



**Corepoint Expert Couplets & Case Studies:
Descriptions of physical, ecological and socio-economic
context and of area-specific Corepoint activities**

Compiled as part of the Corepoint Project

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Editors: Margaret Carlisle, David R. Green, William Ritchie
University of Aberdeen



Executive Summary

This report comprises descriptions of twelve areas which were the loci of activities jointly undertaken between a Corepoint partner and a local authority. Nine of these joint ventures are Expert Couplets – long-term, wide-ranging partnerships involving many joint activities between Corepoint and the relevant Local Authority. Three of these were not formally defined Expert Couplets, and so are termed additional case studies. There is a good spatial distribution of these study sites around the North-West Europe region, and the study areas are also diverse in terms of other geographical criteria, specifically physical, socio-economic and ecological factors. These factors are the physical nature of shoreline, land and subsea substrate, the physical topography/bathymetry, the nature of hydrological dynamism, erosion vs accretion, peripherality vs. core areas, employment, terrestrial & littoral ecology and finally marine ecology.

The first section of this report is the introduction and the map of the loci within North-West Europe. The second section of the report presents an overview of the physical, socio-economic and ecological factors and an overview of the Corepoint activities undertaken. The third and fourth sections of the report give detailed descriptions of each study area. Each study area location is shown on maps and illustrated with images, and its physical, ecological and socio-economic characteristics are described. Additionally, the history of coastal management in the study area, its coastal issues and the Corepoint activities undertaken are detailed.

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1 Introduction

The locations of the twelve areas of Corepoint activity are shown on Figure 1. The next section provides summary overviews of the context and the activities undertaken in all 12 areas. The third and fourth sections describe in detail, with map and image illustrations, both the physical, ecological and socio-economic context and the Corepoint activities of each area in turn.

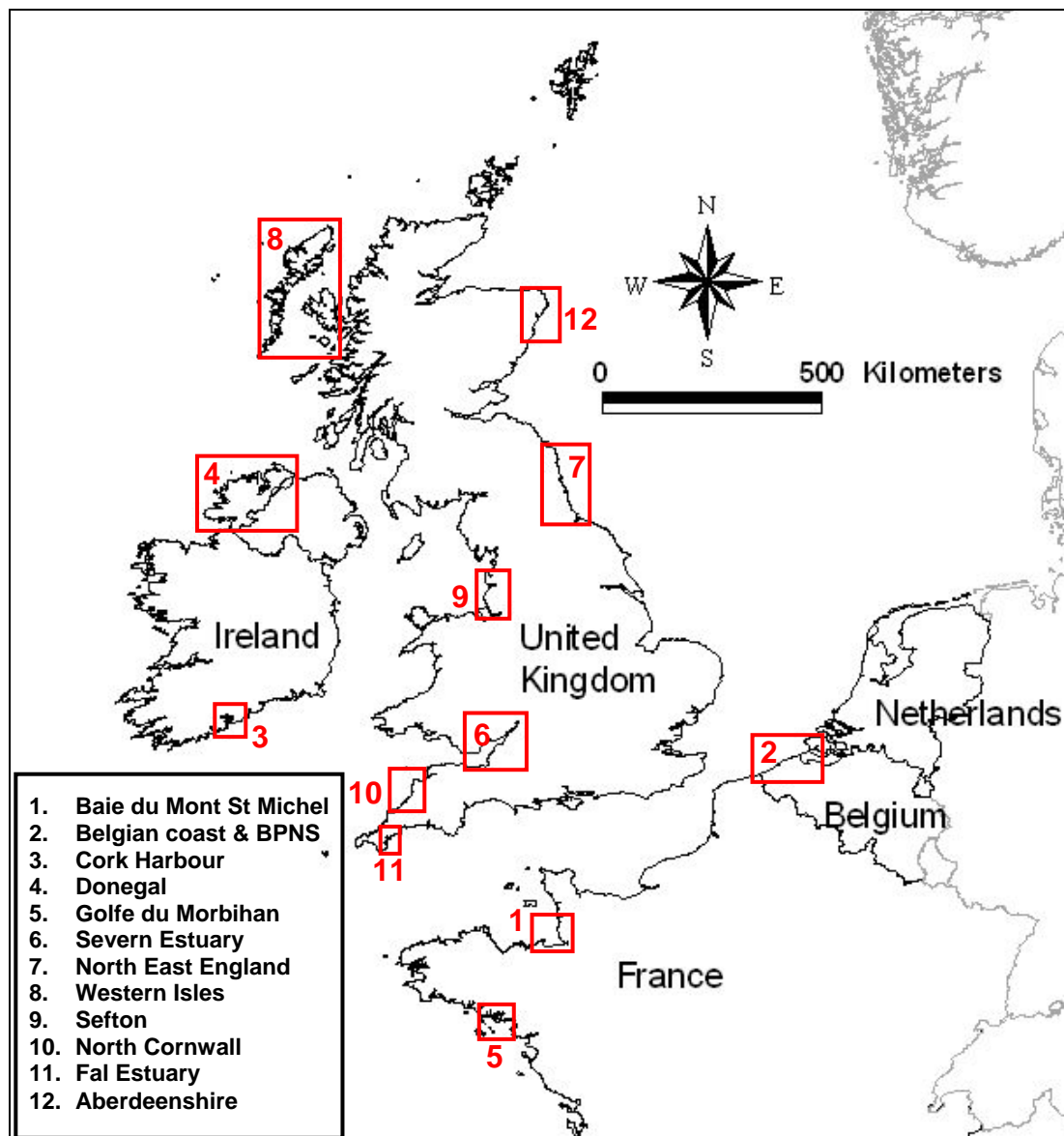


Figure 1: Location of expert couplets and case study areas

2 Overviews

(Contributor (both sections): Margaret Carlisle, University of Aberdeen)

2.1 Overview of context of the 12 study areas

Figure 1 shows that there is a good spatial distribution of case study sites around the North-West Europe region. The case studies are also diverse in terms of other geographical criteria, specifically physical, socio-economic and ecological factors. Examining each factor in detail:

2.1.1 Physical nature of shoreline, land and subsea substrate: Shorelines can be crudely divided into two types, rocky (cliffs and rock platforms) and sediment-dominated (shingle, sand, silt or mud). Many of the case study areas include both types – for example, the Severn Estuary and Baie du Mont Saint Michel have large areas of shingle, sand and mud, but also have many areas of sea cliff and rocky shore platform. However some of the case study sites are strongly dominated by one shoreline type – the Belgian and Sefton coasts are almost totally comprised of sandy beaches, with associated dune systems and flatlands as the landform and sand bars as the subsea substrate. North Cornwall, much of Donegal and the all of the eastern side of the Western Isles, however, are predominantly series of rocky peninsulas interspersed with small sandy beaches or mudflats. North East England and Aberdeenshire both have long sweeping beaches, but also areas of sea cliffs. The Golfe du Morbihan, Fal Estuary and Cork Harbour are all drowned river valleys or rias, and so have very sheltered, muddy gravel subsea substrates, with very little sand.

2.1.2 Physical topography/bathymetry: As noted above, The Golfe du Morbihan, Fal Estuary and Cork Harbour are all rias, so all have complicated bathymetry, often with a deep channel of 30m or so depth. The land around the channels for the Fal and Cork Harbour is also undulating (slightly hilly). The Golfe du Morbihan topography



is more level. Both the bathymetry and the topography for the Sefton coast is very level. The Belgian coast has very level topography, but the bathymetry is more undulating, with a unique sandbank complex varying from -5m to -46m. The most level bathymetry of all is found at Baie du Mont Saint Michel, with its vast intertidal flats. In contrast, the topography of Donegal shows high relief, with the highest sea cliffs in Europe at 600 metres. The Isle of Harris in the Western Isles is equally rugged, although most of the rest of the Western Isles is less steeply hilly. The western shore of the Uists in the Western Isles is very level, both bathymetrically and topographically.

2.1.3 Nature of hydrological dynamism: The Golfe du Morbihan, Fal Estuary and Cork Harbour are all very sheltered from the winds and waves of the open sea, although all three experience strong tidal currents. The Baie du Mont Saint Michel and the Severn Estuary are open to storm surges from the north-west and south-west respectively, and in combination with their very large tidal ranges (the second and third largest in the world, respectively) this means that there is sufficient energy within the entire water column to support very large amounts of sediment transport. Donegal, the Western Isles and North Cornwall are all exposed to the great Atlantic swells and winter storms, and this is a very high energy environment at the top end of the water column, although the energy levels diminish rapidly as one moves down the water column. Aberdeenshire, North East England and the Belgian coast all face onto the North Sea rather than the Atlantic (exclusively so at the national level for Belgium), but this sea too can produce great storm surges and high energy waves for sediment transport. All three are non-indented coasts, and so sediment can be transported great distances along the large sediment 'cells'.

2.1.4 Erosion vs accretion: Many parts of the Sefton and Belgian coasts are heavily urbanized and protected by hard sea defences. Other places on both of these predominantly soft coasts are suffering from problems of coastal erosion, possibly

due to the disruption to the sediment cells brought about by the urbanization. Aberdeenshire and North-East England also have dune systems, generally in a more natural state and with fewer erosion problems, although some of the soft limestone cliffs of North East England are potentially eroding. Mont Saint Michel bay is accreting sediment, as is much of the Severn Estuary (although some of the Welsh sea cliffs have potential for erosion). Those parts of the coasts of North Cornwall, Donegal and the eastern Western Isles that are 'hard', rocky coasts have no major erosion problems, but the gently shelving western coast of the Western Isles is eroding at a substantial rate, a long term geomorphological process of post-ice age coastal retreat. In Donegal many dune systems are eroding, although there are only a few sites where it can be regarded as an issue. The Donegal estuaries are accreting sediment. The sheltered rias of Cork Harbour, the Fal and the Golfe du Morbihan are accreting sediment.

2.1.5 *Peripheral vs. core areas:* Population density varies greatly between the different areas. The descending order is as follows:

- Sefton 1834/km²;
- Belgium 678/km² (number calculated by means of figures for coastal municipalities and part of the hinterland);
- Severn Estuary 476/km²
- Golfe du Morbihan 300/km²
- North-East England 293/km² (whole region – only 62/km² in rural areas);
- Cork Harbour 276/km²
- Fal Estuary 146/km² (figure for whole region of Cornwall);
- Baie du Mont Saint Michel 113/km² (figure for whole region of Brittany)
- North Cornwall 70/km²;
- Aberdeenshire 68/km² (whole region inc. Aberdeen city – rural only 37/km²);
- Donegal 26/km²;
- Western Isles 9/km².



From this it can be seen that both Sefton and the Belgian coast are ‘core’ areas, with large, dense populations. Indeed the figure for Sefton does not include the nearby large conurbations of Manchester and Liverpool, whose populations often travel the short distance to Sefton for local leisure purposes. Those areas with large, busy harbours - the Sefton and Belgian coasts, the Severn Estuary, North East England and Cork - are economic hubs for industry of all kinds, making them even more important ‘core’ areas. Donegal and the Western Isles are classic ‘peripheral’ areas, distant from the ‘core’ economic areas, and with low populations, often exacerbated by migration from rural to urban areas.

2.1.6 Employment: In general, employment patterns reflect the peripherality vs. core typology. Peripheral areas such as Donegal and the Western Isles are still heavily dependent on primary sector employment such as fishing, aquaculture and agriculture. The only large-scale alternative in these areas is tertiary sector tourism. The high-level economic core area of the Belgian coast, with the international port of Zeebrugge, offers a wide range of employment opportunities from secondary sector (manufacturing), to high-level tertiary sector (freight) and quaternary sector (financial services associated with manufacturing and freight). However the Belgian coast as a whole is still substantially dependent on tourism as an employment generator. Sefton, despite having a very high population density, is still principally a residential (commuter) and tourism area. The Sefton coast just edges over into the Port of Liverpool with the Freeport being within the area, very significant economically, with a wide variety of economic activity and social problems. Even greater economic generation is happening in the nearby cities of Manchester and Liverpool. The other case studies areas can be described as being on the spectrum between these two extremes, with some interesting individual variations. For example, North East England has a long history of coal mining in the near coastal zone of County Durham, as well as a history of shipbuilding, heavy engineering and petrochemical industries in the urbanized areas. Mining and shipbuilding are now

almost non-existent, and heavy engineering is much reduced, and the area has to a certain extent re-invented itself as a more service-based economy. Aberdeenshire, on the other hand, despite its low population density indicating peripherality, is the heart of the European oil and gas industry and high-level tertiary sector offshore support is the mainstay of the local economy.

2.1.7 Terrestrial & littoral ecology: There are no major climatic or altitudinal differences between any of the case study areas. The most important differentiating influences on the ecology of these areas are therefore the physical and socio-economic differences as described above. The physical differences define how much of an important resource is theoretically available for a given species. For example, the mud flats of the Baie du Mont Saint Michel, Golfe du Morbihan, and the Severn Estuary support a large population of invertebrates, which in turn support large populations of wading birds. Likewise, the cliffs of Donegal and North East England (Flamborough Head and the Farne Islands), and the many sea stack islands of the Western Isles, provide nesting sites for sea birds. The socio-economic differences define how much of the resource is realistically available. Urbanization has greatly diminished the dune resource of the Belgian and Sefton coasts, but the dune systems of the Western Isles, Aberdeenshire and North-East England are still relatively untouched. Agricultural intensification can use up important habitats such as saltmarsh. Industrialization can pollute habitat and make it unsuitable for species. Population density can have an effect in itself. For example, golden eagles are both extremely sensitive to human disturbance and require large hunting territories (c. 40-70 km² per pair). They therefore need suitable land (reasonably hilly - not necessarily mountainous) with very few people about on it – and so they are found in very few areas of North West Europe, one of these areas being the Western Isles.

2.1.8 Marine ecology: Again, there are no major climatic or altitudinal differences between any of the case study areas. Benthic marine ecology, like terrestrial and



littoral ecology, is tied down to specific location. Maerl beds, for example, are resident on a particular patch of sea floor and can be protected as such. On the whole there is much less information available for the benthic ecology of the case study areas in comparison with the terrestrial and littoral ecology. Pelagic (free-swimming) marine ecology is quite unlike terrestrial, littoral or benthic ecology in that it is principally governed by the movement of resources (especially plankton, the bottom of the food chain) within vast areas of the seas, and so it is often not possible to definitively link a species to a particular case study area. For example, several of the case study area descriptions include sightings of basking sharks, minke whales or turtles. These species are known to travel great distances, and it is possible that a basking shark sighted off Cornwall could then be sighted off Donegal and eventually off the Western Isles.

2.2 Overview of Corepoint activities in the 12 study areas

Some of these Study areas (e.g. Belgian coast & BPNS) were full Expert Couplets involving many joint activities between Corepoint and the relevant Local authority, others (e.g. Fal Estuary) were one-off case studies.

The coastal issues for each Study area are described in full in each of the following Study area sections. These sets of coastal issues were generated by each partner in response to an open-ended request, not a questionnaire, and are therefore often highly specific - for example, “The potential effect of the non-native brown alga *Sargassum muticum*”. This open-ended approach was deliberate, in order to give the respondents total freedom of choice and of description. It is useful to be able to analyse the issues in terms of more generically described issues, so each issue was assigned to one of a list of 43 generic issues, as shown in Table 1. This list consists of three groups of issues – national and international level ones (black type); regional level ones (blue type); and local level ones (green type).



Table 1: Coastal issues for the 12 study areas.

8 study areas	R Cumulative development impacts - tourism
6 study areas	L Conservation of sea water quality L Conservation of habitat L Economic - tourism/recreational (including access issues)
5 study areas	R Developing a Marine Spatial Plan L Conservation of landscape (litter, small scale development) L Conservation of wildlife
4 study areas	R Regional scale landscape impacts (large wind farms etc.) R Regional economic development L Physical - coastal erosion and sea defense L Economic - aquaculture
3 study areas	N Framework for Marine Spatial Planning N Coastal impacts of climate change N Pelagic impacts of overfishing (i.e. impact on wide ranging fauna, from fish species to seabirds) N Renewables strategy R Regional scale erosion management plan (includes sea defenses and sea level rise) L Conservation of beach quality L Conservation of built & archaeological heritage
2 study areas	N Pelagic impacts of climate change (i.e. impact on wide-ranging fauna) R Mediating use conflict/cohabitation R Regional scale wildlife impacts L Conservation of benthos quality L Conservation of intertidal quality L Economic - mineral extraction L Economic - fishing (local) L Economic - industry (ports etc.) L Economic - renewables
1 study area	N Economic development strategy N Assigning funding (from national sources to regional and local level) R Co-ordination of regional management plans R Developing a coastal strategy R Regional scale pollution in benthos R Regional scale marine water quality R Regional scale habitat loss R Cumulative development impacts -other including urbanization R Monitoring R Regional project funding L Physical - coastal sedimentation L Conservation of land quality L Conservation of fresh water quality (especially re. eutrophication) L Economic - agriculture L Economic - landtake (urbanisation) L Economic - local project funding

Many partners identified the same issue (although they may have worded it differently) as being of importance for their case study area. The most obvious case in point is the regional scale issue of cumulative impacts from tourism-related development – 8 out of 11 respondents identified this issue as being of importance to their case study area. Other regional scale issues that were chosen by several (4 or more) respondents were Marine Spatial Planning, landscape impacts, economic development, erosion issues and wildlife impacts.

The other issues that were chosen by several (4 or more) respondents were all local ones. Five of these were oriented towards local scale conservation – sea water quality, habitat, landscape, wildlife and heritage. Tourism was again important (6 respondents), but this time in its positive guise as a local economic generator (for example, issues around improving beach or boating access for tourists was put into this category). Aquaculture was the other important local economic generator (5 respondents). The issue of local scale coastal erosion and sea defence was also important in 5 of the study areas.

None of the national level issues had more than 3 respondents – this reflects the fact that all of the ‘government’ partners in the expert couplets/case studies are regional level or local level authorities rather than national bodies. The Belgian expert couplet is a unique one. The couplet is with a regional administration (Flemish Region), and matter pertaining to the coast above the low water mark are within the remit of this administration. However, matters pertaining to below the low water mark (i.e. the Belgian Part of the North Sea) are dealt with at the national (Belgian Government) level. Additionally, the Flemish coast is also the entire coast of Belgium, and so is of national importance even if it is under regional jurisdiction. As noted in the expert couplet description *“There are many important local issues, such as seawater quality, the increase in holiday homes, the aging of the coastal population, climate change and coastal defence. However, due to the restricted length (65 km) of Belgian*



coastline the real priority is to integrate all 10 of the local municipality initiatives. Because of this the priority coastal issues, as listed here, are regional and national in nature". This couplet was therefore particularly strong on national and regional level issues.

The only other three expert couplets/case studies who identified national levels issues were North East England, Western Isles and Aberdeen. The North East England and Aberdeen couplets have made it a prime objective to facilitate connection between national and regional policy levels as part of their activities. The Western Isles couplet, on the other hand, is a predominantly local-issue-oriented one, but two of these local issues – the conservation of the vast seabird colonies and the planned macro-scale renewable energy generation – require a strategic approach at the national level, and local stakeholders are well aware of this.

Many issues have been identified by only 1 or 2 respondents. For example, local agriculture is of importance only to the Western Isles and Cork, and sedimentation is of importance only to the Baie du Mont Saint Michel. Other of these issues perhaps reflect the limitations of the approach. For example, funding issues at national, regional and local scale was only identified by one expert couplet, North East England, but it is likely that many other of the couplets would have selected these issues if they had been offered as suggestions within a formal questionnaire.

In addition to the ICZM context plus list of issues for each of the Case Study areas there are also descriptions of the actions and outcomes of each of the nine Expert Couplets and of each of the additional three case study areas in the following pages. The Expert Couplets themselves have not attempted to address all of the identified issues. In many cases the identification of the issues has been the most important outcome of the couplet. The following list offers a representative selection of Expert Couplet and Case Study activities, pairing output with issue:



1. Baie du Mont Saint Michel: The 'Days of the Bay' conference and exhibition addressed local economic concerns from all sectors.
2. The Belgian expert couplet has been closely involved with the National Advisory Body for ICZM, the government 'think tank' on the subject. As such the expert couplet has addressed the issues of a framework for Marine Spatial Planning, coastal impacts of climate change, and the sustainable development of the Belgian coastal zone.
3. Cork Harbour: The Expert Couplet reviewed best practice in the rejuvenation of coastal brownfield sites, addressing issues of local landtake and industry development.
4. The Donegal expert couplet facilitated the use of soft engineering approaches to coastal erosion, addressing both regional and local scale coastal erosion, sea defence and effects of sea level rise.
5. The kayaking activity model (GIS) produced by the Golfe du Morbihan expert couplet helped address four issues, namely supporting the local tourism economy, dealing with regional cumulative impacts relating to tourism, mediating use cohabitation and supporting local wildlife conservation.
6. Severn Estuary – work with the Severn Estuary partnership.
7. The North East England couplet's detailed stakeholder assessment of the status of ICZM in the region addressed the two regional issues relating to co-ordination of regional management plans and to development of a coastal strategy.
8. The Western Isles couplet's work on pairwise comparison is supporting the conservation of the local archaeological heritage, and its work on the risk-return assessment for the island of Baile Sear is enabling the cultural as well as economic value of local agriculture to be incorporated into ICZM strategies.

9. Sefton's LIS (Local Information System) is supporting evidence based policy/decision making. The main emphasis is on the sustainable approach but it informs all management aspects impacted on by the future evolution of the dynamic coast. As such it is integrating all of the local economic issues.
10. The work on carrying capacity for surf schools in the North Cornwall expert couplet is addressing the issues of the local tourism economy and the regional cumulative impacts of tourism.
11. The Fal Estuary's LIS (local Information System) is being designed to address important local issues such as conservation of the benthos quality and conservation of the fresh water quality (re. eutrophication).
12. The Aberdeenshire couplet's plans to run a 5 day GIS/use-conflict/evaluating human impact workshop for land managers, concentrating on the important local issue of a planned wind farm, addresses the issue of regional scale landscape impacts as well as regional economic development.

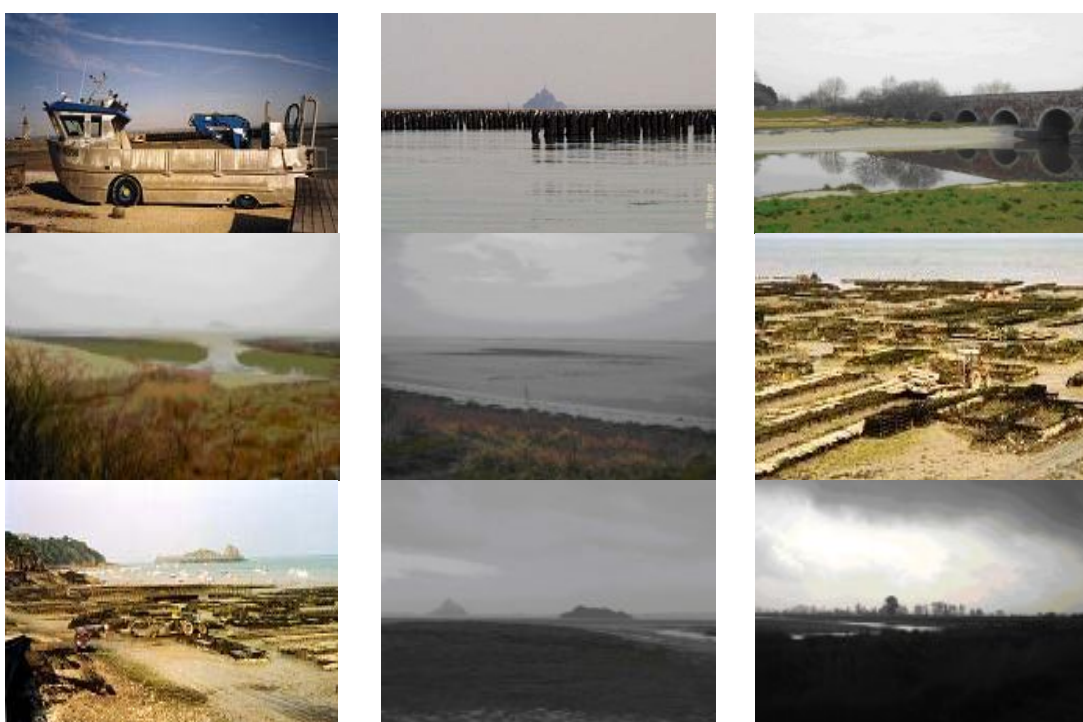
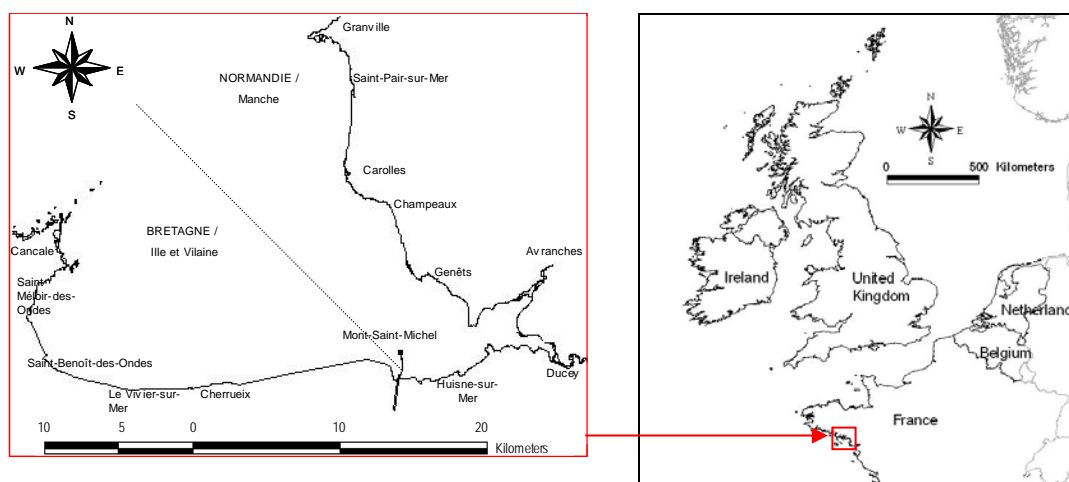
The following pages describe all 12 of the Study areas in greater detail.



3 Expert Couplet Study Areas

3.1 Study Area 1: Baie du Mont St Michel (Brittany, France)

(Contributor: Manuelle Philippe, CEDEM, UBO)



Mussel farming boat (1)	M.St-Michel & mussel farm (3)	Salt marshes MSM bay (2)
Island of Tomblaine.(2)	Flat shore line of the bay.(2)	Oyster farming (1)
Oyster farming close to the city of Cancale (1)	Salt marshes and the islands of MSM and Tomblaine.(2)	Wetlands in the Mont-Saint-Michel bay.(2)

(images © M.Philippe (1), F.Kervarec (2), M. Rougerie / Ifremer (3))

3.1.1 *Physical Characteristics of the coastline*

Mont-Saint-Michel bay has one of the largest intertidal zones in the world (250km²) and the second largest tidal range in the world (15 metres). The bay is characterized mainly by long flat beaches with a few dunes, but also cliffs and rocky coast at its western and north-eastern parts. Mont St Michel and Tomblaine are the two most important rocky peninsula/islands. The mouths of the three main rivers (Couesnon, Sée and Sélune) are found in the south-eastern section of the bay, and this area is characterized by wetlands, saltmarsh and salt meadows. Due to the very flat landform of the bay and the huge tidal range, the tides move extremely quickly. The large intertidal zone is made of sand, quicksand and mud, and the dynamism of the system means that very large quantities of sand move with each tide, with a general tendency for sand to accumulate in the bay.

3.1.2 *Ecological Characteristics of the coastline*

The bay is a large and complex ecosystem where marine and terrestrial ecology are closely interlinked. The river water quality is improving, and salmon migrations are becoming more frequently observed in the bay and in the two rivers (Sée and Sélune) where they spawn. The bay is also favourable for the reproduction of flat fish (plaice, sole), and as a nursery habitat for juvenile seabass. The bay is also of major importance for birds, with 134 species of birds being present either as residents or as migrants. Winter migrants are particularly numerous, with up to 54,000 individuals being present in January, principally wading species such as Dunlin (*Calidris alpina*) and Oystercatcher (*Haematopus ostralegus*), as well as Brent geese (*Brenta bernicla*) and Shelduck (*Tadorna tadorna*). The bay is also home to mammals such as seals (*Phoca vitulina*, *Halichoerus grypus*) and dolphins (*Tursiops truncatus*). One of the most interesting species in the bay is the worm *Sabellaria alveolata* who lives in tubes made in sand. The accumulation of these tubes forms a reef that can be 1.5 metres high. The total surface area of such ‘worm-reefs’ is around 100 ha.



3.1.3 *Human Characteristics of the coastline*

About 40,000 people inhabit the bay. The density of population is therefore relatively low. This population increases considerably in summer time with the arrival of tourists from all over the world attracted by the historic abbey of Mont-Saint-Michel itself. An estimated 3.5 million people visit it every year, and as a result the economy of the bay is mainly based on tourism. The maritime bay is characterized by shellfish farming. It is the major site in Brittany for mussel farming (10,000 tonnes per year). It is also an important area for oyster farming: *Crassostrea gigas* on the intertidal zone (4,000 tonnes produced per year) and *Ostrea edulis* in deep water (1,000 tonnes per year). The main terrestrial land use is farming (orchards, cereals and livestock, including sheep grazing on saltmarsh). The traditional fishing method is to fix gear on the intertidal zone in order to catch fish on the ebb tide. There are currently 16 of these in operation. Additionally there is a limited licensing system enabling 60 trawlers to fish within the 3 nautical miles zone.

3.1.4 *Coastal Management (ICZM): Context*

There are many management tools ongoing in the Bay: UNESCO's world heritage list, RAMSAR, project life environment, Natura 2000, ZICO, ZPS, ZNIEFF, SAGE etc. etc. There are four separate local authorities within the Bay (two departments (councils) and two regions), and historically the issue of different local authorities pursuing different, non-integrated, policies has been a particular problem. In late 2005 the Bay became part of a nationally funded ICZM initiative. This project, timetabled for 1.5 years so due to be completed in 2007, has enabled the four administrations to work together via the inter-county council association "Manche-Ille et Vilaine". In particular the project has aimed to enable communication between the administration, the policy makers and the population in order to restore the identity of the whole bay. The ultimate objective of the project is to build a charter for an ICZM management of the bay.



3.1.5 *Coastal Issues*

- Wildlife Conservation
- Bathing Water Quality
- Water Quality for shellfish farming
- Habitat loss (worms)
- Leisure and Tourism / Recreational impacts
- Natural processes of accumulation of sediments in the bottom of the bay
- Dredging (in relation to shellfish farming)
- Protecting the historical and natural environment
- Conflict between trawlers and shellfish farmers within the 3 nm zone.
- Shellfish farming
- Pollution
- Marine Spatial Planning

3.1.6 *Corepoint activities*

The expert couplet is between the inter-county council Association (“Manche-Ille et Vilaine”) and the French Corepoint Team (UBO-CEDEM and IFREMER). A key strength of the couplet is involvement of the researchers in an ICZM project that can be followed from the beginning (2005) until the end (2007). Additionally, regular contact (every 2 months) between the Corepoint team and the Association’s agent’s proved to be easy to maintain. However, considerable time and effort has been necessary to identify shared issues and to clarify how collaboration could be organised between both partners and it has proved to be difficult to combine the expectations of the Association searching for tools ready to be used (short term) and the necessity of conceptual thinking on the research side. The short-term nature of the project has led to time pressures for both partners in the couplet.

There are several key opportunities in this expert couplet. Due to the diversity of key issues among the different LAs the Mont St Michel Bay area has much interest for research studies on policy issues. Because of the inter-relationship between the Association and other initiatives in the area, especially the Natura 2000 implementation, the linkages are of interest in terms of governance and public policy



analysis. Finally, in 2005, the Association was selected for national funding along with 24 other projects scattered along the coast of France. IFREMER (with a state organism, CETMEF) is in charge of following the 25 projects from the scientific point of view. Thus, on the one hand, this couplet enables focussing in on one specific project among a diversity of others in France. On the other hand, it enables comparison of the Mont-Saint-Michel Bay project with the other 24 in France. However there are also threats. The complexity of the area leads to difficulties in the ICZM project implementation. There is no common key issue to bring the whole Mont-Saint-Michel Bay population into one debate. Finally, the short-term funding (until mid-2007), means that future prospects for the project and thus for the couplet, are uncertain.

The outputs of the Expert Couplet include:

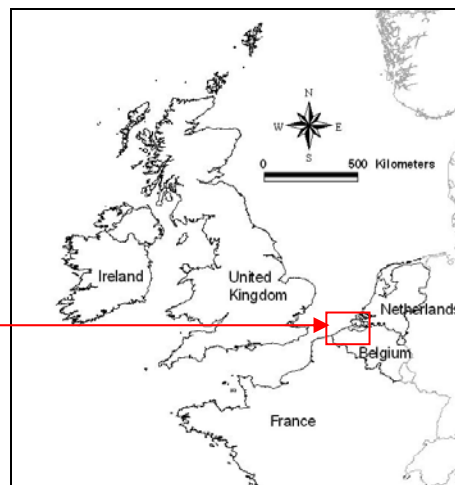
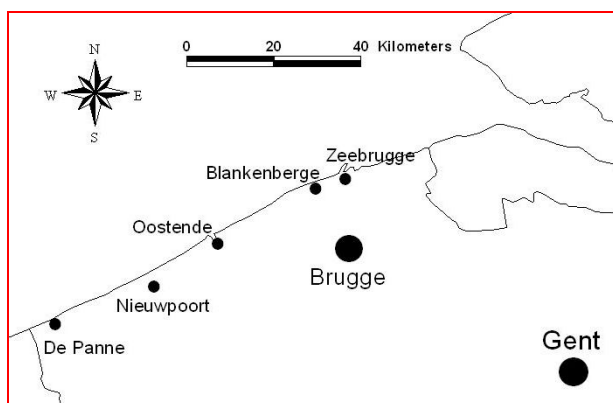
- The 'Days of the Bay' conference and exhibition, which brought together stakeholders from all sectors.
- Co-operative work with the Association on the role of those stakeholders whose participation in such projects is difficult to obtain. This work included many interviews with such stakeholders. A final report was produced for the Association with the aim of supporting the Association in its aim of improving the participation of the local population in ICZM projects.

The couplet has not been able to address all issues. In particular, it has not addressed conflict resolution. However the couplet has been successful on many other fronts. The most important has been the involvement of local authorities in consideration of issues beyond their usual day-to-day remit. Additionally, the couplet has engaged the UBO-CEDEM/IFREMER researchers in more active participation in the ICZM process. Finally, though less importantly, the couplet has facilitated improved communication of science to a target audience and enabled greater understanding amongst the researcher of the needs of local authorities.



3.2 Study Area 2: Belgian coast & BPNS (Belgian part of the North Sea)

(Contributors: Dino DeWaen, Frank Maes, Dirk Bogaert & An Cliquet, Maritime Institute, Gent. Sections 3.2.1-3.2.3 are based on the Belgian coastal atlas www.kustatlas.be)



De Panne (West coast)	Lombardzijde (West coast)	Middelkerke (Mid coast)
Oostende (Mid coast)	Bredene (Mid coast)	De Haan (East coast)
Blankenberge (East coast)	Zeebrugge (East coast)	Knokke (East coast)

(all images ©VLIZ)

3.2.1 *Physical Characteristics of the coastline*

The Belgian coastal plain is part of the maritime plain that extends along the North Sea from the cliffs of the Boulonnais to Denmark. The coastal plain is about 65 km long and 10 to 15 km wide inland, and comprises beach, dunes and polders, with no natural hard substrates (rocky shores). In the framework of coastal defence several artificial hard substrates have been built. Their most important function is the protection of the hinterland (dikes, groynes), the harbour (piers, moles) or the safeguarding of the shipping (buoys). In 1994, 46 km of beach, about 70 % of the total coast length presented some defence structure. At this time coastal defences were largely represented by beach fences, long-shore sea walls and groins, which have been used for a long time but whose effectiveness is now questioned. Furthermore, important artificial nourishments have been performed in certain places: more than 10 million m³ of sand have been put on the beach between Heist and Het Zoute and 2.8 million m³ between Bredene and du Haan between 1978 and 1994. A relatively narrow dune belt with a width of only 100 m to 3 km, constitutes the transition between sea and land. In most seaside resorts the dune belt was replaced by a permanent protective seawall. The dune acreage, which still amounted to almost 6,000 ha at the beginning of the twentieth century, has almost been halved and, more particularly, highly fragmented. This is the result of urbanization and growing tourist activity. Only a few locations still feature uninterrupted dune complexes. Over the entire length of the coast the dunes have largely been influenced by man. Everywhere the typical natural dynamism of the dune landscape has all but disappeared. Since the 1990s the authorities have put in efforts to protect the remaining dune areas from further degradation, to restore the natural dynamism, and to create new dune areas. Inland of the dunes lies a flat and vast polder landscape. The dynamic combination of waves, tides and wind influences the loose sediments which make up the soil in the terrestrial zone, and results in a constantly moving landscape. The Belgian territorial waters form part of the continental shelf, which is rarely deeper than 30 meters on Belgian territory and characterized by the presence

of a complex system of sandbanks that are all oriented parallel or almost parallel to the coast. The tidal range averages 4 meters. The maritime environment is equally characterized by a powerful dynamism. The sea floor is made up of loose sediments (clay, loam and to a lesser extent, gravel) that are set in motion by tidal currents.

3.2.2 Ecological Characteristics of the coastline

Despite the human activities that use a large part of this area and exert great pressure on the fragile ecosystems, a number of ecologically very valuable areas have been preserved. The Belgian coast only has two beach reserves: "De Baai van Heist" and "De IJzermonding" near Lombardsijde. The dunes along the Belgian coast are very vulnerable ecosystems that have only recently been incorporated into a protection plan. The three largest nature reserves along the coast are "De Westhoek" (345 ha), "Het Zwin" (160 ha) and "Ter Yde" (68 ha). The coastal hinterland mainly consists of polders, land previously reclaimed from the sea by systematic dyke construction and drainage. The flat polder area is mainly used for agriculture, for the purpose of which a draining system with sluices and canals has been constructed. Areas along the coast where the natural transition between dunes and polders is still intact, have become extremely rare. Older forests along the coast can be found in the dunes and in the transition zone between the dunes and the polders. The original aim of the afforestation of the coastal dunes was to protect the agricultural lands in the hinterland. They form a wind screen and hold the sands together.

3.2.3 Human Characteristics of the coastline

The Belgian Coast is a densely populated area with important economic and tourist activities. The relatively small coastal area is the setting for a number of widely divergent human activities, resulting in a high concentration as well as a complex spatial intertwining of functions. Agriculture and fisheries have historically been the two most important economic sectors of this region: agriculture was the motive behind the reclamation of land, and many seaside resorts were originally small

fishing communities. Current agriculture is largely non-industrial, and is in danger of being completely ousted by growing urban areas on the one hand and environmental interests on the other hand. The offshore fishery uses the three fishing ports of Zeebrugge, Oostende and Nieuwpoort as its operating base. However, the number of vessels is on the decrease as a result of fish stocks becoming depleted, amongst other things. Although the shallow waters of the southern North Sea are traditionally rich fishing grounds, there is a decrease in fishing activity. Nowadays Belgian fishermen only account for 1 % of the total fish catch in the North Sea. In the period 2006 - 2007 the Belgian fishing fleet dropped from 120 to 107 vessels with a total gross tonnage of 20,000 BT. In 2006 these vessels ensured a fish supply of 17,982 tons or 82 million EUR. Tourism is now the most important economic activity in the coastal region, with a yearly revenue of 675 million EUR (2003 figure). As a result of the development of tourism, the originally sparsely populated coastal area has been urbanized in an expansive and somewhat uncontrolled fashion during the course of the last century. As small settlements along the coast gradually became connected and new residential areas appeared, this resulted in the coast today having the appearance of one elongated conurbation. Due to its geo-economic central location between the economic poles of the European core area, the coastal region forms the setting for specific activities in fields such as transport, logistics and distribution. The extensive road network, the regional airport, the canals and the railroads constitute the economic backbone of these activities. The port of Zeebrugge is a deep-water port (up to 52 feet deep) with equipment that meets all requirements of present-day shipping and transshipment techniques, and has developed from a transit port into a European distribution center. Total trade amounts to about 30 million tonnes per year. Over 350 companies are active in the port area of Brugge-Zeebrugge. Together, they realize an annual average added value of 750 million EUR and employ almost 11,000 persons. The number of indirect jobs is estimated at 30,000 (source: MBZ, GOM - West-Vlaanderen). The port of Oostende is a "short-sea shipping" port with ro-ro and cargo transportation to Great Britain as its main activity. Total annual trade



amounts to about 6 million tonnes. Almost 3,000 people are directly employed in the port area. The regional "Brugge-Oostende" airport represents a cargo trade of about 60,000 tonnes per year. It transports about 100,000 passengers annually, mainly by way of chartered flights. The number of aircraft movements is about 40,000 a year (source: GOM - West-Vlaanderen).

3.2.4 Coastal Management (ICZM): Context

The Belgian policy with regard to integrated coastal zone management is in line with the broader European framework. It aims at a joint approach on the basis of which coastal zone management can be guided, and provides the possibility to formulate long-term strategic objectives in the future. In order to determine whether developments in the coastal region form a basis for sustainable development, the Coordination Center for Integrated Coastal Zone Management (CC-ICZM) has created the sustainability barometer for the coast. This convenient measuring instrument monitors the evolution of a set of themes or 'indicators' that are important for the coast and coastal policy.

The *Coastal Division* is a subdivision of the *Agency for Maritime and Coastal Services*, which falls under the *Ministry of Mobility and Public Works*. It has been in operation since 1898. The activities of the Coastal Division extend to the entire Belgian coastal zone and its areas of responsibility include:

- Protection of the population and the national heritage against storm surges and floods.
- Sustainable and integrated development of the coastal zone.
- Active nature and landscape enhancement at the coast.
- Support for coastal and sea-related tourist-recreational activities as well as cultural and educational initiatives.

In addition the Coastal Division contributes to swift and safe traffic to and from sea ports and the Westerschelde.



3.2.5 *Coastal Issues*

There are many important local issues, such as seawater quality, the increase in holiday homes, the aging of the coastal population, climate change and coastal defence. However, due to the restricted length (65 km) of Belgian coastline the real priority is to integrate all 10 of the local municipality initiatives. Because of this the priority coastal issues, as listed here, are regional and national in nature.

- Climate Change (specifically increased storminess) and it's impacts re. Coastal Defence.
- Safety and pollution due to increased shipping activities
- Increasing Tourism pressure
- Impact of fisheries and climate change on seabird breeding success.
- Marine Spatial Planning
- Designating Marine Protected Areas
- Renewable Energy (3 windfarm projects)
- Coastal Development and the Visual Landscape (off-shore Windfarms)
- Conservation vs Economic Development

3.2.6 *Corepoint activities*

The Coastal Division is a partner in the Coordination Centre on ICZM (CC-ICZM) and is a permanent member to the Task force and the Advisory Board on ICZM. Within the COREPOINT project this advisory board was nominated as the National Advisory Body (NAB) on ICZM, a body that advises the local COREPOINT partner in its tasks and that allows the local COREPOINT partner to give periodical status reports on the activities of the COREPOINT project. The NAB is also the ideal link between the COREPOINT project and the local policy makers, resulting in an increase of the local ICZM capacity. The Coastal Division has commissioned the Maritime Institute to complete its policy analysis of the Belgian COREPOINT case study, the MPA designation in the Belgian Part of the North Sea and the beach

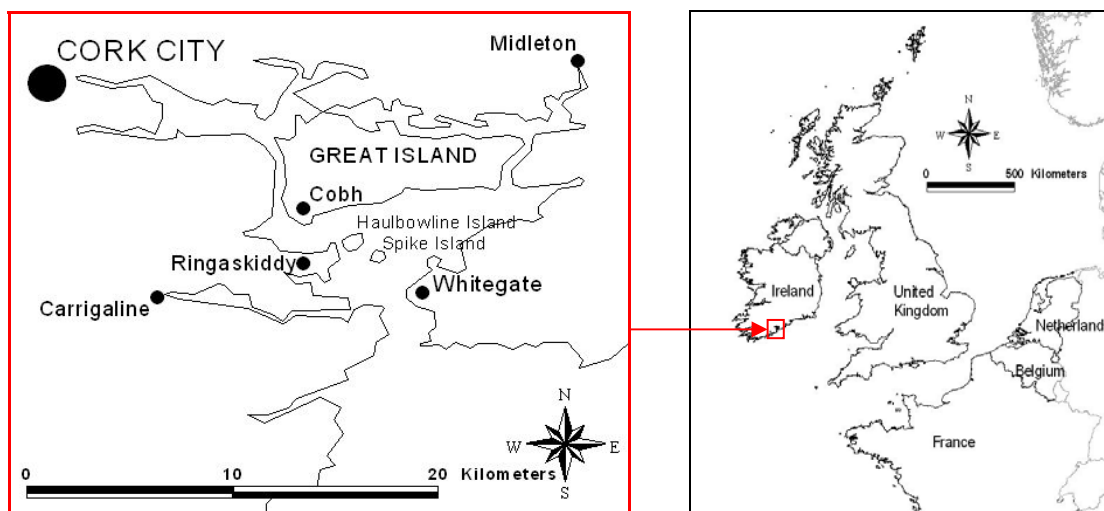


spatial planning process. The Maritime Institute aims to provide insight in the role of public participation and its mechanisms. This analysis should eventually result in clear recommendations concerning public participation and should help facilitate future projects in ICZM for the coastal division and other actors and authorities. Next to this task the Coastal Division has also commissioned the Maritime Institute to further develop its legal inventory of the coastal area and the coastal codex, a unique document indispensable for the future of ICZM at the Belgian coast. Next to its indispensable advisory and financial role the Coastal Division forms a unique partnership with the Maritime Institute. The Coastal Division's expertise lies in coastal defence and the effects of climate change therein, while the Maritime Institute is a key player in the field of Maritime law and policy. Combined, the expert couplet provides a compatible knowledge base to tackle the various tasks within the COREPOINT project. Practically speaking this means that the Maritime Institute will tackle the legal and policy task within COREPOINT and the Coastal Division will give support for the technical and coastal defence related tasks. For these tasks the Coastal Division has provided data and relevant information and its expertise. The Coastal Division has also actively participated in various COREPOINT activities, the COREPOINT progress meeting and the expert surgery were organized with the help and various contributions of the coastal division. During the meeting the Coastal Division gave a clear and informative presentation on its structure and mission objectives. The expert surgery was organized in collaboration with the Coastal Division and its sister administration, the Administration for Nature Conservation and featured expert contributions from the Coastal Division and a guided tour to one of their project sites. In the future these type of activities will become more frequent, in the future the Coastal Division plans to attend the partner meetings and will possibly provide a presentation during the new COREPOINT schools.



3.3 Study Area 3: Cork Harbour (Ireland)

(Contributors: Jeremy Gault & Val Cummins CMRC University College
Cork and Patricia Griffin & Darragh O Suilleabhain, Cork County Council)



Recreation, Cork Harbour	Port Operations, Cork City	Cobh, Maritime History
Heavy Industry, Lower Harbour	Wildlife	Naval Operations
Community Development	Maritime Heritage	Ferry Terminal and Dry Dock

(all images © Vicki O'Donnell, CMRC)

3.3.1 *Physical Characteristics of the coastline*

Cork Harbour, one of the world's largest, naturally sheltered harbours, is a complex estuarine coastal system with a water body surface area of approximately 100km² on Ireland's south coast. The principle riverine input is the 65km-long River Lee, which drains a catchment of about 1,200km². The Lee begins its journey eastwards to Cork City from Gouganebarra, a lake and former ice basin on the border of the counties of Cork and Kerry. Other riverine inputs include the Owenacurra, Glashboy and Owenabue rivers. The Lee is partly controlled by the ESB hydroelectric dams at Carrigadrohid and Inishcarra. The Lee passes through Cork City at the upper tidal reaches and into the navigable Upper Harbour area, which is dominated by strong estuarine influences. The waterway continues through two narrow channels around Great Island before opening out into the expansive Lower Harbour. The two most significant islands within the Lower harbour are Haulbowline and Spike islands. The entrance to the Harbour at Roche's Point is a narrow channel, just 1.3km wide. The distinctive form of the Upper and Lower harbours is shaped by Devonian Old Red Sandstone ridges relative to a basin predominantly underlain by Lower Carboniferous (Dinantian) limestone interspersed with mud- and sandstones of the same epoch. In most areas surrounding the Harbour the subsoil comprises glacial till with some alluvium and marine deposits. A significant proportion of the land area is made-ground corresponding to urban and suburban areas, and hinterland, including Cork City and the towns of Ringaskiddy, Cobh, Carrigaline, Whitegate and Midleton. The mixed coastline consists of built infrastructure, shallow cliffs, intertidal sand and mudflats, shingle and rocky foreshores exposed by the 3-4m tidal range. The bathymetry of the Harbour reflects the morphology of the coastline, with gentle slopes dropping to a depth of 28m near the mouth of the Harbour (11m in the channel which is maintained at that depth for navigation).



3.3.2 Ecological Characteristics of the coastline

Cork Harbour is a highly modified system with only limited areas of natural, undeveloped coastline. The variety of terrestrial, wetland, freshwater, estuarine and coastal habitats supports a diversity of species. The variety of the Harbour's saltmarsh, reedbed and mudflat habitats are important areas for migrating and wintering waterfowl and wading bird populations numbering some 30,000 to 50,000 birds across numerous species, 32 of which occur regularly. The nutrient-rich mudflats and wetland areas support a good level and diversity of invertebrate fauna. Green algal species occur on the flats, and cordgrass (*Spartina* spp.) has colonised the intertidal flats in places. Cork Harbour is home to several protected mammals, including the otter, common seal, grey seal and occasional cetacean visitor, particularly bottlenose and common dolphins. The River Lee is a designated salmonid river under the EU Freshwater Fish Directive (78/659/EEC). Harbour waters are also important fish spawning and nursery areas. The commercial and recreational fisheries, from both boats and shore, target 33 species including crabs, prawns, mussels, herring, whitefish, salmon, sea trout and eels. There are several designated protected wetland areas of national and international importance in Cork Harbour, including five SPAs (totalling 1,420ha), one SAC (the sheltered Great Island Channel covering 1,480ha), several national Natural Heritage Areas (including proposed ones), and a Ramsar Convention Site.

3.3.3 Human Characteristics of the coastline

Cork Harbour, one of the world's largest natural harbours, is of vital importance to the society and economy of Cork City and the surrounding region, as well as to the national economy. The social and economic dimensions of Cork Harbour are characterised by several concentrated urban areas, principally Cork City (population c. 120,000 in 2006), but also rapidly growing towns such as Cobh, Carrigaline and Midleton, and increasing urban (residential and retail) sprawl. Figures for the Cork metropolitan area (Cork city plus satellite towns plus the rural matrix – see Cork Strategic Plan CASP) are given as population 274,000, within an approximate area of



993 km², giving a population density of 276 persons/km² for the Cork Harbour area. The satellite towns are set in a rural landscape of mixed crop and livestock agricultural land use, crossed by an extensive road infrastructure. There are widespread pockets of industrial development and enterprise zones dominated by the chemical, (bio)pharmaceutical and technology industries. The historic location of Cork City in the early Middle Ages, on low, flood-prone islands in an estuary, in the steep-sided valley of the River Lee, has provided problems as the City has grown – most notably flooding and drainage, freshwater supply, air quality and transport infrastructure. Cork Harbour's long and culturally rich maritime tradition stems from its naturally sheltered environment and navigable deep-water channels. Today, the waterway is used routinely by merchant and naval shipping (the Irish Naval Service is based at Haulbowline in the Lower Harbour) and for recreational boating, which is increasing in popularity. The strategic location of the Port of Cork – which handled 9.7 million tonnes of goods during 2006 – and the redevelopment the City docklands for business and residential use have resulted in plans to simultaneously expand and relocate port infrastructure. The local economy is benefiting from recent growth in cruise liner traffic, which berth at the historic town of Cobh. The 2007 cruise season will see 41 visits by 26 liners carrying some 45,000 passengers worth an estimated €35 million. Other key human activities associated with Cork Harbour are recreation and tourism, maritime heritage, sea angling, commercial fisheries (salmon, sea trout, and eels) and aquaculture of both native and Pacific oysters. The historic Spike Island, which together with Cobh, is central to plans to develop Cork Harbour's heritage activities. Waste management is a problematic activity in the area, particularly due the closure of coastal landfill sites and the issues surrounding the proposed development of incinerator plant at Ringaskiddy. There are several contaminated coastal brownfield sites that are awaiting remediation and redevelopment following the closure of industry. These include a former steel plant on Haulbowline and former fertiliser factory at Marino Point on the western shore of Great Island.



3.3.4 Coastal Management (ICZM): Context

The variety and magnitude of often competing human activities and land uses taking place within and around Cork Harbour creates tensions, which present a significant challenge to policymakers and coastal zone managers. Contemporary policy issues relate to water quality and competing uses of both the waterway and coastal zone land. For example, the recent implementation of a major urban wastewater treatment system for Cork City has significantly improved water quality in the Upper Harbour. Nevertheless, high levels of nutrients from agricultural fertiliser use are still entering the River Lee and Cork Harbour. The Port development has implications concerning the carrying capacity of existing road infrastructure. Visually-appealing locations along the coastline are highly sought after by developers, both for residential property and marinas. Other policy issues concern future climate change (particularly the impacts of increasing storm surge and riverine flooding on Cork City) and population growth (i.e. increased urbanisation and infrastructure). Policy responses have tended to be reductionist and sectoral. “Systems thinking” is currently lacking in governance and management, which limits adaptive capacity for dealing with change. However, through the auspices of the EU Interreg IIIB project COREPOINT (Coastal Research & Policy Integration), a multi-stakeholder Cork Harbour Forum was recently established to promote and facilitate improved management of Cork Harbour as a resource and to provide an opportunity for dialogue and networking whilst highlighting the benefits of ICZM.

3.3.5 Coastal Issues

- Brownfield sites (post-industrial remediation & redevelopment).
- Catchment land use (agricultural practices, urbanisation land use changes).
- Coastal flooding and erosion (climate change).
- Coastal urbanisation and infrastructure development (town & country planning).
- Cork Main Drainage Scheme (nutrient management and water quality).



- Fisheries and aquaculture.
- Incinerator and atmospheric pollution (location and impacts of proposed plant).
- Introduction and transfer of marine organisms (ballast water, hull fouling, and aquaculture).
- Marine spatial planning (cross-cutting issue concerning the waterway).
- Port development and maritime transport (incl. merchant and naval shipping).
- Recreation, maritime heritage and tourism.

3.3.6 Corepoint activities

The Cork Harbour Expert Couplet aims to strengthen links between Cork County Council's Planning Policy Unit (PPU) and the Coastal and Marine Resources Centre (CMRC) to improve the management of Cork Harbour. Under the auspices of the Expert Couplet, representatives from the PPU and the CMRC have worked together since November 2004. The programme of work underway in the Expert Couplet focuses on a number of themes that address research questions framed by the PPU, facilitate the development of an ICZM framework involving all relevant stakeholders, and promoting the Harbour as a resource for the community and for visitors.

1. **Coastal Brownfield Sites** – Cork Harbour is heavily industrialised, particularly by the pharmaceutical and food processing industries; a number of large facilities are sited along the shores of the harbour. To date, three sizeable industrialised sites have ceased operations, including the Irish Fertiliser Industries (IFI) plant at Marino Point. To date, under the activities of Corepoint, the IFI brownfield site has been the focus of a review of best practice in the rejuvenation of coastal brownfield sites. The outputs from this action, including recommendations on best practice, were disseminated to local authority planners.
2. **Recreational Carrying Capacity** – Cork Harbour is a natural amenity enjoyed by both visitors and residents who use the harbour environment for a range of recreational activities. The economic upturn experienced by Ireland since the



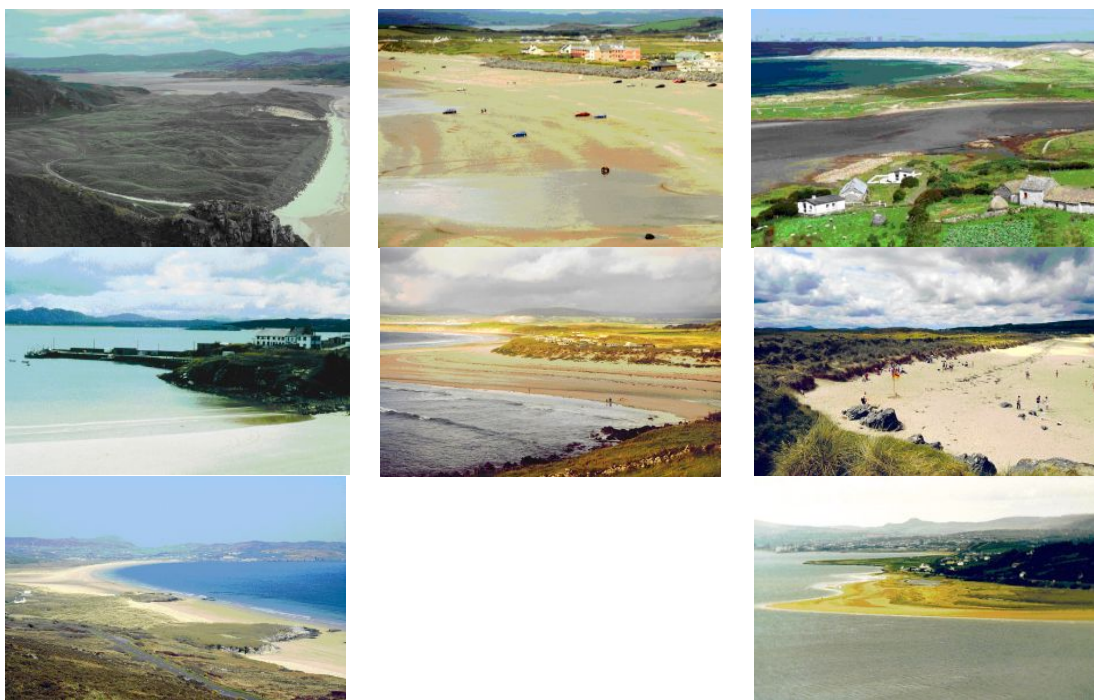
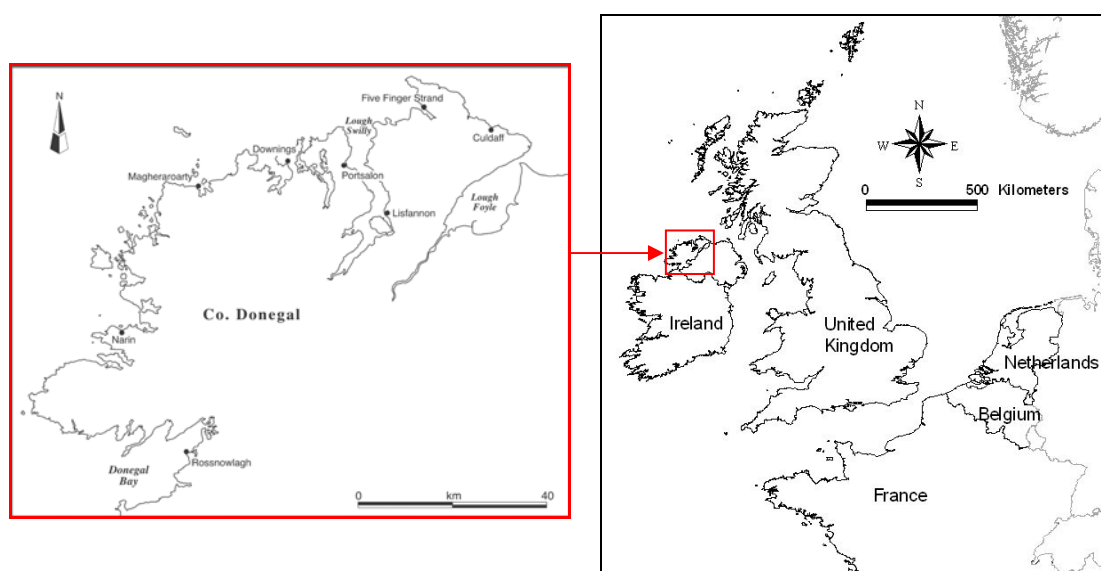
1990s has contributed to an increase in the number of people involved in water-based activities including sailing and power boating. Applications for three 100+ berth marina and associated developments have been submitted for three locations in the harbour. Thus the pressures and impacts of marine recreation are likely to increase in the coming years. In order to assess these pressures, Corepoint partners in Cork Harbour have undertaken surveys of recreation users of the harbour, and developed an inventory of activity with a view to establishing a baseline, and produced a literature review on methodologies for estimating carrying capacity.

3. ***Coastal Flooding*** –Erosion caused by factors such as infrastructure development within the active beach system, sediment deficits due to coastal armouring, sea level rise and an increase in storminess is increasing the flooding vulnerability of the coastline of County Cork, and particularly Cork City and the harbour towns. The activities of Corepoint within this theme are linking with the recently initiated River Lee Catchment Flood Risk Assessment and Management Study (CFRAMS).
4. ***Geographic Information Systems and Planning*** - Corepoint partners in Cork Harbour are working to develop a comprehensive GIS of Cork Harbour, bringing together relevant data and information for the coastal zone, the GIS will be employed as a tool for forward planning and management.
5. ***Harbour Management Plan*** –An overarching objective of the Cork Harbour Expert Couplet is to increase awareness of Cork Harbour as a resource and to facilitate a more integrated approach to the planning and management of the harbour. In order to achieve this, Corepoint partners in Cork Harbour developed the Cork Harbour Forum – a multi stakeholder group representing the various interests contained within the harbour.



3.4 Study Area 4: Donegal Beaches (Ireland)

(Contributor: John McKenna, University of Ulster)



Five Finger Strand	Rossnowlagh	Magheraroarty
Downings Pier	Narin Strand	Culdaff Strand
Portsalon Strand		Lisfannon Strand

3.4.1 *Physical Characteristics of the coastline*

Donegal has the longest coastline of any county in Ireland. Of the total coastline length of 650km, 240km is soft and 410km is hard. The dominant geology consists of Dalradian metamorphosed sediments, but there are also areas of granite, limestones, shales and erodible glacial drifts. The varied coastline is dominated by long stretches of rocky cliffs interspersed with many sandy beaches and dune systems, estuarine inlets and offshore islands. Much of the hard coast on the exposed ocean shoreline is fronted by rugged sea cliffs, for example the cliffs at Slieve League in the southwest, the highest in Europe. However, Donegal also has 26% of Ireland's sandy coastline, the largest proportion in the country. The largest beach and dune systems tend to be found at the seaward margin of the estuaries. Elsewhere, smaller beaches occupy compartments between rock headlands. On the more exposed coasts, many sand dune ridge systems have been deflated to form the near-horizontal sand plains known as machair. The high energy conditions of the exposed open coast cliffs and beaches contrasts with the more sheltered conditions in the many inlets and 25 individual estuarine systems which dissect the coast to create a series of peninsulas, particularly in the north and southwest. On the north-facing coast there are the three large inlets of Lough Foyle, Lough Swilly and Mulroy Bay. The west-facing coastal sector is characterized by shallow medium-sized estuaries, associated with large dune systems and separated by rocky headlands. Finally, the south-facing coast on Donegal Bay is characterized by small estuaries and the spectacular sea cliffs of Slieve League in the extreme west.

3.4.2 *Ecological Characteristics of the coastline*

Donegal's coastal environments have significant natural values. While the many cliffs support typical maritime grasses and other species, the major ecological interest lies in the county's 37 separate sand dune systems. Marram grass (*Ammophila arenaria*) communities dominate the frontal ridges, giving way inland to more species-rich marram red-fescue (*Festuca rubra*) dune grassland. Donegal has



significant areas of the priority habitats of grey dune and machair, and extensive areas of Donegal's coast, including its Atlantic dune systems, have been designated nationally as Natural Heritage Area (NHA) and by the European community as SAC and SPA. The mud flats and salt marshes of the major estuaries provide important feeding grounds for both waders and migratory birds. Cliff faces provide nesting sites for a variety of seabirds. The coast of Donegal records numerous sightings of cetaceans such dolphins and porpoises, and whales such as the minke and humpback. Basking sharks are regular visitors and even leatherback turtles have been recorded.

Traditional coastal land-uses include seaweed gathering, marram grass harvesting, sand extraction and winter livestock grazing. Some of these activities still exist, sometimes at damaging intensities, but recreational uses have become increasingly important, leading to the threat of visitor-induced degradation. A variety of recreation-linked uses e.g. golf courses, caravan parks, etc. have taken their toll leading to a decline in conservation status, aesthetic quality and amenity value of several systems.

3.4.3 Human Characteristics of the coastline

The population of County Donegal in 1996 was 130,000. Over the last 25 years the key population characteristic is a shift in population to the east (i.e. away from the coast) and in particular the focus of growth on the largest county town, Letterkenny, and its hinterland. With the exception of the Buncrana (Lisfannon) area in the northwest, coastal areas showed only a modest increase, averaging 11%. Small towns have recorded no significant population increase. Donegal has a highly rural population (only 20% in towns over 1500) and a small urban base (largest town Letterkenny has just over 10,000). Some coastal areas in the west and northwest have a unique cultural identity as they are Gaeltacht areas where Irish is the first language.



Unemployment has remained consistently above the national average (19% against 9%) and the county has one of the highest proportions of disadvantaged areas in Ireland. Over the last 30 years there has been a huge decline in agricultural employment. Donegal's industrial base has been concentrated in textiles, clothing and food. There has been none of the inward investment in IT industries seen elsewhere in Ireland. However, economic and social problems have resulted from significant structural changes in manufacturing and service sectors, with the latter growing as the former contracts. Recently the textile industry has gone into serious decline, while the fishing industry, although still important, is facing the problems of falling stock levels and tighter restriction experienced generally in Europe. Aquaculture is a growing industry, and has been encouraged at both national and county level, sometimes perhaps too readily as there are several inappropriately sited units.

Traditionally, the local authority saw its role in supporting the creation of employment through provision of infrastructure, but in the light of declining employment opportunities elsewhere, it is now taking a more proactive role in developing sectors where the county has comparative advantage, in particular tourism development and value added food processing especially in the fishing sector. Tourism, especially that based on coastal areas, is being vigorously promoted because it is part of a service sector where greatest job expansion is likely in the future. Despite its natural and cultural attractions Donegal has largely failed to benefit from Ireland's increased popularity with overseas visitors. It has the disadvantages of a remote northwesterly location on the periphery of the island of Ireland, geographically distant from Dublin and mainland Europe, wet windy weather, distance from the main points of entry, relatively poor transport links, lack of honey-pot sites, and its perceived association with civil unrest in adjacent areas of Northern Ireland. The short summer season, and the dominance of day-trippers and



owners of static caravans or holiday homes means that daily spending is relatively low.

Donegal's peripherality and lack of a mainline rail network makes roads the most important access type. Thus efforts are being directed towards enhancing tourist facilities along scenic major road routes. Other developments are the provision in recent years of new car/passenger ferries across two of the major northern inlets (Lough Foyle and Lough Swilly), and the new bridge under construction across the third, Mulroy Bay. These will greatly assist communication in the northern area, and should have pronounced benefits for tourism. There is a regional airport on the west coast at Carrickfin which has scheduled flights to Dublin and Prestwick in Scotland.

3.4.4 Coastal Management (ICZM): Context

In Donegal, as elsewhere in the Republic of Ireland, coastal management is handicapped by the fact that there is no single agency or organisation with responsibility for policy setting and implementation. There are broad issues of coastal management. Over 90% of the soft coastline is considered to be at risk from coastal erosion. There are concerns over the proliferation of holiday homes and second homes. Donegal is the windiest part of Ireland, and several wind farms are currently in operation, with more planned. The development of aquaculture has been strongly supported by Government, but problems of disease and water pollution have emerged in recent years. A number of small holiday resorts have developed based on the most popular beaches. This has the effect of concentrating visitor numbers, leading to unsustainable beach use and endemic problems of environmental degradation. Conflicts arise from incompatible uses, e.g. beach parking and play areas. In the last decade there is a growing perception that the pressure on the county's beaches will continue to grow because of various factors that include the peace "dividend" in Northern Ireland, increased spending power, and strategic decisions to develop the economic potential of the coastal resource. Donegal County



Council is well aware of the importance of its coastal environments, and has recently taken significant steps to produce a more efficient, strategic and sustainable coastal management policy. Donegal is also a leading player in a high-priority national Marine and Water Leisure Programme, including initiatives to develop a network of marinas and moorings, to upgrade piers and harbours, to develop coastal walking routes and beach management plans on a phased basis for Blue Flag and potential Blue Flag beaches.

3.4.5 Coastal Issues

- Coastal development & loss of scenic quality
- Dune erosion & shoreline management
- Visitor-induced degradation
- Pedestrian access
- Vehicular access & parking
- Beach and water safety
- Off-road vehicles (ATVs)
- Litter & fly tipping
- Beach cleanliness
- Water quality
- Maintenance of Blue Flag status
- Animals on the beach
- Beach & water zoning
- Visitor facilities
- Jet-skis & other motorised craft
- Sand mining
- Water supply & wastewater capacity
- Holiday home development
- Static caravan sites
- Nature conservation
- Regulation e.g. bye-laws
- Beaches as economic drivers

3.4.6 Corepoint activities

The formal link between the University of Ulster's Centre for Coastal and Marine Research (CCMR) and Donegal County Council (DCC) dates from 1997, and had its origins as one of the projects in the EC Demonstration Programme on ICZM. The Corepoint expert couplet is best seen as a continuation and strengthening of this existing relationship. The Demonstration Project produced management plans for recreational beaches which subsequently became part of the Council's overall spatial



plan. Dissemination of the lessons learned was achieved by the Council's publication of a coastal management good practice guide.

Three other formal CCMR-DCC coastal management projects overlapped or followed the Demonstration Project. Two were Council funded, these being an assessment of a planning proposal application to build a golf course (1998) and a study of the erosion status and management options of all soft shorelines on the Inishowen Peninsula (2002). The third, EU funded, was a comparative cross-border study of beach management practices in the Republic of Ireland and Northern Ireland (2003). Two major outcomes of all of these pre-Corepoint interactions was the inclusion of ICZM objectives in Donegal's County Development Plan and County Strategy.

Since the Corepoint start-up date of November 1 2004, all interactions, formal or informal, between the CCMR and DCC are categorised as Corepoint couplet activities. While the expert couplet already existed, it was undeveloped because the relationship was essentially consultant/client, and work was focused on specific sites. Site-level work had served to build up familiarity and trust between the couplet partners, but its narrow focus provided no mechanism to influence management at a strategic level. Another major limitation of earlier projects was that they did little to enhance management capacity in the local authority.

Because it existed pre-Corepoint the CCMR-DCC couplet has never formulated formal aims or objectives. In practice it operates in 3 ways:

1. Formal projects. Since Corepoint's start-up there have been 3 projects (see below).

- An appraisal of the potential viability and scope of a proposed regional coastal management centre based at Buncrana on Lough Swilly. (2005- ongoing).



- The CCMR provided advice to Council engineers on the use of soft engineering approaches to coastal erosion (2005).
- In response to the project above, the Council agreed to fund a PhD study that will assess the nature of coastal erosion and develop a management strategy (2005- ongoing).

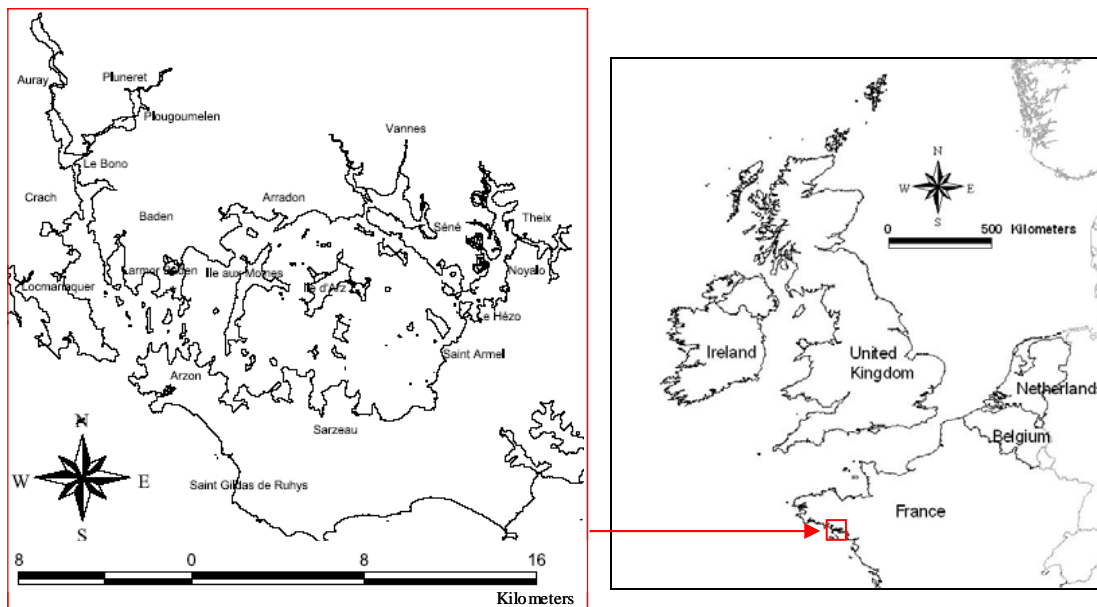
2. Strategic advice. Through both formal and informal contacts, the CCMR encourages the Council to adopt a more holistic and less site-focused ICZM approach. Already the Council has discussed a potential beach recreational strategy, and in 2006 it appointed a beach manager for the summer season. This appointment can be in part attributed to the influence of the expert couplet mechanism.

3. Informal site-level advice. In the decade since the Demonstration Project was established, both during and between projects, Council staff have habitually sought informal advice from CCMR in dealing with management issues at both project and non-project sites. In this informal way their own capacity to manage the coast is being continuously developed. Staff from both the Marine and Water Leisure Programme, and the marine engineering section attended the Corepoint Expert Surgery and/or ICZM Training Course in June 2006.



3.5 Study Area 5: Golfe du Morbihan (Brittany, France)

(Contributor: Manuelle Philippe, CEDEM, UBO)



Traditional boat	Salt marshes and wetlands	Typical landscape of the gulf
A beach	Professional fishing boat, leisure boat and traditional boat	Typical landscape of the gulf
Typical landscape of the gulf	River of Noyal	

(all images M.Philippe, excepted the River of Noyal : P.Camus, Ifremer)

3.5.1 *Physical Characteristics of the coastline*

The gulf of Morbihan is located in southern Brittany, and is 18 km in length (east-west) by 8 km breadth (north-south) with a narrow opening (900 metres) onto the Atlantic ocean. Its total surface area is 11,500 ha. The landscape of the gulf is very flat with a large number of islands, 30 to 40 depending on the criteria used. Most of the islands are very small in extent, but the two large islands are of sufficient size to be designated municipalities (ile aux Moines and ile d'Arz). The main geomorphological features are the three rivers (Auray, Vannes and Noyal), mud flats, salt marshes, wetlands, small sandy beaches and the rocky coast at the opening of the gulf. Most of the seabed of the gulf is very shallow, less than 5 metres in depth, and the intertidal zone is very large and characterized by large intertidal flats, salt marshes and mud flats. The channel opening on to the Atlantic, however, has a principally rocky substrate and is relatively deep (up to 30 metres) which in combination with its narrowness creates strong currents.

3.5.2 *Ecological Characteristics of the coastline*

The gulf of Morbihan has a high ecological value. There are diverse and extensive bird populations, some species being permanent residents and others migratory visitors. Bird species include ducks (*Anas Penelope*, *Anas clypeata*, *Anas crecca*, *Tadorna tadorna*, *Aythya fuligula*), brent geese (*Brenta bernicla*) who feed on eelgrass (*Zostera marina*), gulls, terns (*Sterna sandvicensis*, *S.hirundo*, *S.dougallii*), and wading birds (*Ardea cinerea*, *Egretta grazetta*, *Platalea leucorodia*, *Himantopus*, *himantopus*, *Recurvirostra avocetta*, *Tringa tetanus*, *Galinago galinago*, *Haematopus ostralegus*, etc). These birds are emblematic of the gulf of Morbihan, and they are dependent on the existence of suitable sites for feeding, rest and reproduction. Particularly important sites include the salt marshes and mud flats, and these areas enjoy a high level of protection and preservation. However, some habitats are under threat – for example, the eelgrass beds, which are a very important habitat for brent geese and sea horses, are currently in decline. The entrance to the

gulf is rocky, deeper and inhabited by a different aquatic fauna and flora such as gorgonia and sea anemone (*Corynactis viridis*). The gulf is protected by a large variety of designations from national to international level: Ramsar, Natura 2000, etc. The natural reserve of Falguerec, an important reserve for birds, is one of the most important of these designated areas.

3.5.3 Human Characteristics of the coastline

Despite the apparent quietness of the area, the gulf is densely inhabited: at about 300 inhabitants per km² (cf. 100 inhab./km² in the rest of France). It is densely urbanized, and this urbanization is progressing at a constant rate. Vannes is the main city of the area with about 52,000 inhabitants. The other municipalities are smaller. The easy access from Paris (3 hours by train), the clement climate, and the well preserved landscape are very attractive to a summer visitors. But due to this attractiveness, young people are finding it increasingly difficult to access housing. The population's demographic (age range) is therefore becoming skewed towards the older age ranges, particularly those of pensionable age.

Agriculture is being reduced (in terms of surface area and number employed), in response to economic pressures to make land available for urbanization. Dairy farming is the main agricultural activity. Previously, muck-spreading close to the shore affected the bacteriological quality of seawater, and thus negatively affected oyster-farmers. Integrated management has led to a solution whereby farmers do not undertake muck-spreading on land less than 500 metres from the shore.

Shellfish farming is a long-established traditional activity in the gulf. The mudflats and estuary provide particularly favorable characteristics for shellfish farming, and this activity occupies 25% of the intertidal zone. About 200 shellfish farms produce oysters (and a few clams) on 1650 ha. Fishing is not very developed in the gulf excepted for clam fishing. This fishing activity is undertaken by foot (with large

“mud-shoes”), in shallow water (with a breathing tube of around 1.50m) and by boat (dredging). A limited harvesting of urchins, shrimps, small crustacean and cuttlefish is also practiced.

One of the most important economic activities is tourism. The Departement of Morbihan is the fourth largest French department for tourism with 1.2 million tourists during summer time. The prime activity practiced by tourists is hiking. Boating is important as a tourist activity, but it is also important because local inhabitants practice it. There are about 7000 anchorages used in the gulf. There are numerous aquatic activities, including sea kayaking around the islands and leisure diving which is well developed at the entrance of the gulf on the remarkable natural seabed.

3.5.4 Coastal Management (ICZM): Context

An inter-municipality organisation (SIAGM) have been managing the ICZM projects in the gulf of Morbihan for the last 10 years. They are working on a large diversity of subjects such as: river management re. water quality and use; preservation of the landscapes; and, initiating the idea of “ecologically safe” anchorages for the diving boats (in order to preserve the fauna and flora of fragile zones). The SIAGM is also leading the gulf’s Natural Regional Park project which has been ongoing since 1999. Additionally, there is a specific integrated approach on the management of agricultural spread on the coastline between farmers and shellfish farmers, led by the Cap2000 association. In February 2005, a planning document for the gulf was adopted (SMVM). It was designed in order to organise the distribution of the main activities in the territory and to manage their cohabitation. It covers the activities of protection of natural areas, anchorages, shellfish farming, free access to beaches and sailing. Another source of management is the conservation of natural areas bought by the “Conservatoire du Littoral”, a French national institution devoted to the acquisition of natural areas along the coast. Last but not least, the gulf of Morbihan is



protected by most of the national and international labels and initiatives in order to protect natural areas (Ramsar, Natura 2000, ZICO, ZNIEFF, ZPS). There has been an effort made during recent years in order to try to coordinate these different initiatives.

3.5.5 *Coastal Issues*

- Uncontrolled urbanisation
- Leisure and Tourism / Recreational impacts
- Water Quality (for shellfish farming and bathing)
- Wildlife Conservation
- Shellfish farming
- Anchoring and mooring issues
- Protecting the historical and natural environment
- Cohabitation between a high number of activities / a dense population at summer and nature protection

3.5.6 *Corepoint activities*

The expert couplet is between the intercommunal association of the gulf (SIAGM : Syndicat Intercommunal d'Aménagement du golfe du Morbihan) and the French Corepoint Team (UBO-CEDEM and IFREMER). A key strength of the couplet is that the SIAGM are very advanced in their ICZM expertise, given their comparatively long history (10 years) of managing projects on the coastal zone according to ICZM principles. Additionally, The SIAGM is used to collaborating with scientists, which facilitates the communication between the couplet partners. However, because the SIAGM has built a huge expertise within its staff, it has proved difficult to identify particular subjects or projects for the expert-couplet.

There are several key opportunities in this expert couplet. The gulf of Morbihan is a site where a high number of interaction and uses are found, which makes it an



interesting site for ICZM. Additionally, the timing has proved opportunistic, as during the lifetime of the Corepoint project two major management projects have been initiated on the Gulf of Morbihan : the SMVM (schema du mise en valeur du la mer), a planning tool for the sea, adopted in February 2005, and the PNR (Parc Naturel Régional), a Natural regional park, still ongoing.

However there are also threats. Due to the number of stakeholders on the territory and the number of projects / planning tools / management tools, the relationships with stakeholders are multi-layered and complex – many stakeholders are time-pressured and already committed to several networks. Also, it has proved difficult for the UBO-CEDEM and IFREMER scientists to get involved in projects that were initiated before Corepoint or to generate new research in a territory that has already been very extensively studied.

The outputs of the Expert Couplet include:

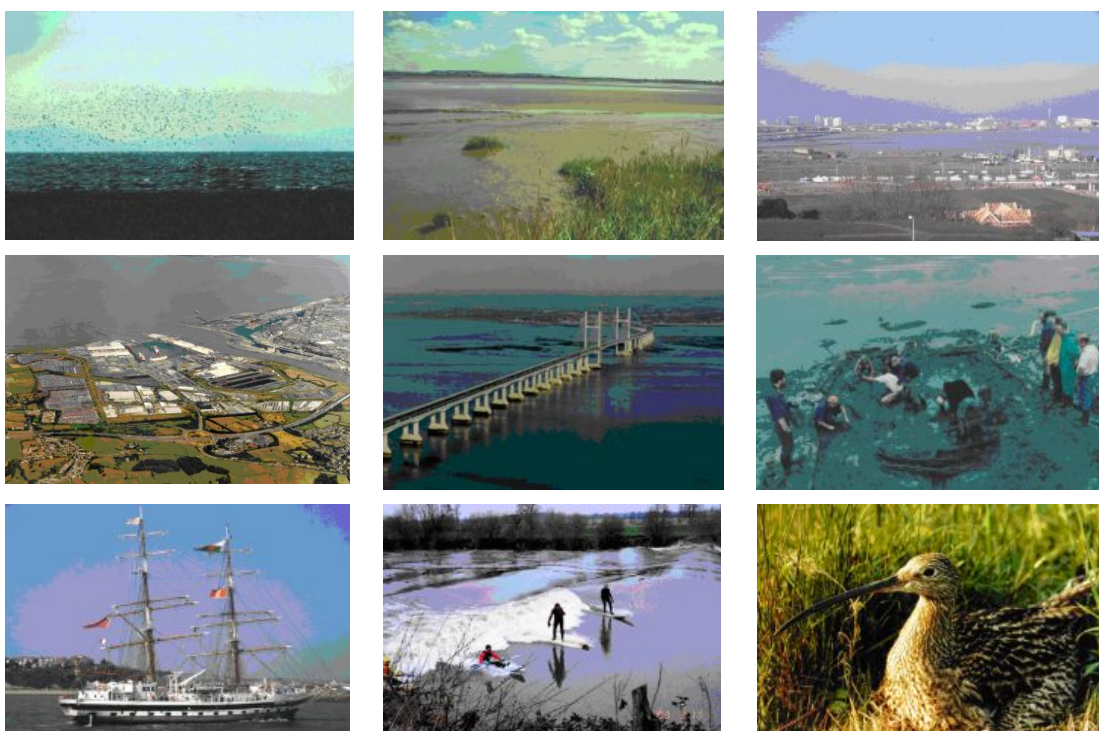
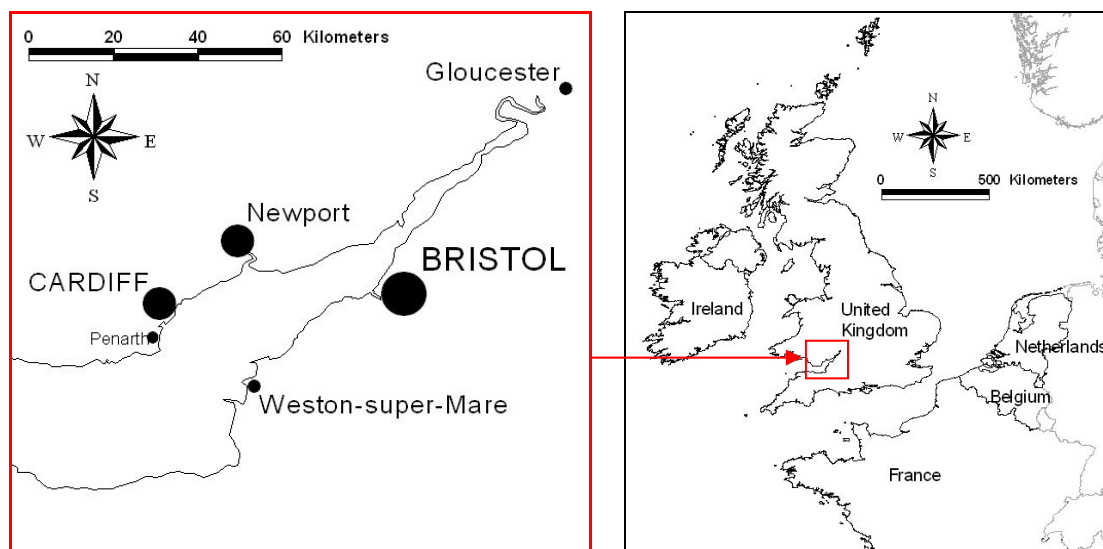
- The generation of a use-cohabitation model (using Geographical Information systems and rule-based modelling) for the two uses of sea kayaking and bird conservation.
- Improvement of capacity building and experience exchanges on ICZM:
 1. Organisation of the ICZM session of a conference on the coastal environment;
 2. Exchange of experience between Belgium (Dirk Bogaert) and the Golfe du Morbihan;
 3. Organisation of a training session with a Parisian engineering school and the ICZM project managers of the Golfe du Morbihan.

To conclude, the couplet has been successful on many fronts. The most important of these has been in capacity building and experience exchange. It has also been successful in improving coastal management and in enabling greater understanding of the needs of local authorities.



3.6 Study Area 6: Severn Estuary (Wales & South West England, UK)

(Contributors: Rhoda Ballinger, Paul Parker & Justina Southworth, University of Cardiff)



Dunlin (© John Marsh)	Intertidal Zone	Cardiff Bay
Royal Portbury 1999	Second Severn Crossing	Magor Pill
Tall Ship Entering Barry	Surfing the Severn Bore	Curlew (© English Nature)

(all images © Severn Estuary Partnership & P. Brabham except Curlew image)



3.6.1 Physical Characteristics of the coastline

The Severn is Britain's second largest estuary with an area of 557 km² including an intertidal area of 100 km² (22,000ha). The estuary boasts the second largest tidal range in the world, on occasions in excess of 14.5m. This feature gives rise to the Severn Bore, a tidal wave which can reach 2m in height under certain circumstances in the lower reaches of the Severn during high tides. The Severn Bore is regularly the focus of thousands of Bore watchers and travels at an average speed of 16km/h. The tidal regime of the estuary leads to strong tidal streams, mobile sediments and high turbidity. The tidal excursion of the Severn is unequal indicating the currents on either side are not similar. The Severn is a large coastal plain estuary, providing an outlet for five major rivers; it is extremely diverse, supporting areas of open, low lying coast, salt marshes, tidal flats and offshore islands. The classic funnel shape of the estuary is unique to Britain and rare in the rest of the world, contributing to the high tidal range of the estuary and the Severn Bore.

The geology of the Severn includes Devonian Old Red Sandstone, Lower Carboniferous limestone, Triassic Mercia mudstone and Quaternary riverine alluvium peat's and marine clays together with the glacial deposits of sand, clays and gravels. Estuary banks consisting of sands and muds are great features in areas of the Severn, including Middle Grounds, Welsh Grounds, Cardiff Grounds and the areas adjacent to flat Holm and steep Holm. Areas downstream from Avonmouth are dominated by extensive subtidal sandbanks which reach a thickness of up to 20 meters.

3.6.2 Ecological Characteristics of the coastline

The Severn Estuary is internationally known for nature conservation. The region has the status of Special Protection Area (SPA) under the EC Conservation of Wild Birds Directive and is a Ramsar site, (a wetland of international importance). The Severn Estuary also incorporates numerous Special Sites of Scientific Interest (SSSI's) and a



significantly large area of the estuary has been proposed as a possible Special Area of Conservation (pSAC), under the European Habitats Directive. The Severn Estuary is also part of a European network of sites known as Natura 2000. The Estuary habitat is internationally important for migratory fish, playing host to such species as Salmon and the internationally rare Shad. The river Severn, Wye and Usk account for more than 25% of Salmon caught in England and Wales and are of great importance for Elvers. Over 100 species of marine fish live in the Severn estuary, with the area being an important feeding ground for such species as Whiting, Bib, Poor Cod, Pollack, Northern Rockling, Flounder and Bass.

The fringes of the Severn have large areas of salt marshes, ranging from gradual to stepped transitions between bare mudflats and upper marsh. These marsh areas support important species of birds including the Redshank, Snipe and Lapwings. The intertidal mudflats are home to species of worm, snails and crustaceans which provide food for the 20,000-100,000 migratory waterfowl which visit each year. In winter the estuary regularly supports nationally important numbers of 10 species of waterfowl, whilst a further 6 species occur in numbers of international importance; (Dunlin, Bewick's Swan, European White-Fronted Goose, Shellduck, Gadwall and Redshank). The estuary is also home to the world renowned Wildfowl and Wetland Trust at Slimbridge. The new grounds support more than half the Russian population of White-Fronted Geese. Small communities of Ringed Plover and Oyster Catchers still breed in scattered locations throughout the estuary. Aside from the fish and bird life, the Severn also boasts the only known extensive subtidal reefs of the honeycomb worm *Sabellaria alveolata* in Britain.

3.6.3 Human Characteristics of the coastline

The Severn Estuary is located on the west coast of Britain, and is largely an urban area although some rural stretches do exist. For centuries the region has been a focus for human activities, a location for settlement, a source for food, water and raw



materials and a gateway for trading and exploration. The Severn's ports have a rich maritime history, which together with modern industrial developments provide employment and pride to many local people. With significant links to Britain's major motorway network and the ports of the Severn providing a gateway to the Atlantic, the estuary and its hinterland supports major cities including Cardiff, Bristol, Gloucester and Newport.

Humans were first attracted to the estuary and the surrounding area for its wildlife, natural resources and access. Paleolithic and Mesolithic hand tools have been discovered within the estuary foreshores, alongside discoveries of Bronze Age, Medieval and Roman Boats proving to be of exceptional importance to British maritime heritage (Severn Estuary Partnership, 2001). During the industrial revolution and modern era, industries including port installations, chemical processing plants and power stations have been sited on the estuary allowing them to utilize the regions resources. Cooling water, cheap waste disposal and sand for construction are provided by the estuary, with the major ports of the Severn utilizing the deep water channels to transport heavy goods. Both the large port of Bristol, Cardiff and Newport are concerned with bulk containers, vehicles, forest products and steel. In addition, dry and liquid bulks are handled within Cardiff whilst Newport is involved in the carriage of Agribulks. However it was not all about industry and with advances in personal transport the Severn Estuary became a recreational haven, leading to the development of Victorian seaside destinations such as Weston-super-Mare and Penarth. With over 5.8 million visitors to Weston-super-mare in 2005, this interest in recreation and appreciation of the estuarine habitat has developed into a dominant service industry constituting the major employment sector for the Severn Estuary.

Recent population trends in the local government areas fringing the estuary show a dramatic increase in comparison to Great Britain as a whole. Looking at the major



cities, the population of Cardiff was about 160,000 in 1900 and grew to 230,000 by 2000 with latest estimates up at 319,700. Similarly, today Bristol is the 8th largest city in the U.K. by population, with just over 400,000 inhabitants. The ten local authorities (district and unitary) which make up the area of the Severn Estuary partnership have in total a population of almost 2 million, which within a total area of 4064km² gives an overall density of 476 persons/km².

3.6.4 Coastal Management Context (ICZM): Context

The Welsh ICZM strategy, '*Making the Most of Wales' Coast*' aims to deliver a management framework to facilitate for integrated coastal management and highlights the value of partnerships such as that on the Severn. Interest in an estuary-wide approach to planning and management dates back to the 1980s when local authorities around the Severn became concerned about the potential implications of a proposed Severn Estuary Barrage. Realising the value of collaborative working, the Standing Conference of Severnside Local Authorities (SCOSLA) was formed to provide a forum for discussing local authority concerns associated with the estuary. A true estuary-wide ICZM-type initiative, involving local authorities, government agencies and a wide range of other organisations with coastal interests, did not start until the mid-1990s. This led to the launch of the Severn Estuary Strategy document 2001. This non-statutory document provides a strategic management framework, including key policies, designed to guide policy development for the estuary. The Strategy is ambitious, covering 13 sectoral areas, focusing on 95 issues and containing over 350 proposals for action. The Severn Estuary Partnership (SEP) was established to aid the implementation of the Strategy.

3.6.5 Coastal Issues

Throughout the development of the Severn Estuary Partnership, there have been various attempts to prioritise coastal/estuarine issues. These have included an initial scoping exercise involving extensive stakeholder and public participation, a



structured Stakeholder Decision Analysis process to prioritise issues involving key stakeholders and, more recently periodic reconsideration of priority issues at various Joint Advisory Committees.

The following list summarises the key issues:

- Renewable energy generation options in the estuary, including a proposed Severn Barrage
- Impacts of climate change and sea level rise on coastal defences, flooding, riverbank protection and coastal squeeze
- Concern over development and urbanisation within coastal areas and associated impacts on biodiversity as well as natural, cultural, archaeological and scientific interest
- Concerns over the protection of the historic landscape of the Severn Levels
- The potential for tourism and recreation within the estuary along with increased access and associated impacts
- Environmental impacts of aggregate dredging and issues of mineral extraction regulation
- Management of fisheries and the decline of fish stocks, including local Eel, Elver and Salmon fisheries
- Water pollution, particularly from land-based sources and contaminated land, and potential impacts on wildlife and recreational use
- Issues associated with multiple use management, including potential conflicts between recreational users, ports, industry and conservation.
- Inadequacies in coastal policy around the Severn particularly associated with variability in regional policies and a relatively weak science-policy interface

3.6.6 Corepoint activities

COREPOINT coupled activities in the Severn Estuary have focused on the following:

1. formalising the relationship between Cardiff University and SEP
2. ICZM capacity-building
3. strategic advice on ICZM, and project management
4. improving the knowledge base for SEP
5. specific projects



Formalising the relationship

A document outlining potential benefits of the relationship was produced during the initial development of the Expert Couplet. This highlighted the research opportunities to MACE, including the benefits of a first-hand, living laboratory/experiment' for research into coastal planning and management. For SEP, benefits included high quality research input into its decision-making and operations, on-tap guidance from a range of researchers and scientists, and a gateway to a wider research network around the estuary.

ICZM capacity-building

The COREPOINT project has increased knowledge and awareness of coastal issues and best practice management approaches through:

- the Expert Surgery (Cardiff Bay) targeted at councillors and key decision-makers
- an ICZM Training course (Clevedon;2005) for local authority and agency officers
- assistance in the establishment of annual Severn Estuary Forums
- workshop sessions in the annual forums
- input to *Severn Tidings*, the newsletter of the Partnership.

Strategic advice on ICZM and project management

This has been achieved by both formal and informal interactions between SEP and MACE staff throughout. Formal interactions have taken place through:

- SEP Joint Advisory Committee and Management Group meetings and associated work
- internal project management meetings between staff
- joint seminars and joint writing of academic papers
- input to each others' responses to government consultations on ICZM and related topics



Improving the knowledge base of SEP

SEP has benefited from multi-disciplinary inputs from the wider research community in Cardiff and around the Severn as well as from specific contributions from other COREPOINT partners. Particularly in the final phases of the project, inputs from academics with planning and engineering specialisms have made major contributions.

Specific projects

The COREPOINT project has included a number of specific projects, delivering key actions proposed in the *Strategy for the Severn Estuary* (2001). Projects include:

- Local Information System (LIS) development
- Estuary research strategy and forum development
- Maritime heritage interpretation and education
- Evaluation of ICZM efforts on the Severn.

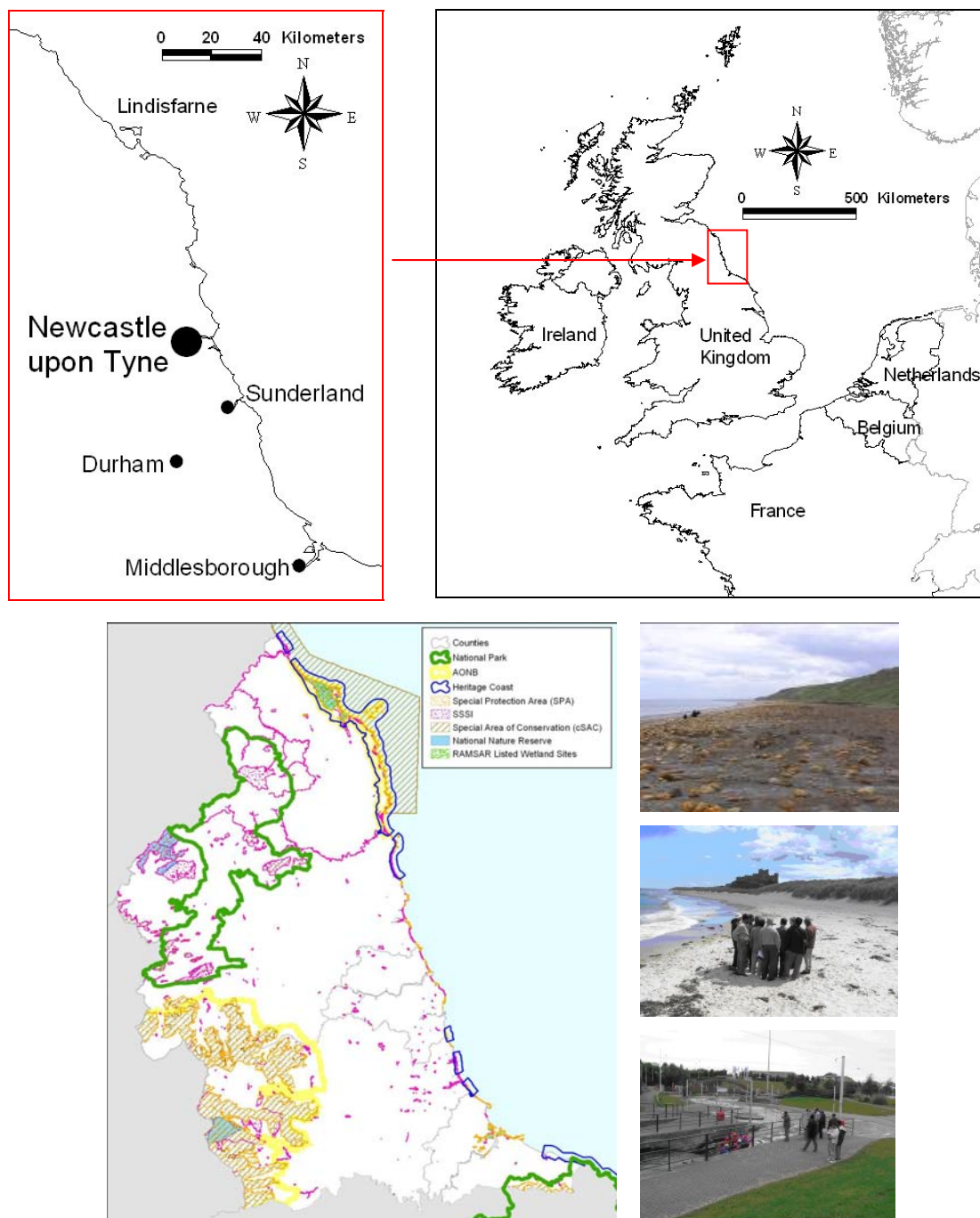
These have involved a range of awareness raising and capacity-building activities, including workshops and conferences as well as the establishment of specialist forums including the Severn Estuary Climate Change Research Advisory Group. Outcomes and outputs have been varied and include:

- improved knowledge and understanding of the coastal/estuarine environment
- better understanding of the benefits and limitations of the current governance system
- a maritime heritage education pack '*Stories of the Severn Sea*'
- a citation database on coastal climate change
- a Local Information System for Strategic Environmental Assessment for use in coastal planning



3.7 Study Area 7: North East England (UK)

(Contributors: Jeremy Hills & Martin Le Tissier, Envision)



Map of NE England showing conservation areas	Remnant collier waste at Castle Eden Dene, Durham Heritage Coast.
	Visitors at Northumberland AONB with Bamburgh Castle in background.
	The recreational canoe run built into Tees Barrage (all images © Envision).

3.7.1 *Physical Characteristics of the coastline*

The North East region (850,000 hectares) lies between the Pennines in the west, the Cleveland Hills to the south, the Scottish borders to the north and the North Sea to the east. There are a number of river valleys running eastwards towards the North Sea, creating estuaries on the coastal plain. The geology consists of carboniferous rocks, mainly limestone and coal measures, interspersed by dolerite intrusions of Whin sills. The Whin sill escarpments are a prominent feature of the North East geology, extending from Greenhead in the south-west to Bamburgh and Holy Island (Lindisfarne) in the north. Some of the region's most famous landmarks are located along these escarpments including Hadrian's Wall, Bamburgh Castle and the Farne Islands. East Durham has a magnesium limestone plateau which concludes in 60m cliffs along the North Sea coast. These coastal sea cliffs together with the quarries expose internationally and nationally important examples of Permian magnesian limestone series.

3.7.2 *Ecological Characteristics of the coastline*

Several of the coastal National Priority habitats are present in the region. Maritime cliffs occur at sites in north Northumberland and Durham where the magnesian limestone meets the sea. There are also extensive areas of sand dune and salt marsh at scattered localities on the Northumberland Coast, Tees Estuary and at Lindisfarne. Intertidal and subtidal reefs and *zostera* beds can also be found off the Northumberland Coast. The grasslands of the Whin sill areas are also of particular importance because it has a thin soil rich in base minerals. This provides a unique environment in which some of Britain's rarest plant species are found, namely Maiden Pink and Spignel. The Durham cliffs create a unique grassland habitat because the rock contains a combination of magnesium carbonate and calcium carbonate, characterised by a calcareous shallow soil that supports unique fauna and flora. Similarly, the chalk cliffs at Bempton, just north of Flamborough Head, are important because they are home to England's largest colony of gannets (*Morus*



bassanus) and form part of the country's largest marine bird site. 13% of the area of the region is covered by a number of international, European and national statutory and non-statutory designations including 7 Special Protection Areas (SPAs), 10 Special Areas for Conservation (SACs), 3 (plus 2 potential) Ramsar sites, 14 National Nature Reserves (NNRs), and 245 Sites of Special Scientific Interest (SSSIs). Of the two large National Parks in the region, one, the North York Moors, includes the coastal zone in the south of the region. The Northumberland Coast is defined as an Area of Outstanding Natural Beauty AONB (135 km²). 129km of the coastline are also classified as Heritage Coast, specifically the North Northumberland Heritage Coast (114km), Durham Heritage Coast (13km) and part of the North Yorkshire and Cleveland Heritage Coast (7km). Heritage coasts are a non-statutory landscape definition to conserve the natural beauty of the coastline and improve accessibility for visitors.

3.7.3 Human Characteristics of the coastline

The North East is home to 2.5 million people, with approximately 70% of the region's population living in the conurbations along the river corridors of the Tyne, Tees and Wear. The remaining two thirds of the region are rural and relatively sparsely populated. This rural population is relatively affluent compared to the urban areas; however, pockets of severe deprivation exist. The rural areas of the North East region are also diverse with a number of distinctive features, ranging from outlying areas with small, isolated settlements which are important as service and employment centres, to the urban fringes which once supported mining, extraction and heavy industries. In the more remote areas of the region, agriculture, forestry and fishing remain as significant employers, accounting for 9.2% of rural employment, over 5 times the figure for England (1.8%). Fishing may not be one of the main sectors for employment in the North East, with 623 fishermen recorded as employed in 2002, but it remains culturally important for traditional fishing communities along the coast. The coal mining industry has also been a thriving form



of employment in the North East, with 83 collieries in County Durham alone in 1951 at the peak of the mining era, employing around 74,000 people. Following the pit closures throughout the 1980s and 90s, most of the smaller mining communities suffered severe problems of unemployment, poverty and crime. However, there is a National Coalfields Programme designed to assist former coalfield communities across England by creating new employment opportunities, leisure facilities and public spaces. The programme has benefited 17 sites across the North East including Seaham, Blyth, Sunderland and Munton.

Supplementary to environmental European support, the rural areas of the region have also benefited from EU Structural Funds Programme 2000-2006. Parts of the region have also been proposed to receive support for the economic regeneration of their urban and industrial areas. Much of the region is also selected as a Rural Development Area, advantaged by support administered under the Rural Development Programmes, now controlled by the North East Regional Development Agency, ONE North East.

As well as their intrinsic environmental value and importance, the natural and cultural assets of the region offer economic and social benefits, with particular effect in the recreation and leisure sector. Rural tourism in the North East was estimated to be worth £263 million, and supports around 10,500 jobs in the area in 1998. As a result, significant proportion of the countryside has been designated by the Council for the Protection for Rural England (CPRE) as 'tranquil areas', recognised as a key economic and environmental asset to promote rural tourism. However, there are developmental pressures on the environment despite environmental quality being a prime regional asset. For example, there are 33 EU designated bathing beaches of which 84% complied with bathing water standards in 1998. However, this number has since been reduced due to local agricultural run-off and urban waste water.



3.7.4 Coastal Management (ICZM): Context

The North-East of England region appears to be already addressing several ICZM principles. The North-East has a strong knowledge base from which to gather advice and experience. This includes ecological, economic and social perspectives to provide a *broad perception* of ICZM. There are already several examples of management plans (e.g. Durham Heritage Coast and Northumberland Coast AONB) that are *locally specific*. There is considerable *support of such relevant administrative bodies* at a local and regional scale, however, the extent to which plans and policies lead to an adequate funding base and effective action across the region remains to be seen. However, the remaining principles appear to have significant room for improvement. It is not yet clear to what extent all *interested parties* and the full *range of instruments* are involved in the ICZM process. Legislative tools remain sectoral for coastal management between the different administrative groups, but this may be helped by the growing political awareness of the need for coastal management, and subsequent regulatory and legal changes in the UK and Europe, principally the development of *Natural England*, the proposed Marine Bill and the EU Maritime Policy. *Long-term perspectives* are more ecologically based, meaning long-term management strategies will be devised within changing *natural processes* and carrying capacity. However, the extent to which the other pillars of ICZM (social and economic) are being built into, or compatible with, these environmental plans in the long-term is not clear, and this aspect remains a challenge. The main barriers to a *long term perspective* and *adaptive management* would appear to be the short-term project funding cycle coupled to the largely sectoral remits of the statutory agency and LA remits. It may be that the short-term nature of planning stifles adaptive management frameworks.

3.7.5 Coastal Issues

A recent stakeholder survey (2006) has identified the main perceived coastal issues for the NE region:



1-3 years:

- Visitor/public access
- Environmental quality (water, pollution, litter, blue flag beaches, illegal vehicles)
- Visitor pressure (tourism)
- Collaboration with other stakeholders
- Archaeological sites
- Development pressures,
- Public understanding
- Funding.
- Coordination of regional management plans
- Habitat losses (unique habitats, overfishing)

4-10 years:

- Coastal erosion
- Sea defences
- Coastal strategy
- Monitoring & coordinated responses
- Development pressures,
- Visitor pressure (tourism) and sustainability,
- Funding

10+ years:

- Sea level rise
- Climate change,
- Ecological changes
- Habitat loss
- Overfishing.
- Coastal erosion,
- Coastal defence
- Funding
- Long-term public and government support.

3.7.6 Corepoint activities

The NE England seems to be relatively poor in terms of regional-level networking and activity in ICZM compared to other areas of the UK. The main target of the expert couplet was to try to instigate a more holistic regional level approach to ICZM in the NE. The COREPOINT partner in the region (ENVISION) has worked with the NE ICZM Steering Committee. This committee was set up in to provide a regional overview of ICZM in the NE region and to promote more integrated and holistic management. The committee was led by the Countryside Agency, with other members drawn from other agencies (e.g. Countryside Access, English Nature) as well as officers of designated areas (Northumberland AONB, Durham Heritage Coast).



Through the COREPOINT project ENVISION has supported the ICZM Steering Committee in a number of activities:

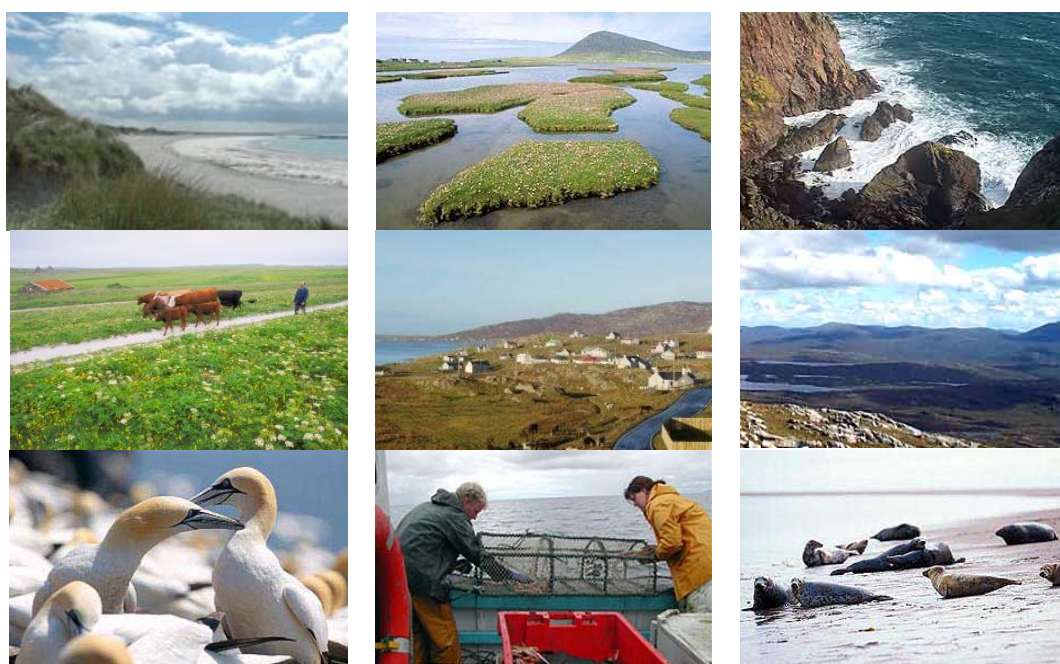
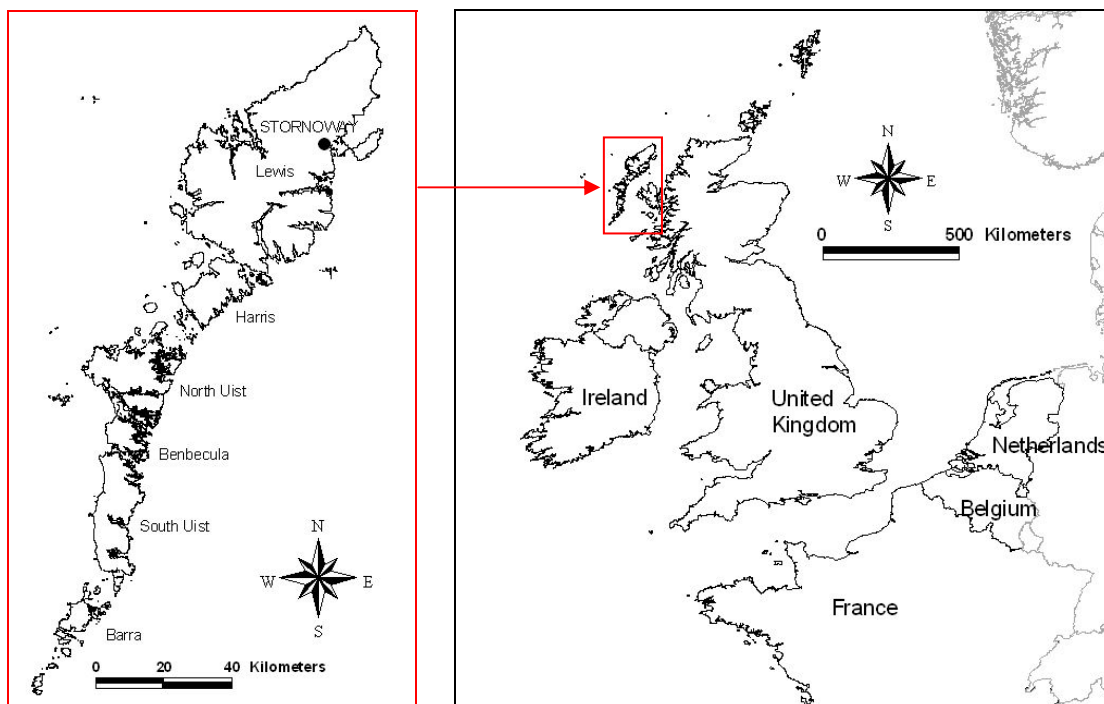
1. Assessment of the state of ICZM in the NE – this was carried out at a workshop in 2005 which aimed to raise the level of awareness of ICZM in the NE and also to assess the progress in ICZM. The EU-expert group ICZM indicators were used at this workshop, and the information provided to the COREPOINT partner developing a NW European perspective on progress in ICZM (EUCC). This workshop was successful in raising awareness in ICZM in the NE.
2. A regional stocktake was carried out by Envision (in collaboration with University of Newcastle) in 2005-6. This provided a detailed stakeholder assessment of the status of ICZM in the NE, a review of the networking that was taking place in the region, and an identification of coastal issues. From the stocktake a set of action points were identified for the region.
3. In mid-2006, a further workshop was run to critically review the action points from the stocktake and to revise them and select priorities. In light of this workshop the revised NE region action points were: Widening perception; Increasing collaboration; Enhancing implementation; Monitoring & information management.

To date progress on these last action points has been slow. This is due to a major restructuring of the English agencies, with Countryside Agency and English Nature (and other agencies) being joined together to form Natural England in October 2006; this has had a significant effect on progress. As part of the COREPOINT extension funding (with supporting funding from Durham County Council) an attempt is being made to kick-start progress in the region through a School of Excellence in ICZM to be held in Durham in late June 2007.



3.8 Study Area 8: Western Isles (North West Scotland, UK)

(Contributors: David Muir, Comhairle nan Eilean Siar & M. Carlisle Aberdeen Uni.)



Sandy (west) coast	Saltmarsh (west) coast	Rocky (east) coast
Machair landscape (© RSPB)	Crofting township (© SCF)	Peatland landscape
Gannets (St Kilda)	Inshore fishing (creeling)	Seals (Monach islands)

(all images © Comhairle nan Eilean Siar except Machair & Crofting images)

3.8.1 Physical Characteristics of the coastline

The Western Isles have a long and varied geological history with a considerable variety of rock type and structure. The predominant rock type is a metamorphosed igneous rock known as Lewisian gneiss. At nearly 3000 million years it is the oldest rock formation in Britain. Igneous dyke intrusions, composed of basalt and aligned in a NW-SE direction, are relatively soft compared with the gneiss, and this has resulted in the erosion of a large number of precipitous coastal inlets or geos, as well as many sea stacks. The mountain areas were glaciated in the last Ice Age, and evidence of glaciation is also found at the coast, Loch Seaforth being one of the finest fjords in North West Scotland.

The extensive coastline (over 2000km) of the Western Isles is a dominant feature of the natural landscape. Generally speaking, the east coast tends largely to be cliff-bound, with the deep waters of the Minch close inshore, while much of the west coast has gently sloping sandy beaches and occasional saltmarshes. Immediately behind the western sandy foreshore there is commonly a narrow belt of dunes separating the coastal edge from the interior of the islands. Further inland lies the low, sandy coastal plain known as machair. In the Uists and Benbecula nearly 60 km² of machair make up about 8% of the land area. Continuing further east and further inland, a large proportion of the Western Isles consists of moorland, characterised by a blanketing accumulation of nutrient poor peat. This is especially the case in Lewis, where it has been estimated there is a covering of peat nearly 595 km² and averaging a depth of 1.5 m.

3.8.2 Ecological Characteristics of the coastline

The machair is home to a wide variety of wild flowers and in the summer months is carpeted with a blaze of natural colour. In addition to many of the common flowers of the seashore and the moor, several calcium-loving plants flourish and several species of orchids are found, including many local variations. The rich invertebrate



population of the machair means that it is important for ground nesting birds such as waders, some of which nest in huge numbers, especially on the machairs of the Uists. The peatland also hosts a wide variety of breeding birds. 327 species of birds have been recorded in the Western Isles and more than 100 breed, including many rare and endangered species. The Islands provide a natural flyway for migrating landbirds to and from their Arctic breeding grounds and a refuge for windblown vagrants from America and northern Europe. The mountains of north Harris are important for Golden eagles (*Aquila chrysaetos*), while occasional sightings of the larger White-tailed sea eagle (*Haliaeetus albicilla*), reintroduced to Scotland in 1975, have been reported.

Many of the cliffs of the outlying islands are home to great colonies of seabirds. The most famous of these ‘seabird islands’ is the archipelago of St Kilda, a World Heritage Site. It is the most important seabird breeding station in north west Europe with over one million birds, including the world's largest colony of gannets (*Sula bassana* - 60,000pairs), Britain's oldest and largest colony of fulmars (*Fulmarus glacialis* - 62,000 pairs), and Britain's biggest colony of puffins (*Fratercula arctica* - 140,000 pairs). The only native terrestrial mammals are red deer (*Cervus elaphus*) and otter (*Lutra lutra*), although the latter is more at home fishing in the extensive kelp ‘forests’ fringing the rocky shores than on the land. Marine mammals include the common seal (*Phoca vitulina*) and grey seal (*Halichoerus grypus*). 10% of the world’s population of grey seal breed on the Monach Islands. Many species of whale (orca, minke and others), dolphin and porpoise, as well as occasional turtles, mainly loggerhead and leathery, may be met in coastal waters.

In addition to St Kilda there are many other conservation designated areas: 53 Sites of Special Scientific Interest (SSSI) with a total landcover of 12.9%; 4 National Nature Reserves 1.1%; 15 Special Protection Areas 10.9%; 11 Special Areas of



Conservation 11.4 %; and 3 National Scenic Areas with 40.3%. Designations are not independent and certain sites overlap.

3.8.3 Human Characteristics of the coastline

The recorded population for the Western Isles in June 2005 was 26,370. This figure demonstrates an increase of 0.4% since June 2004, which is a deviation from the islands long-term forecast of a declining population. A long running characteristic of the demography is that the young leave the islands for further education or employment purposes, leaving behind an increasing proportion of older people in the population. The only large town in the Western Isles is Stornoway on Lewis with approximately 5,600 people. The remaining population is scattered throughout over 280 townships. The total area is 3071 km², giving a population density of 9 people per km².

The provision of infrastructure such as education, healthcare and roads, is focussed on and co-ordinated from Stornoway. Both Gaelic and English are used in the delivery of primary and secondary education. The main hospital in the islands is based in the north in Stornoway, with two small hospitals on the islands of Barra and Benbecula. Most the main islands are connected by road causeways except for Barra-South Uist and North Uist-Harris, which have ferry services. Caledonian MacBrayne roll-on roll-off ferries provide freight and passenger access to the mainland. Because of this freight transport cost the cost of living is rather higher in the Western Isles than on the Scottish mainland. The cost of food is on average 15.2% higher and fuel 13% higher than in mainland urban areas. There are airfields at Stornoway, Benbecula and Barra. Flights are to the mainland urban centres of Glasgow, Inverness (and, via Inverness, Edinburgh) and Aberdeen.

Crofting is the predominant form of land use in the Western Isles and is the foundation of the way of life, the language and the culture. About 77% of the land



area is held in crofting tenure, a land use system unique to the Highlands and Islands of Scotland. There are some 6,000 crofts distributed among 250 townships. Of these, 94% provide less than 2 days work per week for their occupiers and typically average 3 hectares in size. The Western Isles is heavily reliant on primary industries (specifically agriculture, fishing and fish-farming) and the public sector in terms of income and employment. Dependence on these few sectors makes the economy vulnerable to market fluctuations. Primary industries such as fishing and aquaculture in particular are susceptible to environmental impacts and international pressures such as changing European legislation. Tourism has grown in significance for the regional economy; contributing 15.6% to GRDP in 2003 as compared to only 4% in 1988/89. Diversification is therefore the key to local economic development strategies.

3.8.4 Coastal Management (ICZM): Context

The coastline of the Outer Hebrides is over 2,000km in length and forms the predominant landscape feature of the islands. The coastal land, sea lochs and inshore waters of the Western Isles are rich in natural resources, wildlife, cultural and archaeological heritage. Most of the population of the islands lives on the coast or nearby and many derive an income from it and the surrounding inshore waters. Comhairle nan Eilean Siar, the local authority for the region, is committed to ICZM and has led the establishment of a local coastal partnership, the Outer Hebrides Coastal Marine Partnership (known as 'CoastHebrides'), which launched in 2006. This will enable stakeholders with an interest in economic development, tourism and recreation, the environment, archaeology, erosion and flooding, such as businesses, community organisations and individuals, and statutory agencies, to share information, plan, and help to implement ways of managing the valuable assets on the coast and inshore waters of the Outer Hebrides. As a local authority Comhairle nan Eilean Siar has a significant role to play in implementing actions and policies that will influence the long-term sustainability and quality of life within the islands.



The Comhairle endeavours to ensure its policy decisions and services complement sustainable development within its area.

3.8.5 *Coastal Issues*

- Climate Change (specifically increased storminess) and its impacts re. Coastal Defence (Iochdar Flood Action Group, Baleshare Risk-Return project)
- Sustaining local agricultural practice, in particular sustaining crofting systems (important for cultural and conservation reasons, as well as economic reasons).
- Impact of fisheries and climate change on seabird breeding success.
- Marine Spatial Planning re. designating Marine Conservation Areas (effect on inshore fisheries) – potential links to UK's first Marine National Park (site as yet undecided, but most likely to be Oban and North Argyll).
- Marine Spatial Planning re. effects on aquaculture
- Renewable Energy (Lewis Windfarm)
- Coastal Development and the Visual Landscape (Lewis Windfarm)
- Conservation vs Economic Development (Lewis Windfarm)

3.8.6 *Corepoint activities*

As part of the COREPOINT Expert Couplet Aberdeen University maintains a wide range of advisory work with the Comhairle. Aberdeen University attended the launch of Outer Hebrides Marine & Coastal Partnership in July 2006, and has attended several Forum meetings since. Additionally, the ICZM Co-ordinator for the Western Isles attended the COREPOINT Coleraine ICZM School, and reported this as being an extremely useful event with regard to ICZM capacity building. Plans are currently being drawn up to apply for funding for a similar ICZM School to be held in the Western Isles.



As part of Aberdeen's general commitments to the COREPOINT project, the report "A Guide to the Development of Use-Conflict Maps" was produced in February 2006. The last section of this report, on the use-conflict technique of pairwise comparison, is providing the methodological base for the Comhairle's Archaeology Section to undertake the "transparent, sound and accountable procedure for prioritizing which monuments get funding and attention, and which don't." (Mary Macleod, Archaeological Section, pers. comm.). This risk assessment exercise is necessary due to receding shorelines affecting many of the 11,000 or so known archaeological sites in the Western Isles. Aberdeen also held meetings with several Uist Historical Societies re. their input into the management of coastal archaeology.

The report "A Template for Virtual Reality simulations" was produced in May 2007. One of the Virtual Reality examples included in this report, a time series animation of the flooding at Baile Sear, North Uist, during the hurricane of January 2005, was based on expert witness accounts obtained by Aberdeen University during workshops run in North Uist in July 2006. This example contributes to the capacity for empowering and educating local communities with regard to ICZM.

A novel technique developed by COREPOINT partner ENVISION, termed the 'Biodiversity Portfolio Approach' was used for an assessment of the services provided by the coastal environment of Baile Sear, North Uist, as well as an assessment of the risks faced by this environment. The selected area was split into a number of biomes, and a list of services provided and potential threats were developed after stakeholder consultation in workshops run in July 2006. The workshops were set up by the Comhairle ICZM Co-ordinator, and run by the Co-ordinator and Aberdeen together with support from ENVISION. The stakeholder groups were: local residents, mostly crofters (agriculture); national government bodies including SEERAD (agriculture) and Scottish Natural Heritage (conservation); and local industry (quarrying and the local game estate). The first aim

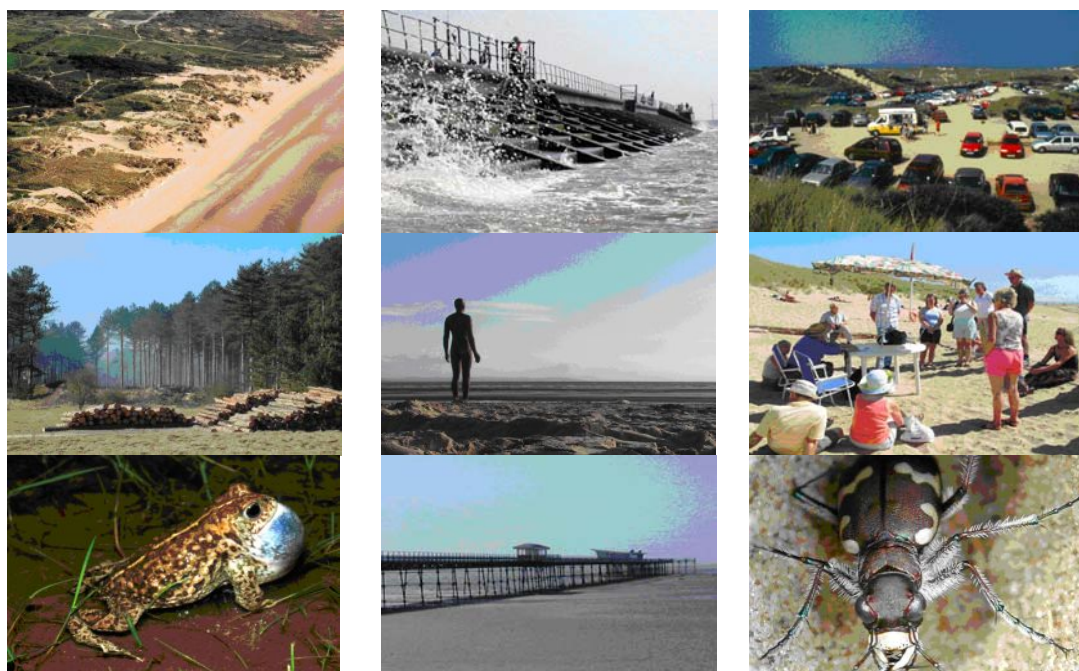


of this exercise was to assemble a biodiversity portfolio of biomes for the Baile Sear, North Uist, Coast and develop risk return values and a risk-return profile based upon this portfolio. By doing this it provided the Baile Sear ICZM managers with new insight into management strategies. The approach proved useful at comparing services with a very high 'existence' value, such as conservation, with services with a more standard economic measure, such as agriculture. By doing this the biodiversity portfolio technique could provide a useful tool for further stakeholder discussion, as well as being potentially useful as a tool for environmental education and understanding and for participatory planning. The technique also proved useful at establishing that the Baile Sear biodiversity portfolio is highly sensitive to threats, and is therefore an area requiring higher than average levels of environmental protection. Finally, the biodiversity portfolio method was shown to be a useful one for simulating the effect of management decisions. The Biodiversity Portfolio exercise was therefore highly successful in building capacity in the Western Isles, and as a transferable technique offers the opportunity to do the same in other areas.



3.9 Study Area 9: Sefton (North West England, UK)

(Contributor: Graham Lymbery, Sefton Council)



Formby Point Dunes	Crosby coastal defences	National trust car park
Pine woodlands	'Another Place' statue	Day out on the beach
Natterjack toad	Southport Pier	Northern Dune Tiger Beetle

(all images ©Sefton Council)

3.9.1 Physical Characteristics of the coastline

The Sefton Coast, which extends over 34 kilometres (21 miles), is comprised of soft and granular deposits of sand, silt, clay and peat. There are no outcrops of rock on the shoreline. Hence, the forces of nature readily mould it, so the shoreline is constantly changing in response to the fluctuating influence of wind and water and as a result of human activity. Its overall shape derives from two major river estuaries, the Mersey and the Ribble. The River Alt and the Crossens Channel, each have important local zones of secondary influence.

The coast is a long wide arc of sand with a hindshore dune system, which at one time would have stretched from the Mersey Estuary to the Ribble Estuary. Human use of the dune system over several centuries has created a dune landscape of great variety. To the north of the Sefton Coast is an extensive area of saltmarsh extending into the Ribble estuary; other smaller areas of saltmarsh also occur at the River Alt and Smiths Slack (located on the foreshore between Birkdale and Ainsdale). Several towns have developed along the coast; at Crosby, to the south, and Southport, to the north, artificial defences have been put in place. In-between these areas towns such as Formby rely upon the sand dunes to provide protection from the sea.

Protection of the dunes is as a result of the LA and other agencies such as the National Trust and the Countryside Commission buying land in the late seventies to prevent it getting built on. Additionally, a number of golf course were in existence which also prevented landtake for urbanisation. Subsequently a raft of designations protect these areas.

3.9.2 Ecological Characteristics of the coastline

The sand dunes, beaches and marshes of the Sefton Coast are one of the most important areas for nature conservation in Europe. The entire Coast is designated as either Special Protection Area (SPA) to the north of the pier at Southport or Special



Area of Conservation (SAC) to the south of the pier, notable species include Sand Lizards and Natterjack Toads with the estuarine area being very important for birds. The Sefton Coast is also an important visitor destination with popular bathing beaches, open countryside, and the seaside resort of Southport.

3.9.3 Human Characteristics of the coastline

Sefton has a population of approximately a quarter of a million but the coast has a much wider catchment with the conurbations of Merseyside and Manchester being a short drive or train journey away. To the North is the town of Southport established at the time when sea bathing became popular and now adapting to the changing patterns of tourism that many coastal towns are experiencing. To the south are the docks and Crosby (with Antony Gormley's 'Another Place'); both these areas have been heavily modified by humans through land reclamation and the building of hard defences. Between these areas is a 16km length of dunes (approximately 20% of the dune resource in England) which whilst subject to nature conservation designations have suffered from past human use ranging from agriculture to sand extraction and dumping of material; they still experience recreational pressure today.

3.9.4 Coastal Management (ICZM)

The Sefton Coast Management Scheme started in 1978 and more recently changed to the Sefton Coast Partnership but its broad remit has always been the same; it has concentrated on nature conservation and coast protection whilst recognising the role the coast has for economic well being. It has tried to bring together the relevant stakeholders to discuss the issues, promote a joint vision and encourage collaborative working; the success of this naturally varies depending on the issues and the people involved.



3.9.5 *Coastal Issues*

- Climate Change and it's impacts re. Coastal Defence
- Recreational pressure
- Regeneration
- Conservation
- Aggregate extraction
- Industry (Ports)
- Water quality
- Access issues for tourists in terms of development of infrastructure and where it is located given coastal change

3.9.6 *Corepoint activities*

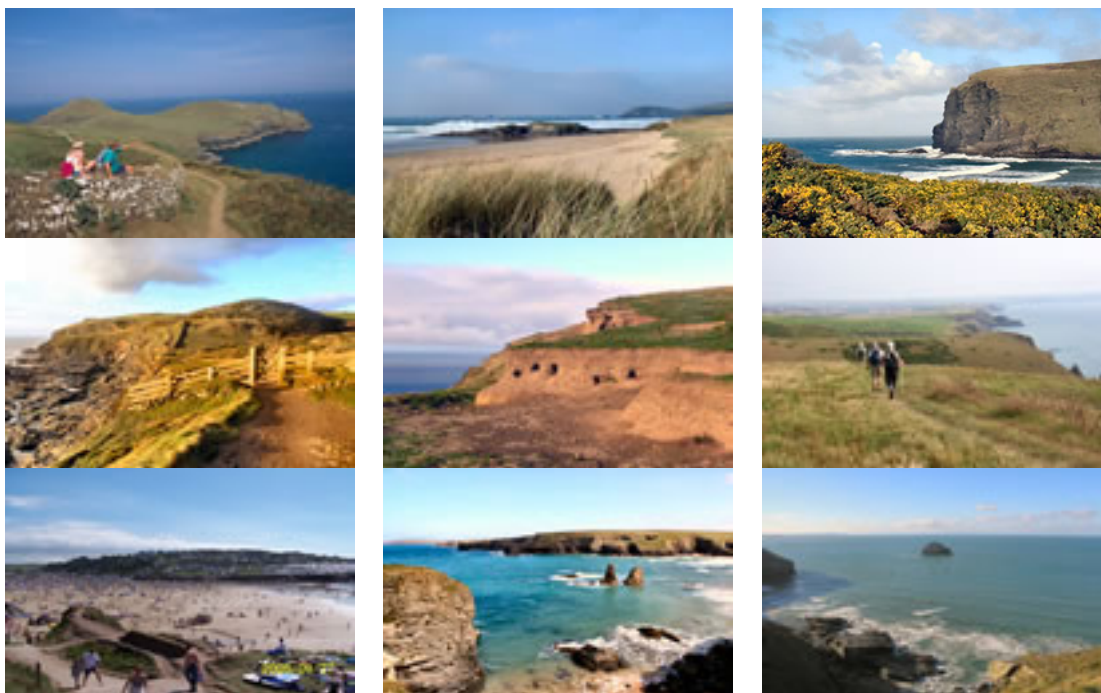
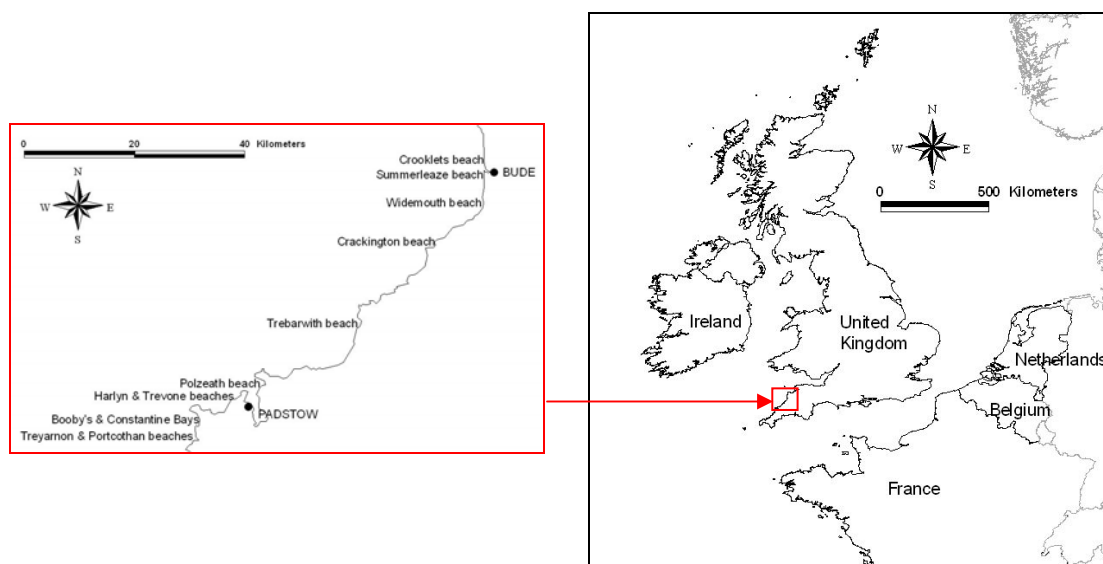
Sefton Coastal Defence Team had previously established a database relating to coastal processes but this had several limitations in terms of the original scope of the work, maintenance of the database and use of technology (original completed 1980). By working with Cardiff whilst developing the review of the database it was possible to challenge some of the decisions that we were taking, have a better generic understanding of what we were doing and learn from experiences elsewhere. Given our experience it was also possible for us to then contribute to the Local Information System Guidelines which has a benefit to the wider coastal management community.



4 Additional Case Study Areas

4.1 Study Area 10: North Cornwall beaches (South West England, UK)

(Contributor: David Green, University of Aberdeen)



AONB	Constantine Bay	Crackington Haven
Pentire Point Path	High Cliffs	South West Coast Path
Polzeath Beach	Portcothan Bay	Trebarwith



4.1.1 Physical Characteristics of the coastline

Cornwall is at the very tip of the Southwest of England. No other county in England is so influenced by the sea, and none has such coastal variety. The coastline comprises a wide range of geomorphological features, including headlands, stacks, islets, beaches, sand-dunes, rocky inlets, creeks and sheltered coves. Bays and inlets vary considerably in shape and size, ranging from small narrow inlets, to wide narrow bays and beaches. The geology of Cornwall is largely granite inland with slates, schists, and sandstones. Whilst both the south and north coasts of Cornwall comprise miles of beaches and cliffs, the coastlines of the north and south coast are very different. The south coast, for example, is dominated by sheltered estuaries, whilst the north coast is 'rougher' as a direct result of being exposed to the full force of the prevailing winds of the Atlantic Ocean. In particular, the north coast of Cornwall is dominated by both impressive cliffs, comprising resistant rock, and extensive beaches of fine sand. *High Cliff*, between Boscastle and Tintagel is the highest sheer-drop cliff in Cornwall at 735 ft (224 m). The only river estuary of any size on the north coast is that of the Camel Estuary.

4.1.2 Ecological Characteristics of the coastline

The north Cornwall coast has maritime grassland, heathland, and stunted woodland of high biological value and of national and international ecological significance. Gorse and heathers populate much of the northern cliffs. In terms of fauna, the coastal waters contain large populations of seals, whilst porpoises and whales are not uncommon. Cornish waters also boast good shark populations, a wide variety of flora and fauna including weever fish, and jelly fish. The Voluntary Marine Conservation Area (VMCA) at Polzeath, for example, provides shelter for important marine wildlife. The area also includes stretches of sand and gravel with distinct wildlife communities providing a strong contrast to stable rock. Many are recognised as being of special conservation importance. Likewise, the Camel Estuary supports marine wildlife. The Camel Estuary Initiative, established in 1994, seeks to enhance and



maintain the natural quality of the estuary and Padstow Harbour Commissioners have published the Camel Estuary Management plan. Rich and beautiful habitats such as maritime grassland, sea cliffs, sand dunes and intertidal reefs provide home for wintering birds, rare plants, seaweeds and a myriad of fish and other sea creatures. National landscape and conservation designations, National Trust and Duchy of Cornwall ownership all help to preserve the natural quality. The Camel is also a designated Bass Nursery Area. Despite this, in the south-west of England, only about 6% of the coastline is protected, the lowest percentage in England.

4.1.3 Human Characteristics of the coastline

North Cornwall District measures approximately 119,381 hectares (294,986 acres) and is the largest district in Cornwall. The coast of North Cornwall contains a wide variety of settlements, ranging from small towns (<100,000) to villages, hamlets and tourist homes. Between the years 1991 and 2004 the population of North Cornwall has increased by 13% (9,600 persons). The total population of North Cornwall in 2001 was recorded as 80,500. The increase in the population in North Cornwall is due to in-migration. Historically employment in the area has focused on tin mining, quarrying, fishing and agriculture. Over time tin mining has disappeared and quarrying has declined. Likewise the fishing industry is in decline although various types of fish are still caught, including pilchard, not plentiful elsewhere in Britain. Agricultural holdings account for some 83.8% (100,038 hectares) of the total land area of North Cornwall. Much of the coastline is characterized by semi-natural habitats, which are managed either as rough grazing or for more intensive agriculture. Traditionally agriculture has been the mainstay of the rural economy in North Cornwall. However, this industry has also been subject to changes that have reduced employment opportunities. In 2001, agriculture was further hit by a 'foot and mouth' epidemic, with consequences for tourism and other industries, as well as agriculture. Aquaculture in the form of Pacific oysters (*Crassostrea gigas*) are cultivated on racks on the foreshore of the Camel Estuary. Other local industries



include primary sector industries such as forestry and quarrying, a small amount of secondary sector manufacturing, construction, engineering, and ship repairing, and an increasing amount of tertiary sector retailing, public services, and most importantly tourism. Today tourism is the major industry of Cornwall because of the outstanding landscape and scenery, warm climate, good beaches, and rocky shores. Cornwall's tourism industry is one of the largest in the UK and in 1996 it had an estimated 3.5 million visitors. Along the North coast tourism is associated with water activities including surfing, windsurfing, sailing, kayaking, swimming, diving, angling, walking and natural history. Cornwall is the prime British surfing location and there are around 50 surfing sites near Newquay. The area is especially good for sub-aqua diving, because of its clear, relatively warm water, unique marine life, and the large number of wrecks there. The South West Coastal Path, which is a national trail, also runs the entire length of the coastline in North Cornwall, a distance of 112 km (70 miles). Despite this Cornwall remains one of the poorest parts of the United Kingdom and as a result has been granted Objective 1 status by the European Union. Whilst tin and copper mining no longer exists a number of mines have applied for status as UNESCO World Heritage Sites. In addition, there are numerous fine historic buildings and a wealth of archaeological and historic sites along the north coast, including Tintagel Castle of Arthurian legend. Together these features contribute greatly to the overall character and landscape of north Cornwall and its distinctive sense of place. There are also specific areas, sites and structures which merit special protection. These include Scheduled Ancient Monuments, Historic Parks and Gardens, and Historic Battlefields, which are of national importance, and Areas of Great Historic Value (AGHV) and Historic Settlements, which are identified as being of at least county significance. 28% of North Cornwall District is designated as Areas of Outstanding Natural Beauty (AONB), and 32% as Areas of Great Landscape Value (AGLV). North Cornwall also contains 39 Sites of Special Scientific Interest (SSSI), and several Cornwall Nature Conservation Sites (CNCS) and Regionally Important Geological/Geomorphological Sites (RIGS).



4.1.4 Coastal Management (ICZM)

North Cornwall District Council (NCDC) is responsible for the management of 11 beaches along this stretch of the north Cornwall coast stretching from Padstow to Bude. Other beaches are privately owned. Local initiatives such as the Camel Estuary Initiative (Camel Estuary Management Plan), and the work of English Nature (now Natural England), Voluntary Marine Conservation Areas, the Cornwall Wildlife Trust, and the RNLI all contribute to coastal management.

Coastal Issues

- | | | |
|-------------------------------------|-------------------------------------|--|
| ▪ Beach management | ▪ Climate change and sea level rise | ▪ Beach Awards e.g. Seaside, Blue Flag |
| ▪ Leisure and Tourism | ▪ Beach Litter | ▪ Beach and Surf safety |
| ▪ Surfing and surf school licensing | ▪ Bathing Water Quality | ▪ Wildlife Conservation |

4.1.6 Corepoint activities

The case study partners are North Cornwall District Council (NCDC) and the University of Aberdeen. Contact with the NCDC has been focused primarily around beach management studies (in the context of ICZM), including Blue Flag beaches, and more specifically in relation to the development of a research-based study on water carrying capacity calculations for surf school licensing for eleven beaches in North Cornwall. The study has been carried out over 18 months culminating in a report and implementation by NCDC and the Royal National Lifeboat Institution (RNLI) of the methodology. The work involved a combination of library-based and field-based research to initially explore the concept of carrying capacity, and its application to water-based leisure activities, specifically surfing. Additional examples of leisure-based applications of carrying capacity were also sought and consulted to determine the basis for a simple, yet practical methodology that could subsequently be used to calculate the number of surf schools that can operate in unit

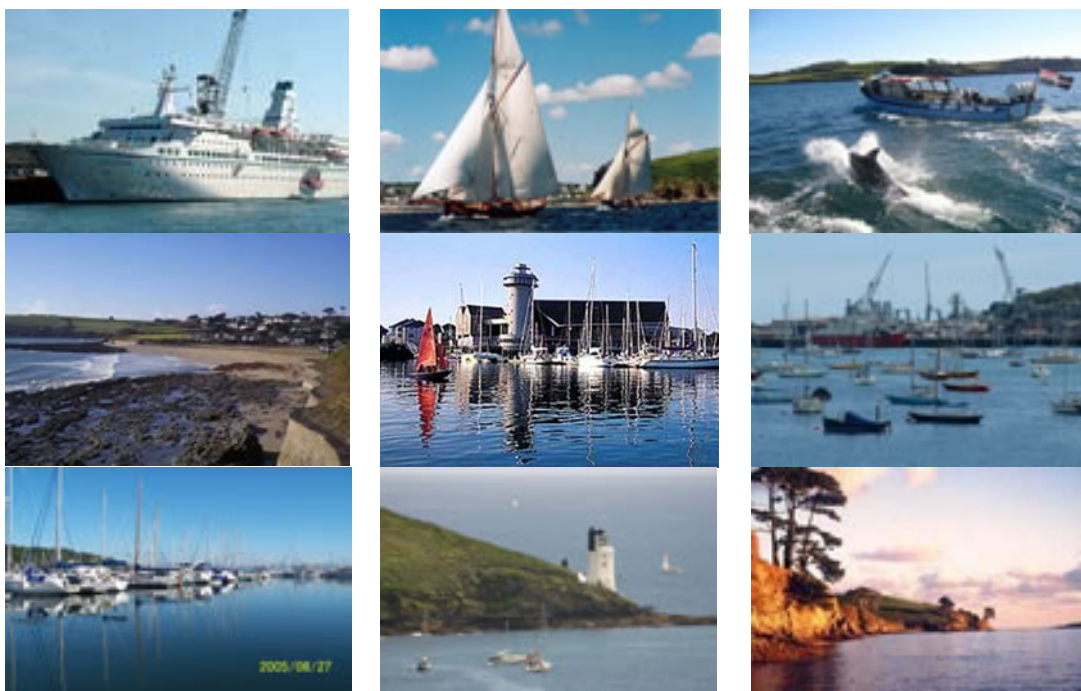
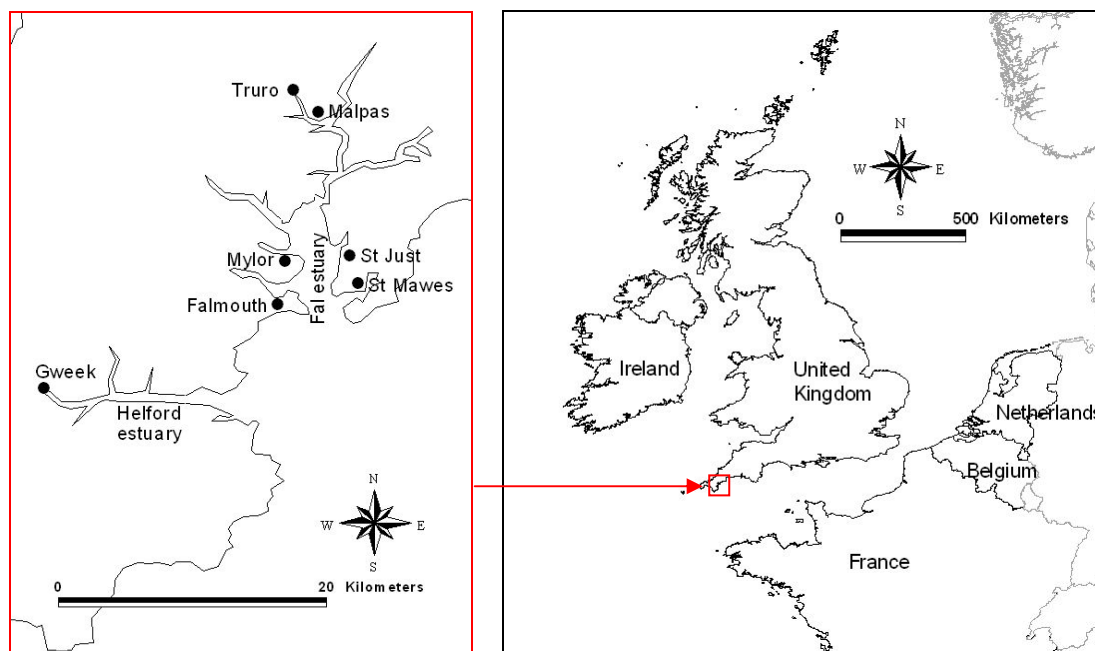


area as well as the number of surfers who can be safely taught in a unit area. A preliminary assessment of use conflict on beaches in North Cornwall was made in conjunction with NCDC and the RNLI. The study also involved digital data sourcing e.g. OS map and aerial photographic image datasets as the basis for image and map backdrops for use in ESRI's ArcView 3.3. GIS, data collection in North Cornwall at a number of beaches utilising North Cornwall beach survey data collected in the field. In addition, meetings were held with NCDC staff (including the NCDC beach manager) and the RNLI as well as involvement in public participation meetings (beach users forum) and discussions with North Cornwall surf schools (local businesses, beach users, and the tourism industry). A simple questionnaire survey for North Cornwall beach users and stakeholders and face-to-face interviews with Surf School operators was carried out together with field visits (field sketches, physical description of the geography of the beaches, counts), and time-based photographic snapshots (single frame and panoramic photographs (with different zoom levels)). Data analyses of North Cornwall beach survey data (previously collected in the field) were carried out including an analysis of questionnaire returns for North Cornwall beach users and stakeholders, and simple map-based GIS and spreadsheet analyses designed to calculate surfing density values for the eleven beaches studied. NCDC in association with the RNLI is currently implementing the water carrying capacity research for beaches in North Cornwall for the current season (2007). A simple traffic light system to promote safe surfing has been proposed, with subsequent modifications as a result of Aberdeen's involvement with the International Life Saving Federation in Germany and the Blue Flag. Involvement with coastal stakeholders in NCDC is continuing, with various inputs to surf school licensing, beach management, beach mapping and marine spatial planning.



4.2 Study Area 11: Fal Estuary (South West England, UK)

(Contributor: David Green, University of Aberdeen)



Cruise Liner, Falmouth	Traditional Sailing Boats	Eco-Tourism in the Fal
Falmouth	National Maritime Museum	Falmouth Harbour and Docks
Mylor Yacht Harbour	St. Anthony Lighthouse	The Helford Estuary



4.2.1 Physical Characteristics of the coastline

The Fal and Helford Estuaries lie on the south coast of Cornwall at the tip of the Southwest of the UK. Both are examples of flooded or drowned river valleys known as Rias which typify the south coast of Cornwall. A deep water channel (33m deep), cut when the sea level was much lower than at present (last ice age), extends as far inland as the port of Truro. Either side the water is shallow over the old floodplain of the river. Comprising sandy and shingle shores, spits and sand banks, as well as wave cut platforms, and mudflats, the coastal landscape is far more gentle and sheltered than that of the north coast, although there are still areas of sheltered and exposed coastline. The plan view of the estuary shows a river valley fed by the many creeks and tributaries that drain the two river catchments of the Fal and the Helford.

4.2.2 Ecological Characteristics of the coastline

The waters of the Fal are particularly rich and internationally important ecologically, for example: sponges, anemones, jellyfish, hydroids, corals, worms, echiura, sea slugs, bivalves, cephalopods, shrimps, crabs, lobsters, bryozoa, sea urchins, sea squirts, and many species of fish can be found in the Fal and Helford estuaries. Both the Fal and Helford estuaries are also characterised by fully saline sheltered muddy gravel communities that are scarce in Britain. Live Maerl beds (calcified seaweed) can be found in the Fal Estuary and the entrance to the Helford, whilst Eelgrass beds can be found in both the Fal and the Helford. Dead Maerl in Falmouth Bay is harvested for fertiliser. Because the Helford River is shallower, smaller and more sheltered, its marine wildlife also flourishes with the rich supply of nutrients carried by the tide. The slopes leading down to the water's edge around the Fal and Helford estuaries are densely wooded, many with ancient oak. In some places agricultural fields also run down to the water's edge. In the woodland areas there are heron and egrets, whilst the mudflats of the creeks and the surrounding waters provide a rich habitat for a wide range of birds from waders to divers, and seabirds including Little Egrets (*Egretta garzetta*), Whimbrel (*Numenius phaeopus*), Turnstone (*Arenaria*

interpres), Oystercatcher (*Haematopus ostralegus*), Curlew (*Numenius arquata*), Heron (*Ardea cinerea*), Swans, Ducks, Gulls, Grebes, Fulmar (*Fulmarus glacialis*), Gannet (*Sula bassana*), Cormorant (*Phalacrocorax carbo*), Shags (*Phalacrocorax aristotelis*), Razorbill (*Alca torda*) and Guillemot (*Uria aalge*). Seals, dolphins and sharks are also to be found in the deeper waters in the entrance to the Fal and the Helford, and in Falmouth Bay. Rocky shores provide habitat for seaweeds and kelp beds extend offshore. There are also reefs off Nare Head to the south of the Helford. Oyster Beds can be found in the mid to upper reaches of the Fal and Helford Rivers. There are also extensive areas of saltmarsh with a diversity of salty tolerant plants in the upper reaches of some of the creeks e.g. Restronguet Creek. Both the Fal and Helford were designated as a Special Area of Conservation (SAC).

4.2.3 Human Characteristics of the coastline

Today Falmouth (popn. 20,775 in 2001) the old port of Penryn (6,227) and Truro (17,431) at the head of the Fal are the largest settlements in the area. Truro is the administrative, commercial, educational, and touring centre. It has been a port in its own right since 1170, and even today continues to attract coastal vessels up to 85m in length right up to the City. Penryn was once also a thriving port dating back to the 14th Century, handling cargoes of granite, tin and coal. Other settlements around the Fal and Helford are mostly small villages and hamlets, many occupied by a holiday and retired population. St. Mawes is a small town situated above a south-facing bay, and from medieval times was a busy port and fishing harbour.

In the past tin and copper mining, fishing, engineering, shipping, and maritime trade have been the major employers of the area. Unfortunately, as with much of Cornwall in general, these industries have long since declined. Leisure and tourism activities are now becoming the main source of employment in the area. The sheltered waters of the South Coast of Cornwall offer some of the best sailing and diving in the UK,



and coastal and inland waters provide fishing, water skiing, windsurfing, and a multitude of other water focused activities.

Due to this increase in tourism, the port and harbour of Falmouth is finding a new lease of life once again as a busy seaport with a thriving ship repair yard servicing ships, bunkering facilities, cargo handling and yacht building at Falmouth Docks, accommodating cruise liners, the development of a new marina and cruise liner facility, as well as being the seat of the local university college. There are also small ship/boatbuilding facilities at Ponsharden and Gweek, commercial wharves at Truro, and occasionally in the King Harry reach anchorage for a number of laid up ocean vessels, ranging from gas carriers to car carriers, private yachts to ferries, and drill ships to trawlers. Rigger, sail makers, yacht chandlers, marine engineers, marine electronics and other associated marine services can all be found in the area. The yacht haven is a facility for visiting yachts and consists of 172m of floating pontoons which allow approximately 50 yachts to berth alongside. There is also sufficient depth of water to allow vessels up to maximum draught of 1.8m to remain afloat. There are also various other visitor pontoons and good anchorages, and a number of marinas have been developed. A recent initiative has been the Fal River links transport network of ferries and shuttles to provide local waterborne services. Both the Fal and the Helford are also well known for their land-based attractions such as the many coastal semi-tropical public gardens. There are also many miles of coastal footpaths.

Other activities are and fishing and the cultivation of shellfish, mainly oysters (*Ostrea edulis*) and mussels (*Mytilus edulis*). Oysters are an important part of the local economy and have been since Roman times. Young native oyster stock from the Fal are initially grown on trays then imported upriver where they are left to develop into a suitable size for the markets. Around 200,000 are dredged annually



from September to April. Natural spat settlement of mussels on ropes from pontoons are cultivated in the Fal Estuary.

Environmental quality is therefore of great importance to the local economy, and threats to this quality do exist. An historical legacy of tin mining and china clay quarries has been the silting up of the creeks, some with sediments contaminated with heavy metals. Concerns associated with climate change, sea level rise and flooding have led to the building of a flood barrage at Truro.

4.2.4 Coastal Management (ICZM)

Numerous projects and documents have been produced for the Fal and Helford Estuaries by different bodies including Cornwall County Council, English Nature, CEFAS, and the HMVCA relating to many different aspects of coastal management ranging from habitat to marina and port development, and environmental impact studies associated with proposals for the cruise liner facility. These include Falmouth Bay and Estuaries Initiative – 1991; establishment of the Roseland and Helford Marine Voluntary Conservation Areas; the Environment Agency Local Plan – Fal and St. Austell Streams Consultation Report – March 1997; Fal Estuary Historic Audit – April 1997 (Cornwall Archaeological Unit); The Fal and Helford: Characterisation of European Marine Sites – MBA Occasional Publication No. 8 – April 2003; Monitoring Survey of the Fal Estuary: Effects of Maerl Extraction – November 2004; Falmouth Cruise Terminal and Harbour Works Environmental Scoping Study – February 2006; and The Cycleau Project: Working together for the future of our rivers, estuaries, and coasts.

4.2.5 Coastal Issues

- Habitat loss
- Dredging
- Aquaculture



- Leisure and Tourism (especially watersports e.g. sailing and waterskiing)
- Maritime transport
- Pollution (oil spills, agricultural, sewage discharge, china clay and heavy metals (tin mines))
- Anchoring and mooring issues
- The potential effect of the non-native brown alga *Sargassum muticum*
- Coastal development, including coastal protection and beach cleaning
- Shellfish collection and bait digging
- Dredging and dumping issues
- Water quality (pollution/eutrophication)
- Inshore fishing, scalloping and oyster dredging
- Marine Spatial Planning e.g. waterfront and marina development
- Protecting the historical and natural environment

4.2.6 Corepoint activities

Contact in the Fal and Helford Estuary, Cornwall in SW England has been maintained with a wide range of coastal stakeholders. The links developed with Cornwall have been long standing, and as such the recent involvement through COREPOINT has been a continuation of these contacts. Examples include the Cycleau Project (now finished), Cornwall Wildlife Trust (CWT), Cornwall County Council (CCC), the Helford Marine Voluntary Conservation Area (HMVCA), the National Maritime Museum, University of Cornwall / Falmouth College, Mylor Yacht Harbour, Falmouth Harbour, and a wide range of coastal stakeholders. These links are also used as part of the annual University of Aberdeen Marine and Coastal Resource Management (MCRM) degree programme.

In 2007 these links were utilised as the basis for a Local Information System (LIS) Workshop (Aberdeen and Cardiff) focusing on environmental management held at the National Maritime Museum in Falmouth in April 2007. The Fal Estuary is an

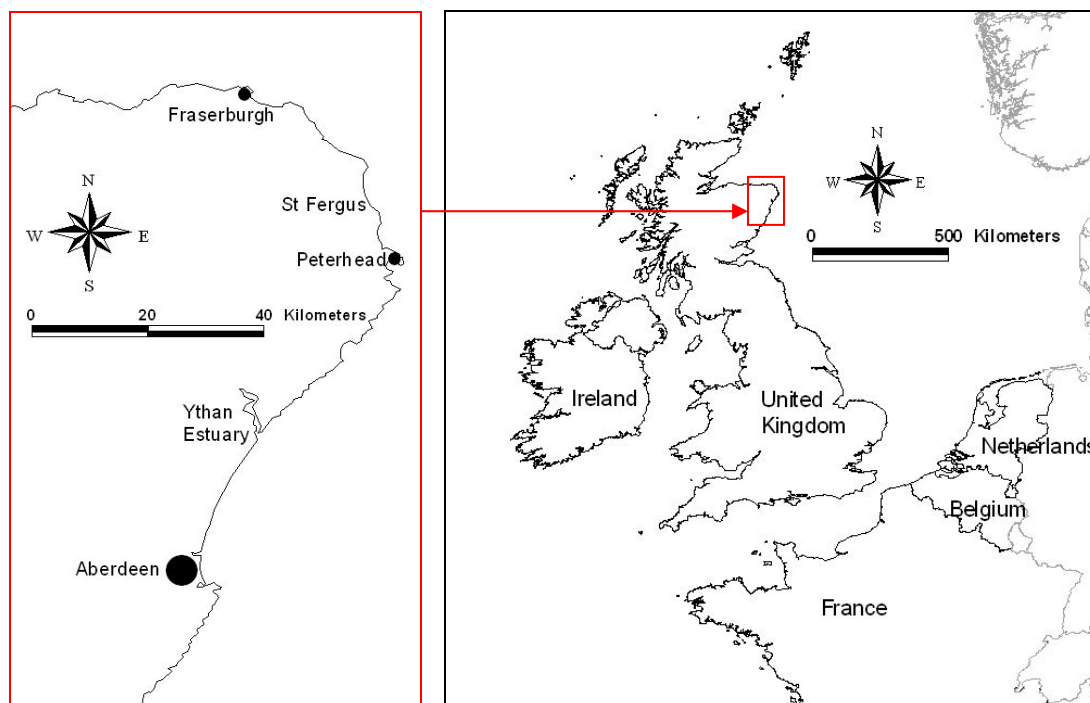


excellent example of an estuary environment that demonstrates the diversity of coastal activities and uses and the potential for user conflict. Issues include oyster beds and dredging, coastal protection and flooding, leisure activities and marinas, as well as monitoring and protection of coastal habitat. There is a large archive of documented research and reports for the area that makes it an excellent place to develop a Local Information System. One such example is that of the proposed development of the dock area for a marina as well as a cruise liner port with the capacity to take the World's largest cruise liners in the coming years. To this end continuing involvement with Falmouth Harbour will be pursued to deploy the University of Aberdeen's Oceanlab in-situ sediment video camera to gather some further time-lapse video photography to help characterise the potential impact of the proposed dredging activity in an area of maerl beds to deepen the area for cruise liner docking in Falmouth harbour.



4.3 Study Area 12: Aberdeenshire (North East Scotland, UK)

(Contributor: David Green, University of Aberdeen)



Aberdeen Waterfront	The Oil and Gas Industry	Aberdeen Harbour
Crovie Village	Fishing Nets at Cruden Bay	Gardenstown
Ythan Estuary	Eider ducks at the Ythan	The Sands of Forvie



4.3.1 Physical Characteristics of the coastline

The coastline of Aberdeen Bay and to the north and south is a mixture of both hard rock and soft sediment, comprising extensive beaches (both sand and shingle) and sand dunes, and a number of geomorphological features including inlets and bays, wave cut platforms, sea cliffs, blowholes (glaup), and sea stacks. At points along the coast there are also a number of small estuarine inlets e.g. the smallest estuary in the UK, the Ythan, comprising sand, gravel and mud deposits. It is a dynamic and changing coastline as much of it is exposed to the wave climate of the North Sea, the small inlets, estuaries, and bays providing the only sheltered areas along the coast. The geology of the coastline, where exposed, comprises metamorphic quartzite mica schist of the Dalradian period (approximately 480-600 million years ago) with other areas of igneous Diorite granites (grey granite of Aberdeen; red granite of Peterhead). Much of the coastal geology is also covered by glacial deposits and windblown sand deposits concealing the underlying rock.

4.3.2 Ecological Characteristics of the coastline

The 250km coastline around Aberdeen is home to many diverse coastal habitats and ecology many of which are important in the UK context. This coastal area supports a particularly wide range of species, dependent on both terrestrial and marine habitats. There are maritime vegetation communities of the sea cliffs around Stonehaven and the sand dunes at the Sands of Forvie (marram grass and coastal heathland). The Ythan Estuary has saltmarsh and mudflats, the latter being the feeding grounds of numerous shore bird communities. The seabird colonies of the cliffs at Bullers of Buchan are also important, and Aberdeen Bay itself is home to a semi-resident population of bottlenose dolphins and has important benthic communities.

Sand dunes are found along much of the coast of North East Scotland, especially in Moray and the east coast of Aberdeenshire between Fraserburgh and Aberdeen. These dunes are of considerable extent and variety, and some are nationally



important. They support a wide variety of species, from birds such as Eider duck (*Somateria mollissima*) and terns, to rare mosses, lichens, fungi, and invertebrates such as the small blue butterfly. The total dune area (7022 ha) represents approximately 22% of the vegetated dune resource in Scotland, and 14% of the total for Great Britain. The Sands of Forvie (763 ha) is a very large dune system, the seventh largest in the UK. There are also small amounts of vegetated shingle at other sites along the North East coast. Marram Grass seeds are an important food source for wintering Snow Buntings (*Plectrophenax nivalis*). The estuarine areas are very important for many species of wildfowl and waders and the Ythan has the largest number of breeding Eider in Britain. Shelduck (*Tadorna tadorna*) also breed here. There are also tern colonies (Common, Arctic, and Little terns – *Sterna hirundo*, *Sterna paradisaea*, *Sterna albifrons*) at the Ythan, the Loch of Strathbeg and Spey bay. The sandwich tern (*Sterna sandvicensis*) colony on the Ythan has held more than half the Scottish breeding population. The Ythan also holds large numbers of wintering Pinkfooted geese (*Anser brackyrhynchus*), and the Lossie Estuary is internationally important for wintering Greylag geese (*Anser anser*). North East estuaries also support Wigeon (*Anas penelope*), Teal (*Anas crecca*), and Goldeneye (*Bucephala clangula*), and Ringed plovers (*Charadrius hiaticula*) breed in small numbers at Lossie, Spey bay, the Ythan and St. Cyrus. In winter, many waders are present, including Turnstone (*Arenaria interpres*), Purple sandpiper (*Calidris maritima*), Knot (*Calidris canutus*), Redshank (*Tringa totanus*), Lapwing (*Vanellus vanellus*) and Golden plover (*Pluvialis apricaria*). Findhorn Bay is an important breeding area for ospreys (*Pandion haliaetus*) and many of the coastal cliffs provide nesting sites for the region's healthy population of Peregrines (*Falco peregrinus*). Last, but not least, the City of Aberdeen itself is home to the world's largest urban nesting population of herring gulls (*Larus argentatus*) as well as having a haul-out area in the river Don frequented by common seals (*Phoca vitulina*).

The coastal waters are populated by a wide variety of fish including migratory salmonids, eels, flounders, saithe, sand eels, dogfish and spurdogs. In summer and autumn, there is a large population of the sand goby *Pomatoschistus minutus* in the Ythan Estuary and river and sea lampreys are important residents of North East estuaries. The Sea Lamprey is also a rare anadromous species present in the Spey River and Bay. The invertebrate fauna in the estuarine sediments is dominated by oligochaetes, such as blood worms, and polychaetes, such as ragworms and lugworms, burrowing amphipods and bivalves such as Baltic tellins, peppery furrow shells, razor shells. Notable plant species are the rare estuarine sedge *Carex recta* (Buck 1993), and the seagrasses *Zostera marina* and *Z. noltii*. The majority of the rocky intertidal areas are fully marine, although there is a variable salinity rocky shore community inside the Dee estuary mouth on the south shore.

4.3.3 Human Characteristics of the coastline

The Aberdeen area has been settled for around 8,000 years. Historically settlements in the area along this coastline were based on fishing. As a result, most human settlements along the coastline are essentially representative of the historical evolution of fishing in the area. These range from the city and port of Aberdeen, to small fishing towns such as Peterhead, Fraserburgh, and small coastal villages and hamlets along the coast. Today Aberdeen is Scotland's third largest city with a population of 203,000. Traditional industries were fishing, paper-making, shipbuilding, and textiles, but with the demise of fishing over time these have largely been replaced by active involvement of the larger ports, such as Aberdeen and Peterhead in the offshore oil industry, providing a base for the numerous oil industry support vessels. Aberdeen's port is the largest in the northeast of Scotland. Aberdeen is the centre of Europe's petroleum industry, and well served by road, rail and air links, with a large heliport. In addition, education, training and coastal and marine research institutions provide other major sources of employment. Whilst some of the small coastal villages, e.g. Cruden Bay, were Victorian holiday resorts, served by a



once dense rail network, coastal tourism is now a major activity once again, with a notable coastal heritage trail, and coastal footpaths. Today many of the small coastal villages include commuter and holiday homes.

4.3.4 Coastal Management (ICZM)

Whilst elements of coastal management have been coordinated by the Scottish Executive, Aberdeen City Council and Aberdeenshire Council, the Moray Firth Partnership, and the University of Aberdeen over many years, the recent formation of the East Grampian Coastal Partnership (EGCP) has now provided the basis for a more stable and active approach to coastal management in the Aberdeen area through the co-ordination of a coastal forum that is involved in a variety of different activities and projects such as beach management and awards e.g. Blue Flag, Seaside, ENCAMS, as well as beach litter, artificial reefs, dolphin watching, and most recently marine spatial planning as a tool to deliver Integrated Coastal Zone Management (ICZM). Additionally, involvement in recent proposals such as a new coastal resort and offshore windfarm, and monitoring of coastal beach erosion. The work of the Moray Firth Partnership has pursued a similar approach. Some coastal sand dune sites have statutory protection as Sites of Special Scientific Interest (SSSI) with Site Management Statements, and others have non-statutory designations, as Sites of Importance for Natural Science (SINS), District Wildlife Sites (DWS) or Local Nature Reserves (LNRs) e.g. Forvie (cSAC, NNR, SSSI, SINS), Cruden Bay (SINS), Donmouth (LNR), Balmedie (Country Park). Forvie, Ythan Estuary (SSSI, SPA, Ramsar), Dee Estuary (cSAC) and Donmouth both have management plans and Balmedie Country Park has byelaws. St. Fergus is managed by a Coastal Environment Committee, which includes representatives from the four major operators with gas plants on the site, Aberdeenshire Council Planning Services (North), and an Independent Senior Advisor, and is administered by the University of Aberdeen. Halcrow carried out a Coastal Protection Study for Aberdeen City and Aberdeenshire area. This showed areas of erosion (Donmouth) and accretion (north



of Blackdog) and the potential impacts from any further coastal protection works on the dune system north of Donmouth. Aberdeenshire Planning Department have also carried out fencing work at Fraserburgh to prevent trampling and quad bike erosion.

4.3.5 Coastal Issues

- Sea Level Rise and Climate Change (SEPA Flood Maps)
- Coastal Defence (Aberdeen Beach Project)
- Coastal Tourism and Leisure e.g. Dolphins, Marinas
- Inshore Fisheries (EGCP)
- Marine Spatial Planning (EGCP)
- Renewable Energy (Aberdeen Windfarm)
- Coastal Development and the Visual Landscape (Golf Course / Windfarm)
- Impact from gas pipelines
- Coastal erosion
- Recreational impacts (trampling and quadbikes in the dunes)

4.3.6 Corepoint activities

East Grampian Coastal Partnership (EGCP) is a local coastal forum based in Aberdeen, Scotland, UK. It was established in 2004, and its mission is to assist in the delivery of Integrated Coastal Zone Management (ICZM) in the area between Fraserburgh and the Mouth of the River North Esk on the East Coast of Scotland. The University of Aberdeen is an academic member of the EGCP and also a member of the EGCP Steering Group.

In addition to attendance at regular stakeholder meetings in Aberdeen, the University of Aberdeen, through the Corepoint project, has participated in several seminars and workshops e.g. Macaulay Marine Spatial Planning seminar December 2005 (MC), an EGCP Forum Meeting and Presentation on ICZM indicators paper in 2006, and a meeting and contribution to a Marine Spatial Planning Paper for AGMACS in 2006.



The ICZM indicators work was a small student project designed to test the indicators developed by EUCC. Although the University of Aberdeen initially made an unsuccessful bid to host the EGCP, we have nevertheless continued to offer academic support (teaching, research, training and consultancy) in various ways to this coastal forum through meetings and exhibitions providing the EGCP with opportunities to promote its activities at conferences and exhibitions e.g. at Littoral 2004, CoastGIS 2005, Oceans 2007, and most recently the ECO-IMAGINE GIS and ICZM Training Workshop in July 2007. EGCP also participates in the University of Aberdeen's Marine and Coastal Resource Management (MCRM) B.Sc. degree programme, with some input to various modules through guest lectures, as well as involvement in an employer's day, and University of Aberdeen open days designed to promote local links with coastal initiatives. Exchange students from the Van Hall Institute ICZM degree programme and the MCRM degree programme have also been involved with EGCP through the University of Aberdeen to undertake a variety of small coastal research projects. A number of potential projects will continue to offer future involvement with the EGCP in the context of coastal management.

Preferred reference: Carlisle, M. & Green, D.R., (Eds.) 2008. Corepoint Expert Couplets & case studies: Descriptions of physical, ecological and socio-economic context and of area-specific Corepoint activities. *University of Aberdeen* <http://www.abdn.ac.uk/cmcm/about.htm>. & *COREPOINT* March 2008, pp92.

