flora. On the drier areas blanket mire vegetation merges into sub-montane dwarf-shrub heath dominated by heather *Calluna vulgaris*. This community becomes much more dominant in the south-western part of the site, where tall, lightly grazed heather moor grades into blanket mire. In the south-west corner of the site is a small mire containing heather, cross-leaved heath, purple moor-grass *Molinia caerulea*, cottongrasses *Eriophorum sp.*, bilberry *Vaccinium myrtillus*, and cranberry *V.oxycoccus*, together with flushes containing soft rush *Juncus effuses* and the bog moss, *Sphagnum recurvum*.

This upland area is also of ornithological importance, particularly as foraging territory for the red kite and other carrion-feeding species. The site also includes the wooded valley of Nant Dynyn and Afon Cymere, known as Coed Fedw-fach, which is predominantly sessile oak *Quercus petraea* with occasional downy birch *Betula pubescens* and ash *Fraxinus excelsior*.

- **CEUNANT TWYMYN SSSI**

Ceunant Twymyn comprises a 2 km long section of the Twymyn Valley which is located approximately 9km south of Llanbrynmair and 14 km east-south-east of Machynlleth. The site is of exceptional geomorphological interest since it provides a classic example of the process known as "river capture", in which a former eastwards flowing tributary of the Afon Clywedog was diverted northwards to follow the course of the modern Afon Twymyn.

In the southern part of the site, the Afon Twymyn flows into the valley via the spectacular 50m high Ffrwd Fawr waterfall before entering a deeply incised V-shaped gorge with scree-covered flanks which rise steeply on each side to an altitude of 350 m. South of the gorge is an elevated, east-west-trending dry valley which is filled with boulder clay. Approaching Pennant-uchaf in the northern part of the site, the river enters a U-shaped valley, floored by a 350 m wide floodplain

which is overlooked in the west by a semi-circular valley head, occupied by the Nant Ddeiliog tributary.

The Afon Twymyn at Ffrwd Fawr provides an excellent example of river capture in its headward reaches. Three kilometres from its source, the river falls 50m at Ffrwd Fawr and then enters a rejuvenated gorge section over a series of cascades and smaller waterfalls. The original course of the river lay eastwards to the Clywedog catchment but it was captured through headwater retreat of the Afon Twymyn, aided by structural and possibly glacial factors, leaving a dry gap as evidence of the diversion. Tributaries which enter the Twymyn in the gorge section have also been rejuvenated and there is active sediment supply to the river from adjacent slopes during extreme rainfall events.

CCW is currently managing the site through voluntary agreement with local landowners on grazing practices and restricting the application of fertiliser and land drainage, in order to maintain the low soil nutrient and wetland properties of the site. These agreements are put in place to ensure that the necessary management continues to keep the site in a favourable condition.

- **AFON DYFI GER MALLWYD**

Afon Dyfi ger Mallwyd is of special scientific interest for the wide range of fluvial and glacial/fluviological landforms (e.g. terraces, morainic mounds, kettle basins and an alluvial fan.) Analysis of these landforms and the sediments exposed in river bank sections has facilitated the development of an integrated model of the evolution of this fluvial system since Late Devensian times. The site incorporates a stretch of the floor of the middle Dyfi Valley extending downstream from the road bridge at Dinas Mawddwy for a distance of approximately 2.4km.

This reach of the Afon Dyfi is important for a sequence of river terraces. They are unusually well preserved due to the local confinement of low lateral mobility of the river. Three main terraces provide an important record of Holocene river changes and good bank sections reveal the composition of the terraces and their relationships to the fluvioglacial deposits that underlie them. The terraces are derived from reworked glacial deposits and comprise mainly medium to coarse gravels typical of many rivers in mid-Wales.

"(c) an outer transition area where sustainable resource management practices are promoted and developed"

By its nature, the flexible Transition Area does not have a defined boundary. Individuals and/or community groups and businesses who feel they can help the area work towards the Dyfi Biosphere's vision are being invited to liaise with those coordinating the Biosphere development process.

In addition to the zones required under the Seville Strategy (Core, Buffer and Transition), maps of the Dyfi Biosphere (see Appendices) indicate the extent of the biogeographic unit that underpins the designation. On land this is the catchment area of the river Dyfi and at sea it is the coastal sub-cell out to 10m depth. The maps show the Transition Area fading out, with an aureole 4 km around the biogeographic unit.

Cross-cutting issues of concern for the locality include:

- The future of farming as the agricultural industry struggles to adapt to change. Many in the farming community anticipate that declining stock numbers, the likely consequence of the CAP reforms of 2005, will further reduce farm incomes
- The question of effectively engaging local business in the wider tourism industry to generate a sustainable income for the Dyfi's inhabitants, in order to protect local services and produce the greatest benefit locally

- Changing socio-economic characteristics - the need to retain more young people within local communities, as the young are leaving and retirees are moving into the area, raising house prices
- The problems facing lower lying communities in respect of climate change and sea-level rise
- Concern over the dilution of the Welsh language and culture, some of which is linked to tourism and related inward migration.

Sustainable management of agricultural land within the transition area is met through Cross Compliance regulations. Cross Compliance is a European Union (EU) requirement setting out standards that land managers have to meet in order to receive the Single Farm Payment (SFP). There are two elements to Cross Compliance:

- Statutory Management Requirements (SMRs) – these are mainly existing EU obligations covering environmental, public health, plant health and animal health and welfare standards
- Standards consistent with keeping the land in “Good Agricultural and Environmental Condition” (GAEC).

Biosphere activities in the transition area will have regard to the following objectives:

1. To keep and improve the area as a great place to live, work and bring up children - and to create more opportunities for them to stay here
2. To place a greater value on our natural environment and on Welsh language culture
3. To increase activity in nature conservation through voluntary means
4. To encourage discussion, agreement and co-ordination between people and organisations with different values and priorities
5. To develop a more self-reliant local economy; less dependent on fossil fuel, with growth driven by local knowledge and resources
6. To develop a more sustainable area; with residents and visitors choosing locally-produced goods more often and reducing our impact on the world
7. To use the Biosphere ‘brand’ to promote the quality of local agricultural & other products and tourism experiences
8. To ensure education and training in sustainable development, as well as research in the natural and social sciences, in support of the Biosphere vision
9. To take advantage of help and advice from UNESCO and other Biosphere Reserves across the world

4.6 "Organizational arrangements should be provided for the involvement and participation of a suitable range of *inter alia* public authorities, local communities and private interests in the design and the carrying out of the functions of a biosphere reserve."

The stakeholder engagement and nomination process has been taking place since April 2006 and has been overseen by the Dyfi Biosphere Partnership. It represents a cross section of statutory bodies, business and community interests operating in the area and its members are listed at section 17.6.1.

This Partnership (with the addition of the RSPB) extended its role in August 2007. It is acting as a coordination mechanism until such time as UNESCO accepts the nomination. During the appraisal process the Partnership will work towards developing the new co-ordination structure, as envisaged in Appendices 2, 3 and 4.

4.7 Mechanisms for implementation

Does the proposed biosphere reserve have :

"(a) mechanisms to manage human use and activities in the buffer zone or zones" ?

Yes. All the elements of the Buffer Zone are designated as Sites of Special Scientific Interest (SSSI) under UK legislation. The citations specify the restrictions placed on the management of each SSSI. The regulating authority is the Countryside Council for Wales.

"(b) a management plan or policy for the area as a biosphere reserve" ?

Our policy is to work towards a situation where Biosffer Dyfi Biosphere will be recognised and respected internationally, nationally and locally for the diversity of its natural beauty, heritage and wildlife, and for its people's efforts to make a positive contribution to a more sustainable world. It will be a self confident, healthy, caring and bilingual community, supported by a strong locally-based economy.

An initial set of objectives and potential is listed in section 4.5c above. These will be refined during the appraisal period, November 2007 to September 2008 and an action plan created to address them. The Biosphere intends to facilitate and support relevant initiatives from the local and business communities, helping them to connect with existing delivery programmes wherever possible.

"(c) a designated authority or mechanism to implement this policy or plan" ?

This will be part of the mechanism described above in Section 4.6 i.e. the successor to the Dyfi Biosphere Partnership. The Countryside Council for Wales, on behalf of the Joint Advisory Committee (or whatever name is eventually adopted for the coordination mechanism for the Dyfi Biosphere), will be formally responsible and answer to the Welsh Assembly Government.

X

Yes No Planned

"(d) programmes for research, monitoring, education and training"?

The Biosphere Partnership has a research sub-group that liaises with a number of stakeholders including: the Universities of Aberystwyth and Bangor; Local Education Authorities; and other education providers and interest groups.

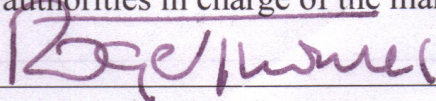
During the appraisal period a suitable framework for research, monitoring, education and training will be developed as part of the action plan.

Extensive research programmes are described in Part 2.

5. ENDORSEMENTS

5.1 Signed by the authority/authorities in charge of the management of the core area(s)

Full name : Roger Thomas



Title : Chief Executive, Countryside Council for Wales

Date: 30 January 2008

5.2 Signed by the authority/authorities in charge of the management of the buffer zone(s):

Full name : Roger Thomas Roger Thomas

Title : Chief Executive, Countryside Council for Wales

Date: 30 January 2008

5.3 Signed as appropriate by the National (or State or Provincial) administration responsible for the management of the core area(s) and the buffer zone:

Full name : _____

Title : Welsh Assembly Government

Date: _____

5.4 Signed by the authority/authorities, elected local government recognized authority or spokesperson/representative of the communities located in the transition area.

Full name : Mark Kerr Mark Kerr

Title : Chief Executive, Powys County Council

Date: 30 January 2008

Full name : MISS BRONWEN MORGAN B. H. Morgan

Title : Chief Executive, Ceredigion County Council

Date: 31 January 2008

Full name : HARVEY THOMAS H. Thomas

Title : Cyngor Gwynedd Chief Executive

Date: 4/2/08

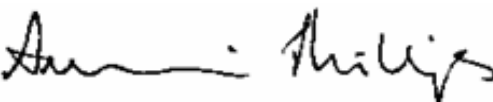
5.5 Signed on behalf of the MAB National Committee or focal point:

Full name : _____

Title : _____

Date: _____

5.6 Signed by the authority/authorities in charge of designated Protected Landscapes:

Full name : Aneurin Phillips  _____

Title : Chief Executive, Snowdonia National Park Authority _____

Date: 4 February 2008 _____