UK Biosphere Reserves: status, opportunities and potential

A review and assessment against the criteria set out in Article 4 of the Statutory Framework of the World Network of Biosphere Reserves

Taynish and Mid-Argyll

A Report by Hambrey Consulting for DEFRA/UKMAB April 2009
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Contents

1 Summary

1. The existing Biosphere Reserve (BR) at Taynish in mid-Argyll no longer meets the revised UNESCO criteria. Although of exceptional ecological quality it fails to encompass sufficient gradation of human intervention or opportunity for sustainable development.
2. Although it might be possible to re-designate a Biosphere over a larger area, with the existing Biosphere Reserve serving as the core area, the configuration of such a BR is not obvious and local support for the idea appears to be limited.
3. This report makes a preliminary assessment of the potential of two alternative extended areas in terms of rating against the UNESCO BR criteria, and in terms of potential social, economic and environmental benefit.
4. The current BR (also a National Nature Reserve NNR) itself well meets the criteria for a *core area*. There are sufficient SSSIs in the surrounding area to achieve a satisfactory, if somewhat scattered *buffer zone* without affecting existing land management or causing local inconvenience.
5. The scope and extent of a wider *transition zone* is less obvious (taking into account cultural, ecological, geographic, demographic and economic factors). Possibilities include a modest area encompassing Knapdale, and across east to Lochgilphead and north to the Crinan Canal; or a much larger area covering the whole of mid-Argyll.
6. In terms of ecological quality these larger areas would score well against the UNESCO criteria, and existing conservation management is relatively strong; but the potential for added value in terms of the promotion of sustainable development, education and awareness is less clear.
7. Taynish BR/NNR itself is literally out on a limb. Although a tiny gem of an NNR, it is not significant in economic or land-use terms, it can only be accessed with difficulty, and it is not well known.
8. Potential organisational arrangements are also uncertain. Our initial impression is that local organisations that might be involved in a BR are not particularly enthusiastic. The Dalriada Project in neighbouring Kilmartin is relevant here. This is a landscape based sustainable development initiative with many similar objectives to those of a BR. It has received council backing and significant lottery funding. Our impression is that there is limited appetite for an additional similar initiative

2 Introduction

2.1 The origin and nature of biosphere reserves

The origin of Biosphere Reserves goes back to the "Biosphere Conference" organized by UNESCO in 1968, the first intergovernmental conference to seek to reconcile the conservation and use of natural resources, thereby foreshadowing the present-day notion of sustainable development[1]. In 1973, the concept of Biosphere Reserves was formally established within UNESCO's Man and the Biosphere (MAB) programme. Their functions were to conserve biodiversity and provide facilities for research, education and training.

The MAB philosophy and programme was substantially revised at the 1995 Seville Conference that created a *"Statutory Framework of the World Network of Biosphere Reserves"* and associated criteria for designation. According to Article 3 of this framework, Biosphere Reserves (BRs) are expected to be *"sites of excellence to explore and demonstrate conservation and sustainable development on a regional scale".* BRs are expected to combine three functions: conservation; sustainable development; and logistic support (education, training, exchange etc)

Management of BRs is conceived within a threefold zonation – a ***core zone*** of high biodiversity value subject to some form of legal protection; a ***buffer zone*** managed in such a way as to secure the qualities of the core while at the same time encouraging sustainable use; and a ***transition zone***, which may include urban areas, in which the ethos of sustainable development can be pursued more broadly, and where the links and inter-dependencies with the core and buffer zones can be explored and demonstrated.

The most recent interpretation of the nature and purpose of biosphere reserves is to be found in the Madrid Action Plan[2] , which includes the following vision statement: *"The World Network of Biosphere Reserves of the Man and the Biosphere Programme consists of sites of excellence to foster harmonious integration of people and nature for sustainable development through participation, knowledge, well-being, cultural values and society's ability to cope with change, thus contributing to the [Millennium Development Goals]".*

The term Biosphere Reserve is therefore a misnomer: the designation is neither restrictive nor exclusive, except in so far as a legally designated core zone is required. Taken as a whole it is not a protected area as defined by IUCN. Rather it is the *only* global designation – or accreditation – for an area demonstrating excellence in sustainable development in practice.

Governance of Biosphere Reserves is highly variable, ranging from relatively autonomous facilitating teams, through a variety of representative and participatory structures, to relatively formal and powerful institutions – and there is no international consensus or indeed guidance on the best governance model. This diversity has

[1] UNESCO MAB "Biosphere Reserves in a nutshell".
[2] [2] UNESCO 2008. Madrid Action Plan for Biosphere Reserves (2008-2013) http://portal.unesco.org/science/en/ev.php-URL_ID=6389&URL_DO=DO_TOPIC&URL_SECTION=201.html

been allowed, if not encouraged by UNESCO to maximise the opportunities for learning and demonstration. There is one key proviso however. The Statutory Framework specifies the need for participatory decision-making structures, involving a wide range of stakeholders, as well as provisions for a "management policy or plan for the area as a biosphere reserve".

2.2 Status of BRs in the UK

In 1976, the UK Government put forward thirteen National Nature Reserves to be part of the global Biosphere Reserve network. All were designated by UNESCO.

A UK review was carried out in 1998 and published in 1999, following which 4 reserves were de-listed because it appeared unlikely that they could meet the revised criteria in the Statutory Framework. The remaining Biosphere Reserves in the UK are:

- Taynish, Scotland
- Beinn Eighe, Scotland
- Silver Flowe/Merrick Kells and Cairnsmore of Fleet in Galloway, Scotland
- Loch Druidibeg, Scotland
- Dyfi Valley, Wales
- Moorhouse-Upper Teesdale, England
- North Norfolk Coast, England
- Braunton Burrows-North Devon, England

Of these, Braunton Burrows has been expanded and developed to meet the new criteria and was officially re-designated in 2002. An expanded Dyfi Valley Biosphere Reserve, Wales has been proposed to UNESCO for re-designation under the new criteria. Several feasibility studies have been undertaken in respect of a new-style BR based around the existing Silver Flowe/Merrick Kells and Cairnsmore of Fleet BRs, and there is significant local interest in progressing this to full UNESCO designation/accreditation.

The remaining 5 BRs, though still formally members of UNESCO's World Network of Biosphere Reserves, have, to date, not been redeveloped in line with the new criteria, and are in a sense "in limbo", with both re-designation and delisting as possible options. We refer to them below as "lapsed" BRs.

2.3 Purpose and structure of this report

This report and associated exercise for DEFRA/UKMAB are designed to assess the current status and activities of the 5 "lapsed" BRs, and the degree to which there is the desire and potential to expand, redevelop and re-designate them to meet the new criteria; or whether they should be delisted.

A primary purpose of this report is to present a preliminary assessment of the area, and alternative possibilities for taking forward a biosphere reserve, against the standard "Seville" criteria. This should serve as a resource for local people, the UK MAB Committee, and the MAB programme, and inform any possible initiatives. The assessment should also serve as a starting point for a full proposal to UNESCO, should local people and organisations decide they wish to progress the concept.

The report offers:

- a brief overview of the history and status of the existing reserve;

- a resume of some of the views and perspectives expressed at the scoping meeting held at Tayvallich on 27th November 2008;
- a preliminary assessment of alternative areas and possible management structures against the standard UNESCO criteria;
- A summary assessment of possible social economic and environmental benefits which might arise from BR designation;
- A summary assessment of the strengths and weaknesses of the area in terms of potential to realise the ideals of sustainable development.

3 The status and functioning of the existing Biosphere Reserve

Taynish Biosphere Reserve (BR) is currently contiguous with Taynish National Nature Reserve (NNR). It is 330ha of very high quality mixed deciduous woodland on the Taynish Peninsula, Mid Argyll, described by Scottish Natural Heritage (SNH) as "temperate rainforest" [3] It is also designated part of the Taynish and Knapdale Special Area of Conservation (SAC), is part of Taynish Woods Site of Special Scientific Interest (SSSI) and is in the Knapdale National Scenic Area. Details of the Taynish Woods SSSI are given in Annex 3. The reserve is contiguous with the Linne Mhuirich SSSI. Nearby are the Tayvallich Juniper and Fern, West Tayvallich Peninsula, and the Ulva Danna and McCormaig Isles SSSIs. Together, these SSSIs form much of the Tayvallich Estate, with which SNH has secured management agreements. SNH currently owns all the reserve, which is essentially the entire peninsula with the exception of three private houses, and also has a 20-year foreshore lease taken out with the Crown Estate commissioners in 1996.

Taynish NNR/BR is currently managed to maintain dynamic woodland with open habitats. The endangered Marsh Fritillary butterfly is a particular concern, as is the management of the coastal area. Research, monitoring and survey are a high priority as the management of these woods is a specialised matter. Some visitor facilities are good, including an all-ability track from the reserve car park to the shore of Loch Sween and a 5km woodland trail. There is a picnic area and interpretative facilities at the reserve car park and also coastal trails at the southern end of the reserve. The road to this car park is poor if one wishes to drive, and this may be acting as some constraint on the number of visitors. The intention is to encourage visits on foot or by bicycle from the nearby village of Tayvallich. Village facilities, including more car parking, are within 500m of the reserve, and the local primary school is right on the reserve boundary.

Practical research and monitoring is an integral part of reserve management. There are links with Edinburgh University and ongoing long-term monitoring projects. Annex 4 details some of the recent research programmes of the current reserve.

[3] The Story of Taynish National Nature Reserve. Scottish Natural Heritage. View online at: http://www.nnr-scotland.org.uk/downloads/publications/The_Story_of_Taynish_National_Nature_Reserve.pdf

4 Alternatives and opportunities for a future Biosphere Reserve in the area

4.1 Overview of the area, people, economy and ecology

Taynish BR/NNR occupies most of a small wooded peninsula in Knapdale, Mid-Argyll. The Taynish peninsula, which joins the mainland at the village of Tayvallich, lies between Linn Mhuirich and Loch Sween and is roughly 5km long by 1km wide. Mid-Argyll is heavily forested, mainly with commercial plantations, but this is different. This peaceful place has been oak woodland for some 6000 years, and it shows. The woodland is hushed, dank and mossy; this is temperate rainforest, with the species to match [4], and maybe the sight of an otter for the fortunate. There are rare butterflies, including the threatened marsh fritillary, and carpets of spring flowers. The woods have historically been put to practical use; for charcoal burning and coppicing, for oak bark to produce tannin and for sheltered grazing for livestock. Taynish joins the north side of the larger Knapdale peninsula at the pretty village of Tayvallich. This is a small community of perhaps 200 people, set around a sheltered bay, complete with small boats, a good Inn, a community-run village shop and post office, and a summer ferry to Jura. The Tayvallich Community Group raised the £280,000 needed to buy the village shop. They made a successful bid for £196,570 from the lottery, and the future of the shop looks secure.

Argyll itself has 2,704 km of coastline [5](not quite as much as France, although often mis-quoted as being so), which adds greatly to the scenery and wildlife of the area. It also explains why the sea used to be the preferred method of transport and why road communication to the remote peninsulas is very slow. The marine environment of Argyll and Bute has been recognised by the designation of six Marine Special Areas of Conservation, and Argyll and Bute council are currently leading on two of them: Loch Creran and the Firth of Lorn. Loch Sween itself was discussed for many years as a possibility for Scotland's first Marine Reserve. It has exceptional marine life, especially in the narrow tidal races. Argyll as a whole, both mainland and islands, has rich biodiversity, with both fresh and salt water, tidal races, marshes, wetlands, dunes, machair, coastline, hills, forests, exotic gardens and significant wildlife.

The Knapdale peninsula itself is almost entirely coniferous forest and moorland, as indeed is most of mid-Argyll. Approximately 10% of the UK coniferous timber plantations are in the Argyll and Bute council area [6], although there is little local processing. To the northeast of Taynish is Kilmartin Glen, an area of great archaeological interest, with one of the most important collections of Neolithic and Bronze Age remains in Scotland. There are 350 ancient monuments within six miles of the village of Kilmartin, mostly standing stones, rings or cairns. New discoveries are still being made, with a "rock art" carving being recently discovered by the Forestry Commission Scotland at Achnabreac forest, high above Kilmartin Glen. Between Lochgilphead and Kilmartin is the hill of Dunadd, former capital of the ancient Kingdom of the Scots, Dalriada.

[4] See Annex 2 for the ecological details.
[5] Scottish Environment Statistics 1998. Scottish Government. At http://www.scotland.gov.uk/library/stat-ses/sest2-1.htm
[6] Economic Development Strategy 2000-2003, Argyll and Bute Council.

This combination of history, open space and publicly owned land [7] may have been the inspiration for the Landscapes in Time partnership [8] to "work for a sustainable future by reviving the spirit of the past" [9] . This expanded to become the Dalriada project, named after the ancient kingdom and concentrating on Kilmartin Glen. The Heritage Lottery Fund has ring-fenced £1.8 million for this landscape partnership project. It has a new manager, and is run from the Forestry Commission offices in Lochgilphead. Quoting from the website [10], *"the Dalriada Project is committed to maximising and realising the community development potential of existing natural and cultural heritage assets for the long-term benefit of residents and visitors".* The project is still largely at the planning stage, and impact so far has been limited.

Statistically, mid-Argyll is 571.4 sq km with a population of 7062 [11]. This translates to a population density of about ten people per square kilometre, compared with sixty-five for the whole of Scotland. Taynish and Knapdale fall under the remit of Argyll and Bute Council, Mid-Argyll ward, and the North Knapdale Community Council. The road to Lochgilphead (the nearest town, and the administrative centre for Argyll and Bute Council) runs east off the Knapdale peninsula thence to the Crinan Canal and south to the town, ten miles away. The Crinan canal was originally a shortcut for steamers travelling from Glasgow to the Hebrides and is now used by thousands of pleasure craft every year. Oban is about one hour's drive away, and Glasgow three hours. Other major settlements in Mid-Argyll are Inverary and the fishing port of Tarbert.

The economy of Mid-Argyll differs substantially from that of Argyll and Bute as a whole in that a far greater percentage of employed people work in agriculture or fishing (11.9% in Mid-Argyll as opposed to 3.7% for Argyll and Bute; see Annex table 3.3). Mid-Argyll has a slightly higher percentage of those at pensionable age than Scotland as a whole, and this difference is particularly marked in Knapdale and Tayvallich, Ardrishaig, Loch Fyne North and Kilmartin. This propensity to an ageing population can affect community confidence and service delivery, particularly in rural areas. There is no higher education provision in mid-Argyll, which contributes to a net loss of young people [12] . The Scottish Index of Multiple Deprivation shows all areas in mid-Argyll above 40%, with Knapdale and Tayvallich coming out at a healthy 67%, well above the Scottish average.

Argyll and Bute council are currently preparing a new area strategy, with town centre and waterfront developments at Dunoon being a focus for limited resources. The council have supported the Dalriada project, but the lack of impact to date may be an issue and reduces the chances that more resources would be committed to any similar initiatives. The council have good working links with SNH, with whom they have developed Sustainable Design Guidance [13] for all new housing developments in the council area.

[7] Forestry Commission Scotland are major landowners in mid-Argyll.
[8] Various local trusts and Argyll and Bute council.
[9] Landscapes in time/Dalriada launch pad document. Simon Hodge November 2001.
[10] http://www.dalriadaproject.org/home.html
[11] 2001 census updated to 2007, Scottish Neighbourhood Statistics. See Annex 3 for statistical detail and sources.
[12] Argyll and the Island, Economic Update, Highlands and Islands Enterprise April 2007. http://www.hie.co.uk/HIE-economic-reports-2007/Economic-report-Argyll-2007.pdf
[13] http://www.argyll-bute.gov.uk/content/planning/developmentprojects/designguide/

4.2 Outcome of the scoping meeting – interest in taking this forward

An exploratory scoping meeting was held at Tayvallich on 27 November 2008. The aim of this meeting was to introduce/re-introduce the concept of the Biosphere Reserve to a knowledgeable local audience, see if there was interest in the idea and begin to review the potential that an expanded Biosphere Reserve would have to meet the required criteria for designation. A variety of local interests were invited, but few attended, and only the local community group, SNH and community council/forestry interests were represented. This was a "testing of the waters" rather than an official public meeting, and any future initiative would need to be much better publicized and more inclusive. Details of the meeting are presented in Annex 1; here we offer a brief summary of the general response and some of the key points made.

Participants quickly latched on to the revised BR concept, but there was immediate concern about the lack of population in the immediate area and the difficulty of envisaging a natural transition zone. It was made clear that SNH would not, on their own, actively pursue BR status, but would offer as much support as they could, if the community indicated that they wished to proceed.

Following the meeting, further discussion with Forestry Commission Scotland (FCS) and local council officials confirmed the possibility that the Dalriada Project could be seen as somewhat similar to the BR concept. Follow-up comments from meeting participants indicated that the BR might not add anything to the community (of Tayvallich), that Taynish was already well managed by SNH and another "quango" was not required, and that there were not enough resources within a small village to do this.

This underlines the difficulty of the existing BR (and the potential core area of a new BR – though there could also be other core areas) being at the end of a long peninsula, with one very small local village and few existing economic links to even Lochgilphead. Judging by our initial contacts and consultations, it would seem that interest in taking the BR proposal forward in this area is currently limited.

4.3 Possible alternatives in terms of area and scope

The Biosphere Reserve at Taynish NNR, as currently constituted, does not meet the current UNESCO criteria, which have changed since the designation was first made in 1977. Nevertheless, the site, although relatively small at 330ha, is a tiny gem and would be a fine core area, already protected by the strongest UK and European site designations.

There are other SSSIs in the area (see annex 3), which could be used as the basis for a buffer zone. It is also relevant that the potential core area is almost completely surrounded by water, which in itself might prove a relatively straightforward buffer zone if one was required, although it would be relatively small. It might be possible to think of the entire Knapdale peninsula (on which about 80% of the forest is owned by FCS)) as a buffer zone, but this might not bring any particular benefit.

The transition zone is currently non-existent, and is perhaps most obviously the whole of mid-Argyll, including the area covered by the Dalriada project. We looked at three scenarios:

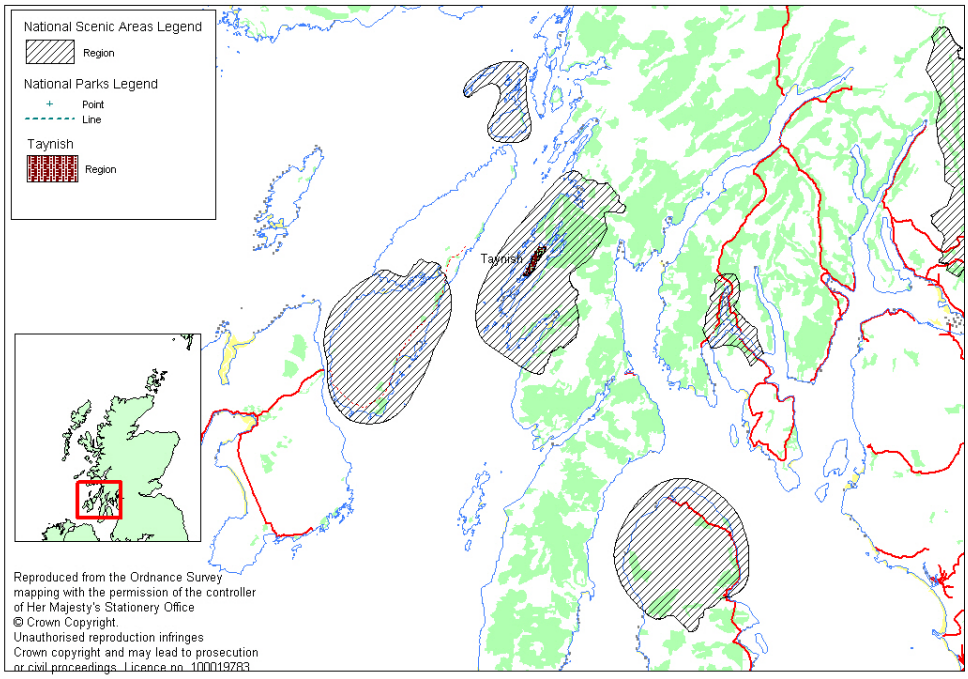
1) Current situation. BR = Taynish NNR only. Not an option.

2) Local BR. Expand into the local SSSIs as a buffer zone (some SSSIs could also be additional core areas) and to Lochgilphead and the Crinan Canal as the transition area.

3) Regional BR. Expand into the local SSSIs and Knapdale Forest as a buffer zone and to the rest of mid-Argyll as a transition zone, including Kilmartin Glen, Lochgilphead and Inverary. Consider a joint core area; using Kilmartin Glen.

These options are not offered as hard-and-fast alternatives – there are many intermediate possibilities – but are offered as a basis for further thought and to begin rigorous assessment against UNESCO's criteria. There could also be good justification for including marine areas, particularly in the buffer zone and transition area.

Map of Taynish and Mid-Argyll



5 Assessment of alternatives against Article 4 Criteria

5.1 Ecological systems:

Criterion 1: It should encompass a mosaic of ecological systems representative of major biogeographic regions, including a gradation of human interventions.

***Overall assessment**. The existing NNR/BR is undoubtedly a fine example of native mixed woodland, but at only 353 ha has little scope for being representative of a major biogeographic region and does not represent an obvious gradation of human intervention. A local BR would better meet this criterion, and an extended regional BR covering Mid-Argyll would score well.*

5.1.1 Existing BR

The current Biosphere Reserve is about 75% woodland with some bracken, semi-improved grassland, rush pasture, coastal grassland, mire and heath. Cattle grazing management on the existing NNR/BR has improved the age structure of the woodland, so there is human intervention, and indeed there has been more in the past, when some of the trees were coppiced and burnt for charcoal.

5.1.2 Local BR

Within a wider area, there is more grazing land and commercial forest as well as native woodland. There is a rich marine habitat in the area. Although this local area (Knapdale) is very scenic, with rolling wooded hills, lochs, and a little grazing, it is perhaps not quite varied enough to count as comprising a major biogeographic region

5.1.3 Regional BR

Mid-Argyll comprises 571.4 square km of rolling hills, wild glens, forest and moorland, often coming directly down to the shoreline. With remote and beautiful lochs and miles of wild coast it is certainly representative of a major biogeographic region and a mosaic of human intervention. Neolithic and Bronze Age remains testify to thousands of years of human intervention, and the continued importance of agriculture and forestry employment in the area indicates that this continues today, albeit in different ways.

5.2 Biodiversity

Criterion 2: It should be of significance for biological diversity conservation.

***Overall assessment**: Even as currently constituted scores the BR scores well against this criterion. Taynish NNR/BR was considered in the last review (1999) to be significant as an area large enough to sustain itself as a discrete ecosystem. A local or regional BR would score highly.*

5.2.1 Existing BR

The current Biosphere Reserve has over 250 species of mosses and liverworts, and over 250 species of lichen. It is also an important habitat for the marsh fritillary butterfly. Certainly it is of significance for biological diversity conservation, as reflected in its multiple (UK and European) conservation designations.

5.2.2 Local BR

A modest extension of the BR to cover nearby SSSIs and Knapdale forest would bring in a further range of habitats and species, including commercial forest. (See annex 3). Including surrounding sea areas would be of considerable benefit.

5.2.3 Regional BR

Mid-Argyll is of considerable biodiversity interest, and an extension of the BR to cover the whole area would bring in much loch and moorland, as well as the woodland already well represented by Taynish and the Knapdale Peninsula. Further inclusion of marine areas, and especially Loch Sween, would increase the overall biodiversity.

5.3 Regional sustainable development:

Criterion 3: It should provide an opportunity to explore and demonstrate approaches to sustainable development on a regional scale.

Overall assessment: *The existing BR does not meet this criterion. . If extended to a local or regional BR the potential and opportunities to meet this criterion might increase significantly, but the definition of regional scale is a problem due to the economic geography of the immediate area.*

5.3.1 Existing BR

This offers no potential to demonstrate regional sustainable development within its limited boundaries. It is too small, its beauties too fragile. Already sensitively publicised as an attractive NNR, it is doubtful if the BR designation is adding any extra benefit at all to the region, either directly or indirectly.

5.3.2 Local BR

This is much bigger than the current BR but is essentially more of the same, with not many more people. An extension of the BR to cover Knapdale (possibly the Knapdale Scenic Area, including Tayvallich) and Lochgilphead would bring in at least 2,500 people, five bed and breakfast providers, four hotels and two campsites. In Tayvallich itself, there is a caravan site, two bed and breakfast providers, the Tayvallich Inn, the village shop/café/post office, and the ferry to Jura. Tourism businesses are limited in number and scope. The Knapdale forest is largely commercial plantation, and although rich in archaeological remains has limited potential for diversification. As a local BR, this would be a small part of a larger economy, with the major town, Lochgilphead, being the key provider of work. There is no overwhelmingly obvious economic linkage between the potential core area and the major part of the population. To include Lochgilphead is somewhat artificial, but needed to bring in more people. Although some of the residents of Tayvallich work and shop in Lochgilphead, and use the administrative services there, the cultural links are not strong and the shops of Oban and Glasgow exert a strong pull.

Even as something of a tourist attraction, thus contributing to visitor spend in the area, it is doubtful if Taynish NNR is in itself sufficient of a draw to be considered a core reason for visiting mid-Argyll. Rather it would be part of a suite of good reasons, to be considered in conjunction with the other appealing features of the area. As a centre of sustainable development, the Taynish peninsula perhaps lacks the necessary economic links and drivers to demonstrate this concept successfully. Although only 12 miles from Lochgilphead, Tayvallich and its NNR/BR feel quite isolated by their position out on the peninsula. Even if the BR area were to become much bigger than the current NNR/BR, this perceived isolation, which may in fact be much valued, would perhaps prevent development of an integrated pattern of sustainable development on a wider scale.

5.3.3 Regional BR

Extending the BR to cover the whole of mid-Argyll would bring in a total of 7,062 people, about twenty bed and breakfast establishments, at least ten hotels and five campsites. Given that over 26% of employed people in mid-Argyll are engaged in distribution, hotels and restaurants, it is reasonable to suppose that a BR which was effectively marketed to increase visitor numbers might have a positive effect on the local economy. Potential for demonstrating sustainable forest-based business is considerably increased, as is the possibility of bringing in more fishing interests and leisure craft. A single core area at Taynish might be seen as restricting viability but, in practice, the BR sign would be awarded to the whole of mid-Argyll and the exact location of the separate zones would become less crucial. Adding another core area at Kilmartin Glen – and perhaps other existing designated areas – is an idea that would need careful exploration.

This might be a way to build on the quiet appeal of the Taynish NNR and distribute some sustainable benefit across a wider area. In reality, the access road to Taynish is unsuitable for much vehicular access and increased visitor numbers on this tiny and slightly fragile reserve might be a very mixed blessing. The comments above relating to a Local BR also apply to this situation, with insufficient real links between Taynish and the economy of Lochgilphead.

5.4 Size and functions:

Criterion 4: It should have an appropriate size to serve the three functions of biosphere reserves, as set out in Article 3 [14].

Overall assessment: *The existing BR does not meet this criterion. A local BR would have to encompass, at the very least, Lochgilphead and the rest of the Knapdale National Scenic Area to meet this criterion. A regional BR would meet this criterion.*

The three functions are conservation, development, and support for research and education. Taynish NNR/BR scores well for conservation and has been used for many years for long-term research and monitoring, but its limited area means that it is too small an area within which to effectively seek to foster social and economic development. The reserve itself is essentially uninhabited. A viable BR under UNESCO's current criteria needs people actually living in it.

5.4.1 Existing BR

The existing Taynish NNR/BR is excellent for conservation and education, but is not suitable to demonstrate sustainable development, being too small, too fragile, and essentially uninhabited.

5.4.2 Local BR

A local BR encompassing Lochgilphead and the Knapdale Peninsula would be just as good for conservation as the existing reserve and as good for educational opportunities as school budgets would allow. Although physically much larger than the existing BR, it is probably still insufficient to demonstrate sustainable development, save for perhaps some further use of commercial forest and limited publicity among local tourist businesses.

5.4.3 Regional BR

This is just as good for conservation as the current reserve, bringing no change to the level of site protection. It may offer increased educational opportunities due perhaps to increased publicity for the designation and for the attractions of the area. This is probably a big enough area for some demonstration of sustainable development, but the direction this would take would have to build upon existing local Council initiatives and take account of projects already supported to be cost-effective.

(i) conservation - contribute to the conservation of landscapes, ecosystems, species and genetic variation;
(ii) development - foster economic and human development which is socio-culturally and ecologically sustainable;
(iii) 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.
From Article 3 of the Criteria for the Statutory Framework of Biosphere Reserves

5.5 Zonation

Criterion 5: It should include these functions, through appropriate zonation, recognizing:
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

Overall assessment: *The BR as currently constituted meets this criterion, as would an extended local or regional BR*

The current Biosphere Reserve at Taynish is legally constituted as a National Nature Reserve and as part of a Special Area of Conservation (SAC). It is an adequate core area in all respects.

Criterion 5b. 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.

Overall assessment*: the existing BR does not meet this criterion. Partly co-located with Taynish NNR/BR is an SAC, which might well serve as part of a buffer zone and would enable a local or regional BR to meet this criterion.*

There may be resistance in some quarters to the idea that the buffer zone is managed for conservation objectives - even if these are compatible with existing land management objectives. It might therefore be appropriate to use part of the existing designated areas as buffer zone. In practice, the SAC, like any Natura 2000 site, already has a legal buffer zone – any activity outside an SPA/SAC is subject to regulation if it is likely to damage site.

This is an issue which would require locally organized “round the map” discussion.

Criterion 5c. An outer transition area where sustainable resource management practices are promoted and developed.

Overall assessment: *The existing BR does not include such a zone and does not meet this criterion. A local or regional BR could be designed to meet this criterion.*

The current reserve is on a peninsula and closely associated with a rather unique and slightly independent little village and forests mainly managed either for conservation by SNH or by the Forestry Commission. This makes it is difficult to see how a transition area would work if the BR remained limited to North Knapdale, which is why we have suggested that a “local” BR would need to encompass all of the Knapdale Peninsula, possibly the Knapdale National Scenic Area.

It would seem sensible that, if there is local support for a BR with a transition area, it be co-incident with a larger area with a strong identity such as mid-Argyll (Our option 2). However, this is very much a community issue and it may be more feasible to

determine a smaller transition area involving communities who have a little more of a direct connection with the core area (our option1).

5.6 Organisation

Criterion 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 carrying out the functions of a biosphere reserve.

Overall assessment: *The existing BR does not meet this criterion. There are no obvious existing relevant organizational structures covering an extended local area. If a wider area regional BR were to be considered, it is not clear how far it should extend, and therefore what organizational arrangements might be built on.*

This is entirely up to the local community, however defined, and there are not many of them in North Knapdale. The local authority, SNH, and Highlands and Islands Enterprise are not currently pro-active about Biosphere Reserve status, and would need to be if it were to proceed. The interest of the Forestry Commission has yet to be determined, but is important given that it is the major landowner. The Dalriada Project, already discussed, run under the auspices of the Forestry Commission and based at Lochgilphead, has similar ideals to a new-style BR and promotes these aims over a wider local area. Local council support is always of great assistance for new initiatives such as a re-vamped BR and, given limited resources and existing support for the Dalriada Project, it may be that this is not thought appropriate.

Whatever the scope of a BR, the key to success would be to make organisational arrangements as simple as possible – and not add yet another administrative layer. A possible model here is that used in France for some of the "Regional Parks". In this case there is no significant management organisation, rather a "*Charte*" or Charter – a set of agreed principles which all the various parties and partners agree to. The detail of implementation is left very much to individual actors. The only sanction is that of peer pressure – and the option for the other partners to exclude partners who fail to adhere to the *Charte* principles[15].

5.7 Additional necessary provisions

Criterion 7. In addition, provisions should be made for:
(a) mechanisms to manage human use and activities in the buffer zone or zones

Overall assessment: *the existing BR has no buffer zones. A local or regional BR could use SSSIs as buffer zones, in which case this criterion is met by the existence of management agreements on these areas.*

[15] Examples and discussion of this approach can be found in Hambrey Consulting, 2008. A review of relevant experience of coastal and marine national parks. Scottish natural Heritage Commissioned Report No. 271 (ROAME No. RO7NC). Report available at http://www.snh.org.uk/pdfs/publications/commissioned_reports/Report%20No271.pdf. Individual case studies available from Hambrey Consulting.

These would depend on the nature and boundaries of the buffer zone(s) - if the concept were to be further developed. It may be that existing land/water management objectives in areas surrounding potential core areas are already adequate to meet this criterion. Indeed, this might well be a criterion for the identification and selection of such areas. Otherwise there are two options:

- use existing designations (such as the SAC or SSSIs) as buffer zones for the core NNR/BR area;
- agree compatible management objectives for other areas not currently subject to any designation, possibly including Forestry Commission land.

Agreement on the boundaries of the various zones and corresponding management mechanisms will require facilitated roundtable/map discussions. Our own view is that any such mechanisms should be very simple and couched in terms of broad principles and outcomes rather than management prescriptions.

Criterion 7b. A management policy or plan for the area as a biosphere reserve

Overall assessment. *The existing BR does not meet this criterion, although the BR designation is mentioned in the NNR Management Plan. A local or regional BR would need to develop such a plan to meet this criterion*

If there were interest in taking the BR forward, then facilitated round table discussion would be required to begin to generate such a policy or plan.

As with a), our own view is that given the plethora of existing designations and associated plans, this should be limited to a simple and concise policy rather than a plan, based on a set of broad principles and outcomes. Reference to other existing management plans should be adequate to meet the requirements of this criterion.

Criterion 7c. A designated authority or mechanism to implement this policy or plan

The existing BR does not have any such provisions (except with respect to the conservation and access arrangements for the existing NNR/BR). A local or regional BR would need to work on meeting this criterion.

Again, we believe that this could be kept very simple, by drawing together existing mechanisms. Some BRs have no more than a designated officer answering to a "steering group". Rather than implementation of a complex plan, the key to success should be effective facilitation and coordination of existing mechanisms, and identification and promotion of positive opportunities as they arise.

Criterion 7d. Programmes for research, monitoring, education and training.

The BR as currently constituted has a monitoring, research and educational programme and meets this criterion. An extended local or regional BR might enhance these activities and opportunities.

Taynish NNR/BR is, according to the SNH reserve proposals, committed to encouraging research, survey and monitoring appropriate to the reserve and to using the reserve for educational purposes and to demonstrate specialized management. An extended BR would only enhance these opportunities if either SNH had sufficient resources to expand their operations in the area or some other body was to take advantage of the potential offered in this respect.

5.8 Summary

Table: summary assessment against article 4 criteria

Criteria	Existing BR	Local BR	Regional BR
1. Mosaic of ecological systems/gradation of human intervention	Good	Excellent	Excellent
2. Significance for biological diversity	Excellent	Excellent	Excellent
3. Opportunity to explore and demonstrate sustainable development on a regional scale	Poor	Limited	Moderate
4. Adequate size to promote conservation, sustainable development and education/research	Limited	Moderate	Good
5. Opportunities for agreed zonation	Non-existent	Moderate	Good
6. Opportunity for community/stakeholder participation	Moderate	Moderate	Moderate
7. Management mechanisms	Moderate	Moderate	Moderate

6 Potential social, economic and environmental benefit of a new-style Biosphere Reserve based on Taynish NNR

In this discussion, we are making the bold but reasonable assumption that the BR, if the community decide to go ahead with one, would have Taynish NNR as the core area, a buffer comprising almost entirely designated sites, and a transition zone that is either local communities or the whole of Mid-Argyll.

Social and economic benefits would depend almost entirely on how the idea was "sold", both to the local community and to the tourist market, and the extent to which local businesses could increase their turnover and profits by making effective use of the designation. Environmental benefits would be limited, but only because the core and buffer zones would already be well protected by statutory designation.

6.1 Assessment against sustainability criteria

The following assessment of potential benefit is based on a framework developed in previous work undertaken by Hambrey Consulting on Biosphere Reserves for DEFRA[16].

Table 2: Analysis of potential benefits using a sustainability

Key:

- *grey*: significant marginal benefit unlikely
- *cream:* limited benefits possible*
- *amber*: **potential for benefit
- *dull green*: ***modest benefit likely
- *bright green*: ****significant benefit likely

[16] Hambrey Consulting 2008. The Potential for Biosphere Reserves to achieve UK social, economic and environmental goals. CR 0393 DEFRA Research. Available at http://www.hambreyconsulting.co.uk/recent-reports-g.asp

Dimensions	*Criteria/potential benefit*	*Identified benefit **
A healthy environment		
Biodiversity	species diversity, range and abundance	This is well catered for by existing designations and management initiatives. It is unclear that the designation will add significant value
	habitat extent and condition	This is well catered for by existing designations and management initiatives. It is unclear that the designation will add significant value
	structural diversity and connectivity	***This may be partly addressed in the evolving RDP. However, there is potential to focus the conservation function of the BR in this area adding value to the existing conservation management which remains very site and species/habitat specific.
Landscape	character, condition and qualities	***This largely catered for through the existing NSA. However, a BR might focus especially on linking structural diversity and connectivity with landscape quality and character.
Ecosystem services	quality and productivity of soil, water, air	**Water and air quality is well catered for through SEPA, the Water Framework Directive and other major environmental management programmes. Soil quality is an area often neglected and there may be some opportunities to add value in this area.
	efficient drainage	**Again this is largely catered for through the Water Framework Directive, though there may remain opportunities to integrate that work with initiatives related to landscape and biodiversity as described above
	erosion resistance	**This relates closely to issues of drainage, water quality, landscape and ecological connectivity/diversity
	carbon sinks	**This relates closely to issues of drainage, water quality, landscape and ecological connectivity/diversity
	other ecosystem services	

A healthy society		
Recreation and access	active recreation	**** A “biosphere reserve” sounds like a healthy place to be, and the brand could well help business development in this area. This would benefit local residents and visitors alike.
	access	Limited. Access is already good due Scottish legislation
	passive recreation and inspiration	****The area is most attractive and a BR designation could be used to strengthen and promote media production of all kinds
Understanding and awareness	understanding and awareness	****The existing NNR/BR is good at raising local awareness. A BR over a wider area, if supported by appropriate explanatory materials, might raise awareness amongst visitors.
Community	engagement *with* community	***The existing NNR/BR does engage with the community, but is necessarily limited by its statutory obligations and more limited remit. A BR with stronger emphasis on sustainable development might facilitate engagement but would need more resources to do so.
	involvement *of* community	**Establishing a BR would require involvement of the community. In this sense it would either add value, or fail. For the reasons noted above it is likely that greater engagement of the wider local community will be achieved for an initiative whose primary objective is sustainable development, rather than the more conservation orientated objectives of the NNR
	vitality and cohesion	A BR might promote vitality and cohesion of the community. On the other hand, if insensitively implemented, it could create discord.
The quality of places to live	near environment (greenspace)	**This is largely dealt with under landscape above
	houses and gardens	Limited
Other	*any other social impacts*	*?*

A healthy economy		
Employment and income	direct employment and income	***Hotel and catering trade is important to the area, a BR can only strengthen this
	indirect employment and income	***ditto
	job quality	***May facilitate move to a higher quality tourism experience and more interesting/skilled associated jobs
	income and jobs foregone	unlikely
Business	business opportunities and constraints	***Probably good for tourism based business, and especially the outdoor/adventure/wildlife sub-sectors.
	short term investment	***Could well attract investment – if well promoted and marketed
	long term investment	***As above
	human resources	*Insofar as there are opportunities for education, training and business development it should strengthen human resources; more generally benefits in this area are rather intangible
Resource use	conservation of resources with an economic value	*These are largely addressed through existing management provisions in respect of water, forestry and fisheries. There may be more novel initiatives relating to e.g. soils and peat.
	conservation of resources with *potential* economic value	No obvious benefits here
Other	*any other economic impacts*	Totally dependent on how a BR was implemented.

6.2 Strengths and weaknesses of future alternatives

The following table offers a preliminary assessment of the strengths and weaknesses of re-designating a BR at alternative geographic scales.

Table 3: Strengths and weaknesses of future alternatives in terms of geographic scale

	Local BR	Regional BR
Strengths & opportunities	Good core area. Adequate designated buffer zone. Small transition area would concentrate effort Small transition area might promote sense of ownership and community cohesion, linked to local identity. Easier to get consensus for action	Good core area. Adequate designated buffer zone. Large transition area = more time and skills available Widespread potential benefits Contiguous with Mid-Argyll
Weaknesses & threats	Small transition area would limit benefits New kind of area might confuse local identity. Small number of people involved might limit skills and time available.	Hard to get consensus over a large scattered group Mid-Argyll coastal settlements not all inter-dependent - limited economic links due winding coastal roads and accessibility of shops in Oban.

Annex 1: Report of initial scoping meeting

(excluding initial article 4 criteria assessment)

Report on the first site meeting for the Taynish Biosphere Reserve.

Held at Tayvallich on 27 November 2008

Present:

Peter Burrell, Chair of the Tayvallich Community Group
Stan Phillips, SNH
Hugh Semple, Forester, Chair of North Knapdale Community Council and committee member of Tayvallich Sailing Club.

Sue Evans, Associate, Hambrey Consulting
Martin Price, UK MAB Committee

Thanks are also due to:
Nick Purdy, Forest District Manager, West Argyll
Audrey Martin, Development Projects, Argyll and Bute District Council
Alison Younger, Area Corporate Services Manager, Argyll and Bute District Council
Chris Carr, Research and Information Officer of Argyll and Bute District Council
Penny Duncan, formerly of the Dalriada Project
John Anderson and Rosie Mcallister, Tayvallich village shop

Introduction
The aim of this meeting was to re-introduce the concept of the Biosphere Reserve to a knowledgeable local audience, see if there was interest in the idea and begin to review the potential that an expanded Biosphere Reserve (BR) would have to meet the required criteria for designation. These criteria are set out in Article 4 of the Statutory Framework of Biosphere Reserves, as published by the United Nations Educational, Scientific and Cultural Organisation (UNESCO), which is provided with this meeting report.

The meeting began with a brief introduction by Sue Evans followed by a presentation from Martin Price explaining the changed nature of Biosphere Reserves and the review process. Sue then presented some of the key findings of the assessment of potential benefits and conditions for success. The general discussion that followed, and which usefully continued through a brief review of other Biosphere Reserves, gave a good indication as to the issues that would be involved in deciding whether or not an expanded Biosphere Reserve would be appropriate for this area.

It should be understood that the Biosphere Reserve at Taynish NNR/BR, as currently constituted, does not meet the UNESCO criteria, which have changed since the designation was first made in 1977. The current site extends to 353 ha, on a peninsula among a most scenic area some 12 miles drive west of the town of Lochgilphead and adjacent to the attractive village of Tayvallich. The NNR/BR is a fine area of native mixed woodland, and is within the Taynish and Knapdale Woods Special Area of Conservation (SAC) and the Knapdale National Scenic Area.

Due to the realities of local population and geography, it is difficult to immediately see a natural extension to the current Biosphere Reserve that would allow all the new UNESCO criteria to be met. The peninsula on which the current site sits is estimated at some 52,000 ha, but the largest settlement, Tayvallich, has a population of only about 200. Although the UNESCO criteria do not specify the population required to demonstrate sufficient social and economic benefits, it is possible that 200 is insufficient on many counts, including the consideration of governance, and that Lochgilphead would need to be included in order to demonstrate sustainable development on a regional scale. The feeling from this initial meeting was that Tayvallich was very much a village unto itself, and that such a link would not be intuitive.

It is possible that much wider consultation would result in the suggestion of a wider area that would be a suitable transition area, but this is not yet apparent.

The crucial issue is whether or not the community here feels that a Biosphere Reserve designation over a larger area, meeting the revised criteria set out below, would help fulfill their hopes for the area, and whether or not they would wish to implement one. The following analysis is for the community, the council, and other local institutions, to assist them in deciding whether or not to take this forward, and also for the UK MAB Committee so that they may better assess the potential of this site and the perspective of some local people.

Views of local people

This was an extremely select meeting, but any initial fears that there would be insufficient response were quickly dispelled and the resulting discussions were most informative.

Participants quickly latched on to the revised BR concept, but there was immediate concern about the lack of population in the immediate area and the difficulty of envisaging a natural transition zone. It was courteously made clear that SNH would not on their own actively pursue BR status but would offer as much support as they could if the community indicated that they wished to.

Questions and issues raised, and opinions expressed at the meeting

- The Forestry Commission is the biggest local landowner.
- There are a small number of other large landowners.
- Forestry Commission are good on public access.
- It would be good to have a community forest, but it could cost £5m.
- A forest drive would be popular, and particularly good for the less agile.
- We are managed by quangos.
- We have too many designations.

- We have bought our own village shop/café/post office.
- We are almost as likely to go to Oban (1 hrs drive, all major retailers) to shop as to Lochgilphead (30 mins, small supermarket).
- We actually do a large amount of our shopping whenever we go to Glasgow.
- We have two fairly large prawn boats and two smaller.
- We don't have any boat trip companies based here.
- This is different from the normal "designation" and has the potential for enormous spinoff. But boundaries are unclear and who would do it?

- There is a local identity.

- No, there is not; many people are incomers and most work in Lochgilphead.
- There are about 30% second homes in this area.

- The core area is fine, and could actually include a few more scattered protected sites.
- Lovely oakwoods, unique in the UK.
- Beavers are about to be released near here.
- We could create buffer areas, perhaps defined by the Special Area of Conservation.
- It's hard to see any natural boundaries for the transition area.
- We don't have much in common with Lochgilphead, or Kilmartin.
- The Dalriada project might be relevant, but it is a limited-term project, and principally concerns the area around Kilmartin Glen.
- A BR could cover the whole of North Knapdale, but there are still not many people.
- Could this be the same size as the National Scenic Area (NSA)?
- Are we allowed to take this into the sea?
- This area was previously identified as (a relatively small part of) a potential Coastal/Marine National Park.

- What would the organisational structure be?
- It is always the same group of people who actually do things and here we are again.
- Where does the money come from?
- Where do we go from here?
- Taynish is very well managed by SNH and the thought of another quango getting involved is not an attractive one.
- The BR would not add anything to our community.
- There is a lot of work involved here and we are all pretty busy.

Annex 2: Ecological information

SSSIs – All details extracted from SNH website.

SAC
Falls within Knapdale Oakwood forest Area and Knapdale NSA

Taynish Woods SSSI. contains Taynish NNR

Area 390.1 ha
Location. Grid reference NR 735850. Landranger sheet 55
Notified for: Beetles, bryophytes, dragonflies, fen meadow, flies, lichen, Marsh Fritillary butterfly, mesotrophic loch, moths and reefs.

One of the largest, continuous native, deciduous woodlands in Scotland, supporting woodland floral and faunal communities of outstanding ecological importance. The underlying geology of metamorphosed rock (quartzite and epidiorite/hornblende schists) gives a marked north-east/south-west orientated system of ridges and hollows, which have influenced the range and distribution of soil types and drainage patterns. The distribution of the woodland communities reflect these variations, but it is likely that past woodland management has emphasised oak dominance in the canopy in some areas.

The shaded, boulder slope, oak/birch communities *Quercus petraea – Betula pubescens – Dicranum majus* are the largest in the selection area, and support a rich oceanic fern and atlantic bryophyte flora, including the Tonbridge filmy-fern, *Hymenophyllum tunbrigense*, *Adelanthus decipiens, Harpanthus scutatus, Lepidozia cupressina* and *Dicranum scottianum*; with a total of 232 bryophyte species recorded for the entire woodland. The less rocky slopes support a more open oak/birch woodland community *Quercus – Betula – Deschampsia flexuosa* which has a rich woodland flora, including the unusual narrow-leaved helleborine, *Cephalanthera longifolia* which occurs over the hornblende schists. The dry base rich slopes also support a mixed deciduous woodland community with ash, wych elm and dog's mercury *Fraxinus excelsior, - Ulmus glabra* and *Mercurialis perennis* although in the wetter wooded hollows the comparatively unusual alder carr community *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemorum* occurs.

Many of the open hollows within the woodland support rich fen communities with species including broad-leaved Cottongrass *Eriophorum latifolium*, tawny sedge *Carex hostiana*, royal fern *Osmunda regalis* and bog mosses *Sphagnum* spp.

The woodland lichen communities are of particular importance. Most of the recognised British epiphytic lichen associations are well represented with particularly well developed Lobarion pulmonariae communities. On smooth bark, especially hazel *Corylus avellana*, the hyperoceanic type of the Graphidion scriptae community, an internationally important feature of the West of Scotland woods, is present in abundance. The acidic oak and birch barks support Parmelion laevigatae communities which elsewhere are found predominantly on rock. Conversely where trees grow adjacent to the Linne Mhuirich shore there is an unsual mixture of upper shore lichen species and some of the normally corticolous *Lobarion* community species together on a rock substrate. The rich lichen flora (336 recorded species) is predominantly oceanic/sub oceanic/temperate European and includes species with

an otherwise markedly southern distribution. The rare *Physcia clementii* occurs here at the most northern European limit of its range.

Lochan Taynish is a mesotrophic loch with a rich fauna and flora including shining pondweed *Potamogeton lucens*. In recent years eleven species of dragon and damselfly have been found at Taynish including the southern hawker *Aeshna cyanea*. Other invertebrate groups are also well represented on the peninsula, including 243 species of lepidoptera, of which four are considered to be particularly rare in Scotland.

On the old raised beach, at the south-west end of the peninsula there are herb rich, fen meadows characterised by sharp-flowered rush and marsh-bedstraw *Juncus acutiflorus – Galium palustre* with whorled caraway *Carum verticillatum* locally abundant and the marsh fritillary butterfly *Euphydryas aurinia* which is associated with devils'-bit Scabious *Succisa pratensis*. The *Molinia* meadows of the coastal grassland fens benefit the Scotch argus butterfly *Erebia aethiops* and the meadow thistle *Cirsium dissectum* grows here in one of its two Scottish localities. Towards the sea the fen vegetation grades into saltmarsh, with saltmarsh rush *Juncus gerardi*, and saltmarsh flat-sedge *Blysmus rufus* dominated communities.

The intertidal communities of the peninsula and Taynish Island are of national importance. The unusual Hydrographic conditions including a small tidal range result in unusually compressed intertidal zonation where the *Chthamalus montagui* barnacle distribution is uncharacteristic and *Balanus balanoides* is surprisingly scarce. The lower shores of the Linne Mhuirich support large populations of the rare alga *Codium fragile* spp *tomentosoides* and rich eelgrass *Zostera marina* communities. The Linne Mhuirich rapids have an outstanding intertidal sponge population with *Hymeniacidon perleve* and *Halichondria bowerbanki* in addition to many common species.

Linne Mhuirich SSSI

Area: 107.8 ha
Location: Grid reference NR 726847, Landranger sheet 55
Notified for: Fen meadow, lowland calcareous grassland, saltmarsh and upland mixed ash woodland.

An area of orchid rich grassland interspersed with ash/hazel woodland, sallow carr and alder swamp. Juniper is locally abundant on the higher and drier areas. At the head of Linne Mhuirich is a transition from saltwater to freshwater marsh. This site is adjacent to the nationally important intertidal and subtidal areas of marine interest in the Linne Mhuirich, a water body particularly susceptible to nutrient enrichment because of restricted tidal exchange. The terrestrial interest within this site is therefore supplemented by a secondary role, that of buffering and providing some protection to the adjacent marine system.

Tayvallich Juniper and fern SSSI

Area:419.5ha
Location:Grid reference NR 725858, Landranger 55
Notified for: Dragonflies, upland oak woodland, valley fen.

The landscape of the Tayvallich Peninsula is dominated by a series of steep-sided north-east/south-west orientated ridges and narrow valleys with small basins, which are influenced by increasing maritime exposure towards the west coast. The Dalradian limestone schists, phyllites, and quartzites and the fragmented drainage pattern, contribute to the extremely rich habitat mosaic, with dry wooded ridges grading into heathland and grassland communities, which in turn grade into a range of flushes, valley mires and open water transition communities.

An important feature of the Tayvallich woodlands are the juniper *Juniperus communis* scrub communities which grow across the peninsula from the west coast to the Linne Mhuirich and are characteristic of the dry south east facing ridges. The juniper scrub in conjunction with the long established birch/oak/hazel *Betula/Quercus/Corylus* woodland communities, form a continuum with the internationally important woods of the adjacent Taynish peninsula.

The woodlands provide appropriate conditions for several rare oceanic bryophytes including *Epipterygium tozeri* and *Cephaloziella turneri* at the northern limit of their range as well as the endemic *Fissidens celticus*. The diverse flora of the base-rich grasslands also includes a rich bryophyte interest, and the limestone grasslands to the east of Drimnagall are a notably rich locality.

The diversity of the fen communities is influenced by the inflow water chemistry. The base-rich areas support rich dioecious sedge – common butterwort *Carex dioica – Pinguicula vulgaris* mires, or near the sea the rich fens are characterised by the presence of black bog rush *Schoenus nigricans*. Star sedge – bog moss *Carex echinata – Sphagnum recurvum/auriculatum* communities are typical of the poor fens in the less nutrient flushed areas. Where base-rich water collects in the valley basins bottle sedge-moss *Carex rostrata – Calliergon cuspidatum* areas have developed. In some sites these grade into a rich type of *Phragmites* swamp or into an open water vegetation system with stoneworts *Charophytes*, least bur-reed *Sparganium minimum* and floating rafts of bogbean *Menyanthes trifoliata* with marsh cinquefoil *Potentilla palustris*.

The valley mires and lochans are important for their damsel and dragonfly populations. Eleven species breed within the site including the unusual keeled skimmer *Orthetrum coerulescens*.

The inlets of the west coast provide quiet feeding grounds for wading birds and are used by seabirds which breed on the offshore islands. Eider ducks feed along the shore, which forms part of a site of exceptionally rich marine interest. The area is well frequented by otters.

West Tayvallich Peninsula SSSI

Area: 661.7 ha
Location: Grid reference NR 706834, Landranger 55,62
Notified for: Geology (Dalradian structural and metamorphic geology)

This has been one of the classic study areas for the Dalradian since 1911 when Peach discovered the pillow lavas in the Tayvallich volcanics, and so established the existence of extrusive igneous rocks in the south west Highland Dalradian. The succession ranges from the Crinan Grit and Tayvallich Limestone, of the upper Argyll Group, through the Tayvallich Volcanics to the Kells Grit of the Southern Highland Group. A major fold, the (F1) Tayvallich Syncline, runs through the area and has an axial planar crenulation cleavage.

This large area is best considered as a number of separate sections.

1. Loch na Cille. This area is in the axial zone of the Tayvallich syncline and contains the youngest rocks of the section, the arkosic sandstones of the Kells Grit (NR 696806). They are distinct from the older Crinan Grit in containing detrital epidote and more feldspar and mica.

The Loch na Cille Boulder bed is the most remarkable unit in the area. It stratigraphically overlies pillow lavas, exposed on the west coast, and is in turn overlain by limestone containing fragments of the metabasite that crops out on the east coast. The boulder bed has a spilitic to calcareous matrix full of fragments of metabasite and pebbles of acid volcanics. This controversial deposit is now generally considered to be a hyalocastite of submarine volcanic origin, probably from a fissure eruption.

2. The northwest coast to An Aird. This section contains the classic outcrops of the Tayvallich Lavas. Northwards along the coast progressively older members of the lava formation occur. The lithologies include massive lava, pillow lava, pillow breccias, stratified and reworked hyaloclastites, porphyry breccia containing large boulders of feldspar porphyry and a pink feldspar porphyry intrusion.

3. Rubha na h-Airde to Port an Sgadain. The peninsula is composed of a metabasite laccolith which may represent the magma chamber feeding the pillow lavas. Northwards from Rubha na h-Airde the pillow lavas are replaced by pillow breccias and hyaloclastites, then thin rusty-weathering limestone lenses are seen until just south of Port an Sgadain where a distinct dolomitic breccia occurs.

4. Port an Sgadain to Port Bealach nan Gall. At the southern end of this section the base of the Tayvallich Lava Formation and the underlying Tayvallich Limestone occur. Here the lava flows have pipe amygdales at the base and scoriaceous tops, often with rusty limestone veins penetrating between the blocks of lava. Peach used these exposures to demonstrate that the sequence here dips uninverted to the south-southeast. During its extrusion the lowermost lava produced “push-folds” in the underlying phyllite.

The Tayvallich Limestone is very variable comprising dolomites and phyllites, thin bedded and massive limestones, and conglomeratic horizons. It contains a variety of sedimentary structures including grading, cross-bedding, channelling and flute casts. The limestone probably had a turbiditic origin.

At Port Bealach nan Gall the Crinan Grits are exposed beneath the limestones. They are coarse grained and locally conglomeratic containing a pelitic bed with carbonate nodules above which are excellent examples of flute casts.

5. The closure of the Tayvallich Syncline can be traced out by following the junction between the limestone and the lavas around the northern slopes of Barr na h-Iolaire. In spite of much of the limestone being obscured by debris the base of the lavas can be traced around the minor folds associated with the closure of the syncline.

Historically this large site is a classic area, being the location of the first recognition of pillow lavas in the Dalradian. It is also important in geological education and research, combining first class stratigraphical, structural, and volcanic phenomena which enable the reconstruction of both the depositional and the geotectonic

environments of this part of the Dalradian. First notified as An Aird SSSI. Site now significantly extended. Overlaps in part with Ulva, Danna & The McCormaig Isles SSSI and Tayvallich Juniper and Fen SSSI.

Ulva, Danna and the McCormaig Isles SSSI

Area: 742.5 ha
Location:Grid reference NR 700799, Landranger maps 55, 62, 61
Notified for: Briophytes, cormorant, Greenland barnacle goose, Greenland whitefronted goose, lowland calcareous grassland, lowland dry heath, lowland wet heath, maritime cliff, mudflat, saline lagoon.

The site comprises the Ulva peninsula; including the coastal lagoons leading into the Linne Mhuirich in the north east and the head of Loch na Cille on the west coast; and also includes the islands of Danna, Liath Eilean, Sgeir Bun an Locha, Sgeir Dhonncha, Eilean Mor, Dubh Sgeir, Corr Eilean and Eilean Ghamhna, which lie in the entrance to Loch Sween.

The geological bands of Tayvallich limestone, epidiorites, basaltic dykes, phyllites, and mica schists, together with the more acidic bands of quartzite and Crinan grits, have a significant influence on the plant communities and their distribution throughout the site. In addition the distinctive topographical series of north-east/south-west orientated ridges and valleys provides an important range in maritime exposure and soil moisture conditions.

Extensive areas of calcicolous and mesotrophic grasslands reflect the base-rich edaphic conditions and support several interesting plant species including: frog orchid *Coeloglossum viride*, small-white orchid *Pseudorchis albida*, greater- and lesser-butterfly orchids *Platanthera chlorantha and P.bifolia*, fragrant orchid *Gymnadenia conopsea*, moonwort *Botrychium lunaria* and adders tongue *Ophioglossum vulgatum*. Some ridges support dry atlantic heath communities, occasionally in association with juniper *Juniperus communis* scrub. In the hollows with impeded drainage, moist atlantic heathlands have developed. The diverse conditions present within the site are responsible for the rich mosaic of different grassland/heath vegetation patterns, which in turn have been influenced by agricultural management practices.

Other communities which contribute to the exceptional habitat mosaic include the long established woodland and scrub communities which are particularly associated with the more sheltered east facing slopes. The birch/oak/hazel *Betula* sp*/Quercus* sp*/Corylus* sp dominated woods have a herb-rich ground flora and the scrub communities are dominated by gorse *Ulex europaeus*, blackthorn *Prunus spinosa* and hawthorn *Crataegus monogyna* although bracken *Pteridium aquilinum* dominates in some areas. The valleys, and raised beaches along the coastal fringes, support meadow fen communities (including *Juncus effusus/acutiflorus – Galium palustre* and star sedge flushes *Carex echinata – Sphagnum recurvum/auriculatum)*, whilst around open water bodies herb-rich fen (including *Filipendula ulmaria – Angelica sylvestris*) and bottle sedge *Carex rostrata* type swamp communities are present. Many of the fens support diverse dragonfly assemblages which include the unusual keeled skimmer *Orthetrum coerulescens*.

The extensive coastal area includes rock crevice vegetation communities and saltmarsh zonations with particularly well developed saltmarsh flat-sedge *Blysmus rufus* communities in the saltmarsh hollows at the north end of Danna Island.

Beaked tasselweed *Ruppia maritima* grows in saltmarsh on the northern shore of Loch na Cille, where the brackish water crowfoot *Ranunculus baudotii* is also found. The mud flats of Loch na Cille support all three species of eel grass *Zostera angustifolia, Z.marina,* and *Z.noltii* whilst the eel grass communities of the Linne Mhuirich have a diverse fauna. The intertidal sponge populations in the Linne Mhuirich rapids is outstanding, with *Hymeniacidon perleve* and *Halichondria bowerbanki* in addition to many other more common sponge species. It is probable that similarly rich communities would have occurred at the Ulva Island rapids prior to the impondment of An Grianan but water flow in that area is now retarded.

Several of the islands and coastal skerries form breeding and haul out sites for common and atlantic seals *Phoca vitulina* and *Halichoerus grypus* and the area is well frequented by otters *Lutra lutra*.

The entire site supports an exceptional flora with especially rich areas around An Grianan. The “Flora of Danna” by A G Kenneth (1964) lists many interesting species with a total of 550 vascular plants recorded for the area, plus four stoneworts (charophytes) and over 270 bryophytes. Eight nationally scarce plants occur including lesser tussock sedge *Carex diandra* and two eyebrights *Euphrasia curta* and *E.rostkoviana.*

The outer islands have particularly important seabird colonies where significant numbers of cormorant *Phalacrocorax carbo*, and over 1% of the British shag *P.aristotelis* population, breed. Other birds breeding within the site include eider *Somateria mollissima*, black guillemot *Cepphus grylle*, shelduck *Tadorna tadorna*, red-breasted merganser *Mergus serrator*, common tern *Sterna hirundo* and several wader and gull species.

The wintering birds are internationally important. The Greenland races of the barnacle goose *Branta leucopsis* and the white-fronted goose *Anser albifrons* spp *flavirostris* occur in internationally important numbers. The barnacle geese utilise improved pastures on Danna Island as their core feeding zone, whilst the white-fronted geese range more widely, and utilise the saltmarsh communities to a greater extent. The offshore islands, notably Eilean Mor and Eilean Ghamhna, provide goose refuges and roosting sites. Over 1% of the British whooper swan *Cygnus cygnus* population utilise An Grianan and Loch na Cille areas in the autumn before dispersing more widely, however there has been a noticeable decline in their usage of these sites in recent years. Overlaps in part with West Tayvallich Peninsula.

Annex 3: Social and economic information

https://www.nomisweb.co.uk/default.asp ONS national stats

Mid Argyll ward 3 map
http://www.sns.gov.uk/Reports/Report.aspx?MapAreaTypeId=MW&MapAreaId="310"

Argyll and Bute facts and figures
http://www.sns.gov.uk/Reports/Report.aspx?MapAreaTypeId=MW&MapAreaId="310"

The following data has been collated from Scottish Neighbourhood Statistics [17] and the Scottish Index of Multiple Deprivation (SIMD) [18] produced by the Scottish Government. Additional information is from

For the purposes of SIMD, Scotland is divided up into "data zones", which typically have populations of 500-1000 people. Data zones are a statistical tool and may not always correspond to recognizable community units. For each data zone, statistical information is compiled under 7 separate "domains" covering income; employment; crime; education; health; housing and access. The combined index is used in this report. The result of the statistical process is a ranking of all 6,505 data zones from lowest to highest. Scottish Government (SG) can use the SIMD results as a means to identify areas suffering from multiple deprivations so that these can be targeted for assistance.

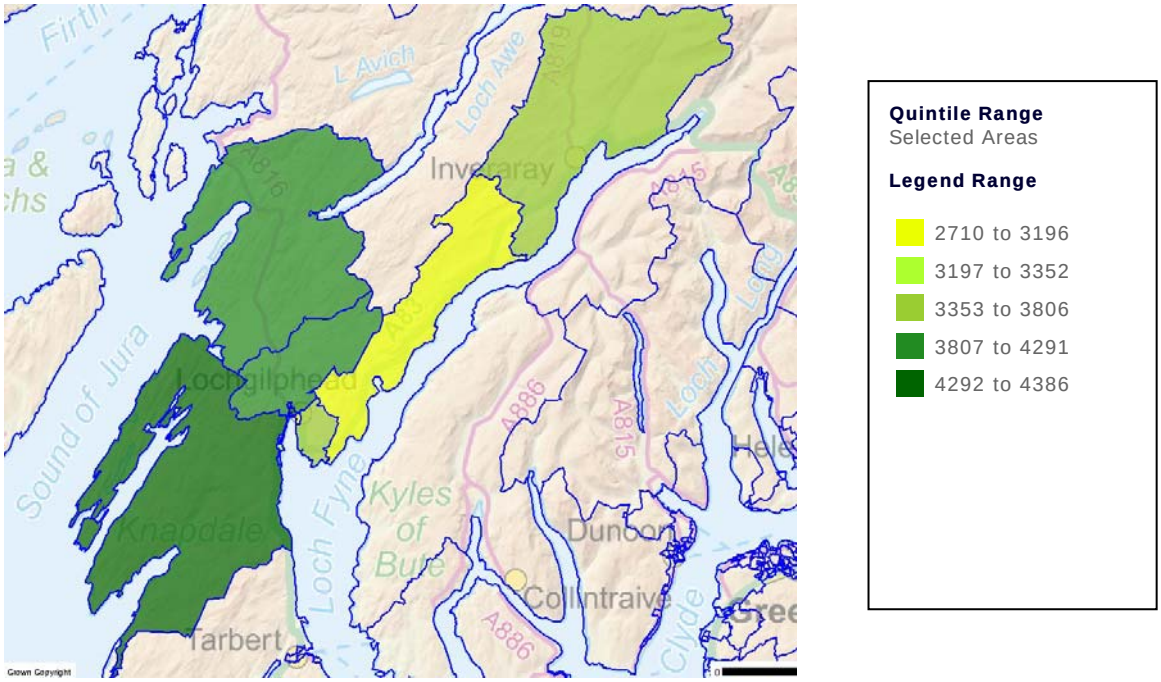
Annex table 3.1 Population and Scottish Index of Multiple Deprivation (SIMD) for Mid Argyll datazones.

Datazone name	Datazone number	Population 2007	SIMD rank (2006) out of total of 6505	% SIMD ranking
Knapdale and Tayvallich	SO1000763	798	4386	67.4
Ardrishaig	SO1000789	657	3231	49.7
Glendarroch	SO1000791	609	3205	49.3
Kilmory Castle	SO1000793	641	3433	52.8
Lochgilphead South	SO1000794	871	2710	41.7
Lochgilphead North	SO1000795	875	4303	66.1
Cairnbaan & Kilmichael	SO1000801	716	4289	66.0
Loch Fyne North	SO1000802	716	3160	48.6
Ardfern and Kilmartin	SO1000803	1179	3853	59.2

Sources: Scottish Index of Multiple Deprivation 2006
Scottish Neighbourhood Statistics 2007

[17] http://www.sns.gov.uk/
[18] http://www.scotland.gov.uk/Topics/Statistics/SIMD/map.asp

Map 3.1. Scottish Index of Multiple deprivation 2006. Mid-Argyll.



Source: Scottish Neighbourhood Statistics.

Annex table 3.2 Population structure Mid Argyll datazones and Scotland. Scottish Neigbourhood Statistics 2007.

Area/Datazone name	% Children	% Working Age	% Pension Age
Mid Argyll (Scotland) pop 7898	17.16 (17.82)	60.26 (62.72)	22.59 (19.45)
Knapdale and Tayvallich	14.66	59.90	25.44
Ardrishaig	17.50	54.95	27.55
Glendarroch	18.56	59.28	22.17
Kilmory Castle	21.37	62.87	15.76
Lochgilphead South	19.63	55.91	24.45
Lochgilphead North	18.86	59.20	21.94
Cairnbaan & Kilmichael	16.06	64.66	19.27
Loch Fyne North	15.36	57.68	26.96
Ardfern and Kilmartin	15.61	60.56	23.83

Annex table 3.3 Employment by Sector, Ward 3

% of people employed in:	Mid-Argyll	Argyll and Bute	Scotland
Agriculture & fishing	**11.9**	**3.7**	**1.6**
Energy & water	**2.5**	**1.3**	**1.8**
Manufacturing	**7.0**	**4.1**	**9.2**
Construction	**4.6**	**5.7**	**5.7**
Distribution, hotels and restaurants	**26.3**	**24.5**	**22.0**
Transport and communications	**5.6**	**4.6**	**5.4**

% of people employed in:	Mid-Argyll	Argyll and Bute	Scotland
Banking, finance & insurance, etc.	**9.3**	**12.8**	**18.8**
Public admin., education & health	**21.0**	**38.0**	**30.3**
Other services	**11.8**	**5.2**	**5.3**

Source; Annual Business Enquiry 2007, From NOMIS under licence

Annex 4: Recent community, educational and research activities.

"Key research projects completed in recent years have included studies of marsh fritillary butterfly. McCluskie (1998) completed a PhD on the foraging behaviour of otters around the Taynish peninsula. He has subsequently followed this up with studies of otters to help inform us on the location of new access routes at Taynish, to minimize disturbance to this key species. Edinburgh University honours students visit the reserve annually and many return to complete small research projects. Demonstrating conservation management has also been a key aspect of previous management plans for the reserve including, woodland and grassland management projects. Most of these projects have been interpreted to the local community and educational groups, with a few open days for demonstration projects to land managers."[19]

In addition, there are long-term monitoring projects contributing to national schemes, e.g. the Butterfly Monitoring Scheme, and specific monitoring to ascertain the effectiveness of new grazing regimes.

[19]The Story of Taynish NNR SNH