

**Managing the Donegal Coast
in the
Twenty-first Century**

By

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*For the family that nurtured me,
for the family I hope to nurture.*

ABSTRACT

This thesis discusses the concept of coastal zone management in relation to County Donegal. An outline of the existing administrative and legislative structure for the coastal area of Donegal is given and the current approach to coastal erosion control is described. An alternative strategy of coastal defence, utilising land and water use management, is advanced. The general aims of coastal management programmes, adopted internationally, are outlined.

The physical and human geography of the coast of Donegal is described, with attention being paid to changing employment patterns. The role of agriculture has decreased in importance as alternative industries such as tourism and aquaculture experience strong growth. The impact of these industries on the Donegal coastal resource is examined and the absence of an integrated coastal development strategy is highlighted.

Having discussed the theory of coastal management and described the general Donegal coastal situation, specific examples of coastal management issues in Donegal are given. Case studies highlighting current issues in the Donegal coastal zone are discussed and conclusions drawn as to how this beautiful but fragile resource, which is the main location of a growing tourism industry, can be sustainably managed in the twenty-first century.

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CHAPTER 1

MANAGING THE DONEGAL COASTLINE: AN OVERVIEW.

1.1 Introduction.

Several weaknesses in the management of coastal issues in Ireland have come to the fore in recent years, particularly in the aftermath of the violent storms of 1989/1990, which focused the attention of coastal communities and their local authorities on the fragile nature of the coast and the vulnerability of their sea defences. Predictions of future sea-level rise, due to global warming have added to these concerns, while costings on the works required to maintain the coastline at its present position have highlighted enormous financial implications, far beyond the capability of local and central government.

Increasingly, questions are being asked about the suitability of hard structural defences and studies of sites where such defences have been constructed have shown that they may indeed contribute to erosion by reflection and refraction of wave energy (Pethick, 1984). Attention has switched in recent years from a policy of coastal erosion management to one which recognises the need for integrated management of the coastal resource. Irish Government policy and EU policy now favours such an approach.

Managing the Donegal coast in the twenty-first century will be a much different task than managing the coast heretofore. There is a growing awareness of the pressures which a developing tourism industry will place on coastal resources. Throughout Europe, coastal environments continue to degrade due to increased urbanisation and habitat loss. The challenge to the managers of the coastal areas will be to put in place a management

strategy which allows this growth to take place in a sustainable fashion. Such a strategy is not helped by current administrative and legal structures for the coastal area. It is suggested that:

1. The administrative divide of the High Water Mark (hereafter HWM) hampers effective management of the coastal resource.
2. The degree of interaction between coastal lands and sea is such that they should be administered together as a "coastal zone".

This thesis describes the concept of coastal zone management and examines the application of such a strategy to the coast of Donegal. The existing management structures for the Donegal coast are investigated and the roles of the main agencies are outlined. The physical and human geography of the Donegal coast is described and examples of existing management practices are given. From the locations studied in Donegal, recommendations are made as to what issues a regional coastal zone management policy should address.

1.2 Defining the coastal zone.

* The term *coastal zone* is not defined in Irish legislation. The terms *sea-shore*, *tidal lands* and *foreshore* are defined in the Foreshore Act 1933, which is the legislative instrument for the control of development below the HWM. The coastal zone can be taken to include both land and sea in a varying combination of physical and biological features. Its width varies depending on the nature of the environment and management needs. The landward boundary is sometimes denoted by the nearest continuous section of road running parallel to the coast (McGuigan, 1994) while the offshore boundary may be undefined or taken to

coincide with the 12 mile legal limit. An alternative landward boundary would include any catchment discharging to coastal waters. Whatever the definition or limits, it is essential that the coastal zone have economic and administrative integrity if management of the coastal resource is to be effective. As will be seen, this is far from the case at present.

1.3 The Importance of the coastal zone.

Many of the major manufacturing industries in Ireland are located on or near the coast. A large portion of the economic activity of the country can be said to take place within the coastal zone. This is especially true in the less developed areas of the country where the only employment opportunities may be directly related to the coastal environment. The population of Donegal is largely a coastal population and traditionally the produce of the coast has been of great benefit in sustaining the population.

The growing tourism industry in Donegal is primarily coastal with the attractions of the coastline being a major tourism product. The industry has grown significantly in recent years and is regarded as being particularly suitable for stimulating employment and economic development in the North West (IBEC, 1995). Much of this development will be located in coastal areas adjacent to fragile habitats and will require careful management.

Many sites of archaeological interest are located on Donegal's coastal zone. Promontory forts, castles, and middens are found extensively (Lacy, 1983), while marine archaeological sites of note, particularly those of the Spanish Armada, have been recorded and in some instances excavated (Flanagan, 1988).

There are thirty-eight proposed national heritage areas along the Donegal coast, of which five are internationally important. Many of these areas are so designated because of their ecological character. In most instances it is the remoteness of the sites which has allowed the habitat to survive, as for instance when the site is of botanical or ornithological importance.

Donegal also has a large fishing industry with major ports located at Killybegs, Greencastle and Burtonport, and approximately 80 minor piers and harbours located around the coast. In addition a growing fish farm industry producing both fin and shellfish operates in several sheltered estuaries, such as Lough Swilly and Mulroy Bay.

1.4 A resource under threat.

Clearly the potential for conflict exists when some of the above activities are located in close proximity to each other. The situation is further complicated by the large number of regulatory agencies responsible for development in these areas. In the absence of a coherent overall strategy for the coastal zone, development will occur in an uncoordinated fashion with serious adverse environmental impact. It is noteworthy that our much praised green environment is mainly due to “a historically low level of development rather than any preconceived plan” (Operational Programme for Tourism 1994-1999).

Without doubt, the sandy beaches of Donegal particularly those of EU Blue Flag standard, of which there were six in 1995, are among the county’s top attractions both for tourists and local recreation. However it is these sandy beaches and other soft coastline which are most susceptible to erosion from natural causes and man-made developments.

A recent study identified 110 km of beach coastline in Donegal to be at immediate risk with annual average rates of erosion of over 2 metres given for several locations in Donegal (Callery et al, 1992). The cost of protecting this coast by conventional rock armouring methods is estimated in the same report at £3.56M. Funding of this magnitude is simply not available and alternative coastal defence strategies have not been adopted.

1.5 Inadequacies in the present approach

At a national level, the major problems associated with coastal management are:

1. fragmentation of responsibility
2. lack of co-ordination
3. lack of money
4. inadequate legislation

Each of the above inadequacies stresses the need for an effective management strategy.

Historically the coast is a resource which has been self-regulating. Natural forces of erosion and accretion have been reshaping the map since sea-levels stabilised some six thousand years ago (Pethick, 1984). At present, there is a worldwide tendency towards shoreline erosion, mainly due to sea-level rise, resulting in a slow landward movement of the shoreline (Bird, 1985). When development takes place on the coast, it becomes necessary to protect this development, both against erosion and against flooding, by constructing structural defences which will hold the line of the coast against the sea (Figure 1). This creates a static barrier in a highly dynamic environment which is then subjected to the destructive power of the sea. Very often, in the case of sea walls or gabions, erosion will occur at the side of the structure, creating a further requirement for defence works and resulting in more expense. When such structures are located on a

Figure 1. **Rock Armour protecting golf course at Buncrana.**



When development occurs close to the shore, it becomes necessary to protect such development, by fixing the line of the coast. This creates a static barrier in a highly dynamic environment, which interferes with sediment flow in the locality.

beach, lowering of the beach level in front of the structure often results, due to the increase in reflected wave energy. In short, despite much usage, such structural defences rarely provide satisfactory solutions for soft coastlines.

× Reappraisal of the structural approach to coastal defence has taken place internationally, resulting in an increased emphasis on a multi-disciplinary approach, involving engineers, geomorphologists, planners and ecologists. There is a growing awareness that a certain amount of erosion is actually desirable in that it supplies beaches with a source of sediment. When this source of sediment is sealed off by coastal defence works, other adjacent areas are attacked. Thus the emphasis in coastal protection is now being placed very much on managing rather than preventing coastal processes.

1.6 How Coastal Zone Management can improve matters.

Coastal zone management plans are framed to achieve the following:

- promote sustainable use of coastal and marine resources
- balance demand for coastal zone resources
- resolve conflicts of use
- promote strategic planning for coasts.

It is recognised that coastal zone management is a management tool rather than a solution in itself, and it is not suggested here that adoption of CZM will provide an instant cure for present day coastal ills. What is being suggested is that the creation of an administrative structure, which encourages input from the users of the coastal zone, whose administrative boundaries match those of the coastal zone and whose structure meets the present day needs of the coastal zone, seems a good step in efficient management. In

order to achieve the above aims in an Irish context, certain policy and administrative changes are required and these are discussed in Chapter 3.

Recent initiatives at EU and national level have recognised the importance of promoting integrated CZM. A national coastal zone management plan is currently being drawn up which will function as a strategy guide for future more detailed regional CZM plans. In addition three government departments (Marine, Environment, OPW) have formed a coastal management committee in order to overcome the fragmented nature of departmental responsibility for the coast. A strategic planning framework is fitting into place at EU and at national level. It is essential that this be carried through effectively to the most important regional level, where policy implementation will be carried out. As of now there is no integrated management structure in place for the Donegal coastal zone.

1.7 Layout of Thesis.

This thesis firstly describes coastal zone management (hereafter CZM) in general terms and then studies the application of such a strategy to the coast of Donegal.

Chapter One introduces the concept of the coastal zone, and describes the importance of the zone for its large residential population, for recreational use and for the many important habitats which are found only in coastal areas. The chapter then outlines what are considered to be weaknesses in the administrative framework of the coastal resource and gives reasons why coastal zone management could be used to improve matters.

Chapter Two describes the current management of the coast in Ireland and gives an account of the major agencies involved, and the legislation which they implement. Difficulties which arise due to the involvement of many different agencies are noted, and the chapter concludes with some observations on how coastal protection works are currently funded in Ireland and on the order of priority of funding for schemes.

Chapter Three looks in detail at coastal zone management. The different approaches taken in various countries are contrasted, and common themes of CZM programmes are listed. EU policy on coastal matters in recent years is described, as are recent significant advances in CZM in Ireland. The Wexford Coast CZM plan is examined and some comparisons made between Wexford and Donegal.

Chapter Four narrows the focus to describe the physical character of the Donegal coast. The unpolluted waters, the high numbers of sandy beaches and the “high proportion of sublime scenery” (National Coastline Study, 1971) are noted as a resource which will be of vital importance to Donegal in sustaining a population on the very periphery of Europe. The decline in the numbers of people engaged in agriculture is detailed and the opportunities and threats posed by alternative coastal industries, such as tourism and aquaculture, are listed.

Chapter Five examines the EU Blue Flag Scheme for beaches and comments on the importance of the scheme to Donegal. While researching this thesis, many coastal sites in Donegal were inspected. A selection of these sites is presented to illustrate aspects of

current management practice in Donegal. Illustrations of both good and poor practice are included.

Chapter Six concludes the thesis by making some general observations on the current state of the Donegal coast. Finally some recommendations are made as to how this beautiful but fragile resource can be developed in such a fashion as to sustain itself and the communities it now supports in the future.

A plan of the Donegal coast, indicating locations named in the text, is included in Appendix 1.

CHAPTER 2

EXISTING COASTAL MANAGEMENT IN IRELAND.

2.1 How the coastal zone is currently managed.

Responsibility for the Irish coast has been described as a mosaic (Kelly, 1994). Many government departments and agencies share responsibility for the resource. The complexity of managing the Donegal coast at present is highlighted by considering the number of different authorities with some responsibility for the coast. See Appendix 2. This chapter outlines the approach to coastal management to date in Ireland and then describes the role of the main agencies involved.

In Ireland, the approach to coastal management has been largely one of coastal erosion control whereby rock armour (loose boulders), gabions (single sized stone in wire cages) or sea walls were placed immediately in front of the section of coast under threat. It has been estimated that some 238 km or 3.8% of the Irish coast has been protected by artificial constructions (Carter & Orford, 1988). The large amount of finance required to fund such schemes has meant that their deployment has been dictated by the availability of finance rather than by environmental suitability. The cost of such structures is prohibitive - an 80 metre long section of rock armour in Waterford cost £50,000 or £625 per linear metre of coastline (O'Flynn, 1992).

One of the arguments which has emerged in relation to artificial constructions is that this type of defence in the wrong location, i.e. adjacent to a section of sandy beach, upsets the regular sedimentation patterns in the area and may indeed cause erosion to adjacent areas.

A report on coastal erosion throughout Ireland found that erosion of sand dunes was seen as a major problem in counties where they are prevalent, and went on to state:

“Most of these counties have provided for reinforcement of dunes by conventional methods using rock armour or gabions. In most cases however studies have not been carried out to determine the optimum solutions. Past experience alone would indicate that similar solutions have not worked in many instances, and in some have probably exacerbated the situation.”

(Callery et al, 1992).

The truth of the above statement is particularly evident in areas along the Donegal coast. Examples of coastal structures interfering with natural sedimentation patterns and causing erosion occur at Magheraroarty (Figure 2), Lisfannan and Rosstownlough.

Structural defences have worked well in particular situations. Many coastal cities, including Dublin and Cork, have low-lying land which requires strong defences against flood attack. However in most rural areas the land under threat has little economic value, and cost benefit analysis indicates that there is no justification for protecting thin strips of poor agricultural land, even with an occasional house. Conversely much rich fertile land has been reclaimed from estuaries in Donegal. Such reclamation reduces the tidal prism of the estuary and can have very long term effects on erosion trends. The earthen embankments protecting reclaimed lands will come under increased attack if the predicted rise in sea-level materialises and pumping of drainage water will also increase (Figure 3).

These two facets of coastal management, namely the high cost of marine structures and the long term effects of destabilising coastal equilibrium has led to a fundamental policy

Figure 2.

Maheraroarty, near Gortahork, Co. Donegal.
Looking north to Inishbofin and Tory Island.



The pier has interrupted longshore drift causing extensive deposition on the western side and erosion on the eastern side.



Efforts to combat the erosion with rock armouring have moved the problem along the coast.

Figure 3.

Land Reclamation in Lough Swilly.



Large areas of land in Lough Swilly have been reclaimed since the 1800's. This practice effectively reduces estuary size and changes tidal patterns. Note the collector drain on the landward side of the embankment.



Breached embankment at Rathmelton, causing flooding of reclaimed land.

change on coastal matters in recent years. The concept of *defending* the coast against the sea has become outdated and the limited effectiveness of trying to do so is evident in many instances around the coast. The cost of regaining land from the sea is also being revised, as related erosion becomes apparent (Orford, 1988). Coastal engineers are learning to work with coastal dynamics rather than opposing them. Fundamental to this is the realisation that the beach is an extremely effective coastal defence in itself, capable of dissipating wave energy. The dunes to the rear of the beach can be regarded as a reservoir of material for maintaining the beach at a suitably high level. Good dune management techniques are seen to be essential in maintaining a sufficient stock of material in store. The concept of “managed retreat” has gained currency whereby development is prohibited within a specified distance from the coast, thereby helping to conserve coastal habitats and reduce the need for future defence structures.

2.2 Role of the Office of Public Works.

The National Parks and Wildlife Service (NPWS) of the Office of Public Works is responsible for conserving wild flora and fauna and their habitats. Disappearance of coastal habitats is seen as one of the major environmental threats worldwide. The NPWS do not have a separate policy for coastal areas and coastal management and protection ties in with the overall strategy for nature protection (Wright, 1994). This strategy is dictated by the Wildlife Act, 1976, which provides for the protection and management of sites of importance for wild plants and animals. Initially protection was provided by the classification of certain locations as “Areas of Scientific Interest”. However these sites were classified in a non-consultative way without any input from affected landowners and the Supreme Court, in a 1992 case concerning Clifden Airport, found that this method was contrary to natural justice. An amendment to the Wildlife Act has been drafted which

will replace ASIs with National Heritage Areas (NHAs) and place them on a statutory basis. At present, NHAs have no formal legal status. However, they do have the practical benefit of increased premiums under the Rural Environment Protection Scheme (REPS). Farmers in NHAs which contain habitats listed in the Habitats Directive or Birds Directive will be entitled to an extra 20% payment under REPS, which is administered by the Department of Agriculture. It is surprising to learn therefore that the rate of farmer participation in REPS in NHAs, at 3%, is considerably lower than the national average of 10% (Coveney, 1996).

In addition to national legislation, the NPWS are also obliged to implement EU policy which has been ratified by the State. With the signing of the Maastricht Treaty in 1993, Ireland committed itself to an environmental policy with the objective of “preserving protecting and improving the quality of the environment”. In EU regulations governing grant aid, all reasonable steps must be taken by the beneficiary to avoid adverse effects on the environment. There are a number of relevant EU Directives which contribute to determining NPWS policy:

- The Birds Directive (79/409) obliges the NPWS to protect wild birds by creating Special Protection Areas (SPAs) for threatened or vulnerable species as well as regularly occurring migratory species. Most of the SPAs are in coastal areas. To date 33 such sites have been designated in Ireland, including sites at Horn Head, Lough Swilly and Tory Island. Some sites have also been designated as Nature Reserves and Refuges for Fauna under the Wildlife Act, 1976, which gives added protection to wildlife.

- The Habitats Directive (92/43) places the State under an obligation to protect specified ecosystems under threat and to contribute to a network of special areas of conservation (SACs). No sites have been designated to date but it is considered likely that most of the coastal NHAs will be included in the proposed designation (O'Keefe, 1996). Once classified, the NPWS will be obliged to take whatever measures are required, including court injunctions, to prevent the degradation of habitats and the disturbance of species on these sites. An environmental assessment will be required for any project likely to have a significant impact on a SAC.
- The Ramsar Convention obliges Ireland to safeguard wetlands because of their importance to migratory waterfowl. Ramsar sites are wetlands of international importance for migrating birds. There are twenty-one Ramsar sites now designated by Ireland including three in Donegal; Pettigo Plateau Nature Reserve, Lough Barra Bog Nature Reserve and Meenachullion Bog Nature Reserve.

All planning applications in a designated area are referred by the planning authority to the OPW for consultation and advice on good practice. Developments which damage a site are normally not allowed but where the development has no significant environmental impact the proposal may be given permission to proceed.

2.3 Role of the Local Authority.

The Department of the Environment has responsibility for the control of pollution from land based sources and for physical planning and development above the high water mark.

The control is implemented by the local authority and by the Environmental Protection Agency. Land above the high water mark (HWM) is within the administrative area of the local County Council, while the land below the HWM is defined as the foreshore and is outside the administrative area of the council. It is noted that every tidal river and every tidal estuary is included in the definition of foreshore given within the Foreshore Act 1933. Thus towns as far "inland" as Letterkenny and Carrigans have foreshore frontage.

The Local Government (Reorganisation) Act, 1985 empowers the Minister for the Environment to extend the maritime boundaries of any county for up to 3 miles beyond the high water mark. This would appear to be a very useful concept and it is surprising to learn that with the one exception of the maritime boundaries of Co. Cork being extended into Bantry Bay following the recommendations of the Tribunal of Inquiry into the Disaster at Whiddy Island, no other order has been made by the Minister. The situation at present is that a planning application to Donegal County Council for a proposed fish farm can only consider the onshore stores and that part of the slipway above the High Water Mark, while the most visually intrusive aspect of the proposal, the fish cages, is dealt with by the Department of the Marine under a foreshore licence and is completely outside the control of the planning authority.

Each planning authority is required to prepare a Development Plan for its area under the Local Government (Planning and Development) Act, 1963. The plan sets out the development guidelines for the planning area and normally includes zoning of particular

areas. The County Donegal Development Plan has designated almost all of the coastal areas as “high amenity” while outstanding coastal landscapes have been designated as “areas of especially high amenity”. The plan states that “development control policy in these areas will be greatly concerned with the effect of any proposed development on the visual amenity of the area” (Donegal County Council, 1988a). The plan notes however that threats to sensitive areas do not always fall within the planning control system. Agriculture, forestry and drainage can all cause severe damage or destruction to environmentally fragile areas and most activities under these headings do not require planning permission. A case study exemplifying this point is included in Chapter 5.

In its role as a sanitary authority, the Council is required to monitor and ensure compliance with set standards for bathing waters, shellfish waters and drinking waters. Donegal County Council are currently preparing a water quality management plan for Donegal Bay. The Council is also required, under the Water Pollution Acts, 1977 and 1990, to monitor waters including tidal waters for ingress of pollution.

2.4 Role of the Department of Marine.

The Department of the Marine is responsible for planning and co-ordinating activities in relation to sea, inland fisheries and aquaculture. Under the Foreshore Act, 1933 and 1992, it has responsibility for the preservation of beaches and seashore and the control of disturbance. The Department also licenses the use of the foreshore for aquaculture and leisure facilities. Under the Coast Protection Act, 1963, the Department undertakes and advises on coast protection works. At a Marine Policy seminar in Sligo in 1995, many participants spoke of their frustration with the foreshore licence application procedure,

complaining about the length of time involved and the lack of information coming from the Department regarding the state of applications.

There has been a dramatic increase in unlicensed shellfish aquaculture in recent years, much of it in areas which qualify as NHAs or SPAs. Many of these sites are so designated because of their bird life, such as Lough Swilly and Trabreaga bay. There is considerable risk of damage to these areas, particularly when aquaculture develops in an unregulated manner. In such circumstances the fragmented responsibility for the coast hinders effective control. The Department of the Marine is the licensing authority, Bord Iascaigh Mhara is the development agency and the NPWS has responsibility for preserving the habitat. Refusal of grant aid to operators in unlicensed sites is an important step taken by BIM in regulating matters. However, unregulated development is increasing rather than decreasing and more needs to be done.

2.5 Too Many Cooks.....

The need to address the fragmented nature of coastal management activities between government departments has been recognised by the agencies themselves, in the formation of an inter-departmental committee comprising representatives from the Departments of Marine, Environment and the OPW. Among the aims of this committee is the preparation of a national coastal zone management strategy, and a report outlining such a strategy is due in July 1996. Given the fact that most coastal land is owned and managed by farmers, one could argue for a role in the inter-departmental committee for the Department of Agriculture.

A local example of poor inter-departmental co-operation occurred in 1995 in Burtonport where complications with drilling and blasting works at the harbour led to an over expenditure of almost £300,000 on an original estimate of £270,00. A Dáil committee heard that engineers from the Office of Public Works had noted problems with the proposed scheme but failed to pass on the information to the Department of the Marine, who eventually had to settle a claim from the contractor for the above amount (Donegal People's Press, 1996).

2.6 Legislation.

Legislation is an area which typifies some of the problems that can be encountered in the coastal zone. The legislative framework is “characterised by over-complexity, ambiguity and irregularities” (Thomson, 1994). There is little integration in the operation of legislation, and some of the major pieces of legislation were not drafted with current situations in mind. A thorough review of the relevant legislation is required and replacement of deficient legislation has been recommended (O’Flynn, 1991, Callery et al, 1992). Two pieces of major legislation are described below.

2.6.1 Foreshore Act, 1933 and 1992.

The original purpose of the Foreshore Act 1933 was to regulate property rights in the State owned foreshore. It ensured that use of the foreshore did not interfere with navigation or fisheries and issued licences for foreshore use and coastal protection work (Kelly, 1994). The Act was amended in 1992 in order to increase the fines for the illegal removal of foreshore material. This move is very welcome as the removal of sand from beaches, particularly at a large industrial scale, reduces the capacity of the beach to

dissipate wave energy and results in increased erosion. Shortcomings of the Foreshore Act, when used to regulate development on the foreshore, have been cited as follows:

1. The public will not be aware of the conditions attached to any licences issued.
2. There is no appeal to An Bord Pleanála
3. Privately owned foreshore sites are outside state control.
4. The right of public access to the foreshore is not enshrined in law.

(Crosbie, 1994)

As tourism development in the coastal zone has the effect of restricting public access, the issue of access, while not a major issue at present, will become more prominent. Uggool Beach on the northern shore of Killary Harbour is a case in point. A local landowner has fenced off the beach, denying public access even though the beach has been a place of recreation for generations. The authorities have been unable to rectify matters, despite six months of effort (Douglas, 1996).

2.6.2 Coast Protection Act, 1963.

The Coast Protection Act, 1963, empowers the Commissioner of Public Works to carry out and maintain Coast Protection Schemes. This power, together with some staff experienced in coastal environmental matters, was transferred from the Office of Public Works to the Department of the Marine in 1990. The Coast Protection Act has been condemned by one County Engineer as “a very tortuous document and is generally found to be almost unworkable in practice” (Callery, 1992). The Act outlines a twenty-three step process for licensing and approval of schemes by the Department of the Marine. Many schemes get bogged down in the process and the legislation is not structured to be responsive to urgent requirements. While the Act might appear to give responsibility for

carrying out coast protection works to central government, it is non specific on the area of funding and the practice has been that the local authority have been requested to provide joint funding for works in their area. O'Flynn, in his capacity as Waterford County Engineer has argued that the coastline is a national asset and that it is unfair on coastal counties to be expected to shoulder a high financial burden in the protection of the coast when it is an asset from which the population as a whole derive benefit (O'Flynn, 1991). In the UK, similar schemes are funded 70% by the Ministry for Agriculture and 30% by district councils.

Concerns such as the above have led influential bodies such as the City and County Engineers Association to call for the replacement of the existing Foreshore Act and the Coastal Protection Act with a new Coastal Zone Management Act which would clearly define the coastal zone and also enshrine the public's right of access to beaches in legislation (Callery et al., 1992).

2.7 Funding of Coast Protection Schemes.

In the current Operational Programme for Environmental Services, 1994-1999, coast protection works have been funded for the first time from EU structural funds. An amount of £5.1 million has been allocated over the duration of the plan, though no funding has been made available to Donegal as of yet. In 1995 grant aid totalling £735,000 was made available for ten projects, which will receive 75% funding from Europe.

Local authorities were invited by the Department of Marine in 1995 to submit schemes for funding under this programme. Full details were to be given of all schemes submitted

and value for money was required to be shown. By June 1995 the cost of proposals received by the Department came to £25 million, greatly exceeding available finance.

SCHEME LOCATION	WORKS	COST
Courtown Co. Wexford	Study of erosion problem and solution	£25,000
Duncannon Co. Wexford	Rock revetment protection	£75,000
Waterville Co. Kerry	Rock armour and groynes	£100,000
Maherees Co. Kerry	Rock armour and protection	£100,000
Roundstone Co. Galway	Sea wall protection	£75,000
Inisbofin Co. Galway	Gabions protection of roadway	£100,000
Bertra Co. Mayo	Dune management and stabilisation	£50,000
Laytown Co. Meath	Gabion protection of seafront	£105,000
Killiney Co. Dublin	Protection of Cliff	£105,000
Total		£735,000

Table 1: Coast Protection Works 1995.

Source: Department of Environment.

The selection criteria employed by the Department was as follows:

“The primary objective of the available funding is the preservation of

- the state owned foreshore,*
- local authority owned property including county road networks,*
- tourist amenities including beaches and dune systems*
- natural habitats/ecology,*
- private property.*

Aid can be given to only a limited number of priority projects having regard to the economic, environmental and ecological benefits arising.”

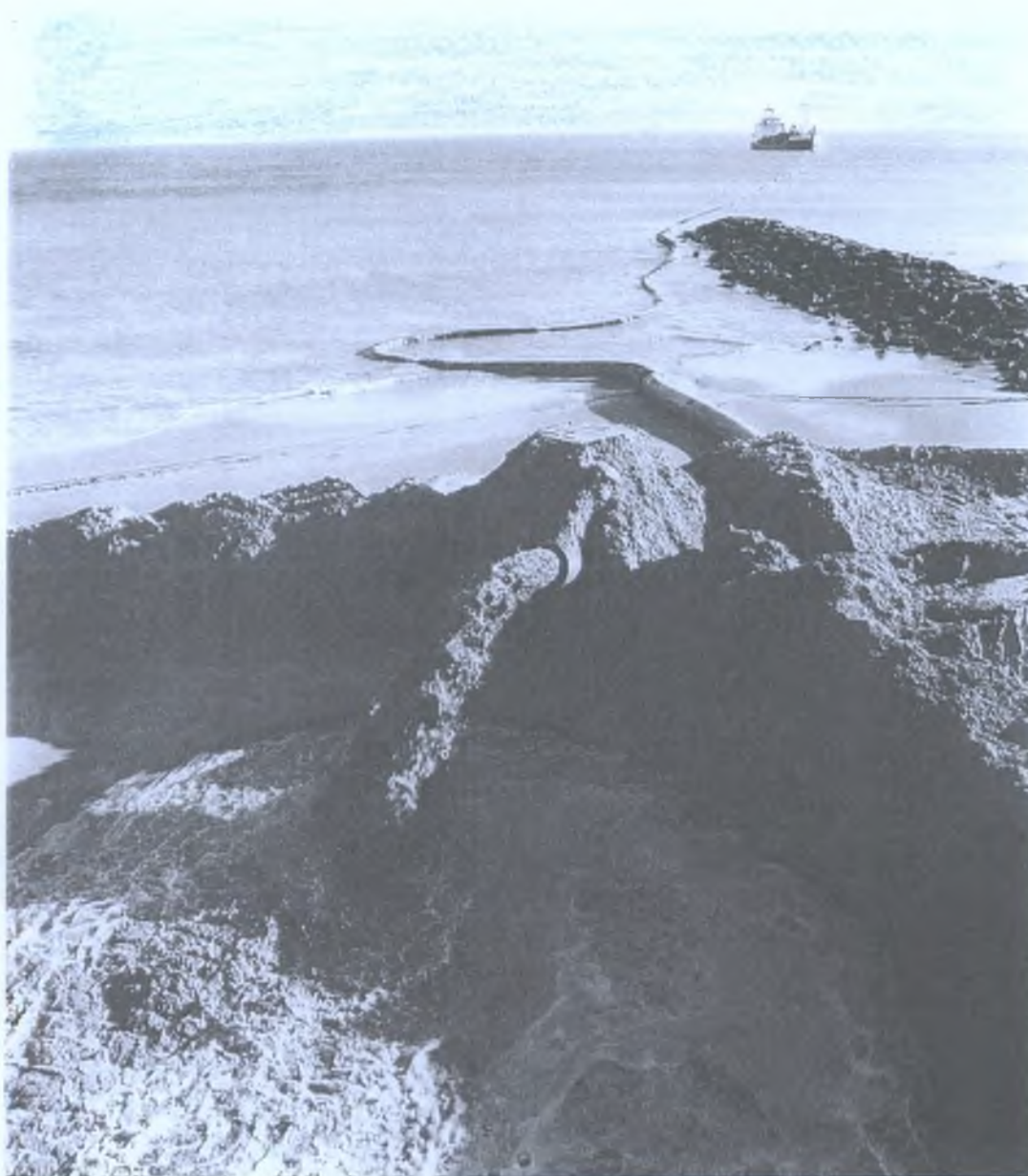
(Operational Programme for Environmental Services 1994 - 1999).

Given that the total allocation under the programme of £5.1 million over five years will fund only a limited number of schemes, it is extremely unlikely that schemes, which will protect privately owned property, will be publicly funded.

A major beach nourishment scheme for Bray will obtain £2 million of the above £5.1 million. Another scheme at Rosslare Co. Wexford will require £1 million (Figure 4). Thus the reality of the present situation is that very few coastal protection schemes in Donegal will benefit from the above programme. In 1991 Donegal County Council submitted proposals for protection works at 30 locations in the county to the Department of the Marine. None of these schemes were funded or constructed. In 1995, following a request from the Department, the Council submitted a list of seven priority schemes. Present indications are that one scheme at Magheraroarty, which will protect a threatened pier where the Tory Island ferry boat berths, will be approved. It is noted that erosion at the location is due to the pier itself interfering with longshore drift and causing a scouring eddy to form (Figure 2). In the absence of large sums of capital, softer options such as land use and dune management techniques are vitally important. Such techniques, properly applied in a strategic, comprehensive fashion will modify rather than arrest the erosion process and are likely to be far more sustainable in the long run.

Figure 4.

Beach nourishment at Rosslare Strand, Co. Wexford.



The beach has been restored using sand dredged from a sand bank, 7 km offshore, which is pumped via a floating pipeline on the beach. A rock groyne, used to minimise sand loss due to longshore drift, is visible to the right of centre.

Source: Department of the Environment, 1995.

CHAPTER 3

ADOPTION OF COASTAL ZONE MANAGEMENT AS A MANAGEMENT TOOL

3.1 Worldwide Status of Coastal Zone Management.

In many regions of the world, national governments, local authorities and coastal communities have to a varying extent recognised the need for integrated management of their coasts. In 1972, the US enacted the Coastal Zone Management Act, which introduced the concept of effective coastal protection by land and water use management. The approach to coastal problems ranges from extensive control in developed countries (Holland, Denmark, US) to zero control in some undeveloped third world countries (Callery et al, 1992). 62 out of 177 coastal countries had formally adopted CZM programmes by 1992 (Sorenson, 1993). In many cases, the adoption of CZM was a reactive rather than a proactive approach, where changes to the existing situation were initiated only when a critical point had been reached. Similarly, Ireland's current progress with CZM can be traced back to the large scale damage inflicted by the storms of 1989.

The most common reasons for developing a coastal management programme has been pressure on coastal resources and threats to the coastal environment (Gubbay, 1994). The threat of sea-level rise is a global issue, but will affect low-lying countries such as Bangladesh or the Maldives critically. Carter (1990a) has estimated that 176,000 ha of Irish coastal land is at risk from the impact of global warming, including most of Dublin City and the Cork harbour area, and 21,199 ha in Donegal (4.45% of county area).

In Mediterranean countries, the pressure on the coast has come mainly from the tourist industry and is very concentrated in some locations. Tourism related development, whether in a Mediterranean or an Irish context has the potential to damage those aspects of the environment which attract the tourists, and so diminishes the resource if not managed in a sustainable fashion. It is this concern which has concentrated the minds of the authorities in Spain where the coastal population density rises from 308 to 904 persons/km² during the tourist season (Mora, 1993).

Countries such as Holland and Denmark have had the incentive of a physical erosion process with which to contend. Sorenson (1991) indicated how erosion of 2 km had taken place on the west coast of Jutland, within the last 200 years. This has resulted in villages inhabited in 1790 now lying 1.5 km offshore. Denmark has been looked at in some detail as a possible role model for CZM in Ireland, as Denmark has similarities with Ireland in terms of size, population spread and strong agricultural base (Callery et al, 1992). Unlike Ireland, the Danes have a history of strong planning enforcement. Having adopted their own national CZM strategy they have in recent years forged ahead together with the governments of Holland and Germany to form a tri-national management structure for the Wadden Sea, off their joint coastline. As the dynamic nature of the coast is confined by sediment cell boundaries rather than by national borders, this is a logical progression from national CZM plans and the EU is keen to develop regional CZM programmes where appropriate. To this end, Donegal County Council and the Department of Environment for Northern Ireland are currently examining the Foyle estuary with a view to building on the work of the cross-border Foyle Fisheries Commission and developing policies for coastal management of the estuary area.

3.2 General Aims of Coastal Zone Management Plans.

Coastal zone management is in essence a management tool. Therefore there is no single correct approach to CZM. The point is borne out by the diverse way in which CZM programmes are being implemented in different countries. The programmes are seen to be greatly influenced by the reasons which triggered the programme, the cultural and political background and the administrative structures in a particular country (Gubbay, 1994). The differences between the programmes are exemplified by the variance in the landward and seaward boundaries of the programmes (in effect the extent of the coastal zone) and also in the building setback lines which have been adopted. Examples are included in Appendix 3.

The administrative structure of a region determines the number of levels from national to local level at which CZM plans operate. Australia, US, Denmark and Netherlands all have a national strategy for CZM and regional and local plans operate within this framework. In the UK and France, on the other hand, local planning authorities are developing their own CZM plans without the guidance of any national framework. A recent review of coastal management in Western Australia has recommended a shift from local plans to increased emphasis on regional level strategic planning (Gubbay, 1994). Local CZM plans are the proof of how effective the regional planning is, and they can create a momentum for a national programme. One can cite the example of the lead role which Wexford County Council have played in promoting CZM in Ireland.

Despite the above differences between various CZM programmes, a number of common themes have been identified.

CZM AIMS	CZM RECOGNISES	CZM REQUIRES
Promote sustainable use. Balance demands on resources. Resolve conflicts of use. Promote strategic planning	The need to link planning and management of coastal waters and land. The coastal zone as an area requiring special attention.	A specific lead agency. A national perspective. An integrated approach A long-term view Public involvement

Table 2. Aims of CZM programmes.

Source: Gubbay, 1994.

3.3 EU policy concerning Coastal Zone Management.

The need to protect the coasts of Europe has been recognised as far back as 1971, when the Council of Europe called for regional planning to protect the coasts (Resolution 627). The European Coastal Charter, adopted by the EEC in 1981 recognised the need for improvements in coastal planning and management and identified three types of action required:

- to establish a European coastal research network
- to include integrated planning for coastal developments
- a comparison of regulations on coasts so as to regulate more effectively sea transport, control of pollution and dumping at sea.

This led onto the Fifth Environmental Action Plan (1992), which identified the development of an EU coastal strategy as one of the priority areas for action. In 1995, the EU Environmental Council adopted a European Commission communication on integrated coastal zone management. A key conclusion of the communication is that the environmental situation of coastal regions continues to degrade due to too many diverse

and competing uses in such areas, and insufficient co-ordination between authorities at regional and local level, and between such authorities and those at national level (European Commission, 1995).

Traditionally the coastal regions of the EU are the poorest. Of the regions classified as Objective 1 regions from the EU Structural funding criteria, 90% are coastal. Many of these regions will benefit from economic input from EU funds and this will inevitably lead to environmental pressures. Construction of a golf course in a dune system at Ballyliffen, Inishowen, which was grant-aided, is a case in point. Although such funding offers these regions the potential for economic development, it also constitutes a considerable threat. Consequently the need to ensure that such development is sustainable is all important. Without a coherent planning policy, it is conceivable that EU funding will be used both to protect a particular habitat and simultaneously assist a development in the same area, as happened in 1995 with a raised bog in Tipperary.

Several international agreements such as the Paris Convention 1974 and Helsinki Convention 1974 & 1992 have seen countries acting in combination to directly and indirectly improve CZM. The provisions of the Oslo and Paris Conventions have been updated by a new “Convention for the Protection of the Marine Environment of the North East Atlantic” which was agreed by 15 countries including Ireland and by the EU in Paris in 1992.

3.4 Recent advances in Coastal Zone Management in Ireland.

Following a series of severe storms during the winter of 1989/90, which caused extensive damage to the coastline of Ireland, the Chairmen, Co. Managers and Co. Engineers of the coastal counties met in Wexford, and resolved to prepare a national report on coastal management. The report showed that the coast was under threat both from natural causes and man's activities. The report marked a turning point in the approach of the local authorities to the coast in that it advocated departing from erosion control in isolation to a policy of managing the entire coastal zone in order "to preserve a priceless but diminishing and non-renewable resource" (Callery et al, 1992).

The main recommendations of the report were:

- Establishment of a single new agency - The National Coastal Authority - within an existing Government Department, with overall responsibility for coastal affairs.
- Replacement of the existing Foreshore Act and Coast Protection Act by a new CZM Act, which would clearly define the extent of the coastal zone and enshrine in law the public's right of access to beaches.
- The need for extensive data collection including the establishment of an expanded network of water level measurement stations.

More recently the Government Task Force Report "A Crusade for Survival" included recommendations on a number of aspects of national policy. Having endorsed the potential of the marine resource for economic renewal and job creation in the western region (which includes Sligo and Donegal), their first recommendation on marine development stated that:

“an integrated policy framework for Coastal Zone Management should be developed as a priority in consultation with all relevant authorities and local interests. This consultative process should be completed within 12 months.”

(“A Crusade for Survival” Report, 1994)

3.5 Wexford Coast Coastal Zone Management Plan.

Wexford County Council commissioned the first CZM plan in Ireland, which was produced for the Wexford coast in 1992. The plan studied the change in use of the coastal lands between 1972, when the National Coastline Study was undertaken, and 1990, and found the following:

- The area of land committed to development had increased by 33%.
- The only areas free from development, other than agricultural, were areas designated as Areas of Scientific Interest.
- Tourism and leisure use now accounted for some 20% of land use in the zone.
- Changing agricultural practices had reduced hedgerow cover by 35% in some areas since 1920.
- There were over 4,500 caravans in the Wexford coastal zone in 1990.

With the exception of the finding regarding changing agricultural practices, the trend towards tourism and leisure would appear very similar to, but more concentrated than, the trend in Donegal. The total number of caravans in the Donegal coastal zone in 1994 was 2,500 (Bradley, 1994), and the coast is approximately three times as long (Brady et al., 1992, Callery et al., 1992).

The plan also highlighted the vulnerability of the south-east coast to erosion and flooding and recommended enforcing the following controls:

- no development, including caravans, within 50 metres of soft coastlines.
- no further reclamation of estuary lands.
- all coastal defence measures to be assessed for environmental impact.

These recommendations have since been adopted into the Wexford County Development Plan, thereby giving them legal status. An extract from the plan is included in Appendix 4.

The plan suggested the following management strategy for Wexford County Council:

1. Despite being limited to land use issues the Local Authority should adopt a pro-active approach, as the leadership to plan and manage the coastal zone is not coming from any other agency.
2. Management rather than development control should be the theme of the approach.
3. The management strategy should seek to ensure freedom of access and in particular to develop a continuous coastal walk, which could provide a focus for promotion and marketing.
4. A strategy which recognised the different development potential, the different protection needs and the different priorities of parts of the coast would be most suitable.

The four elements of the strategy are equally valid for all coastal local authorities in Ireland and could be adopted in Donegal.

The plan describes the status of aquaculture and of fisheries in the county, but makes no recommendations as to their strategic development or how issues such as conflict of use could be resolved. The plan's recommendations on coastal management are based on an

acceptance of the current administrative framework, which has been shown in this work to be fragmented and lacking in overall policy. It is therefore confined to the administrative area of the County Council and is very much a land based plan. Nevertheless, the plan is a very significant contribution towards effective coastal management and provides a good lead for other local authorities to follow.

3.6 The ECOPRO project.

A research project entitled ECOPRO (Environmentally Friendly Coastal Protection) was initiated in 1992 in Ireland and Denmark, with the involvement of universities, local authorities, Coastwatch and foreign research institutes. The project's aim is to increase understanding of erosion processes by gathering data on the factors influencing erosion at locations around the coast. Every two months since 1992, wind and wave condition data have been collected at six study sites, together with a survey of one hundred beach profiles. When complete, the project will be the most comprehensive collection of information on soft engineering coastal protection in Ireland. Among the project's output, a code of practice is being drafted to provide a guide to the assessment of a coastline's sensitivity to erosion, by means of a sensitivity index rating, and of the suitability of various protection methods. It will enable soft coastal engineering works to be designed in a technically recognised manner. However many of these soft techniques have been described as not being suitable for exposed high energy coasts with large waves (Dollard, 1994). A list of techniques researched during the project, subdivided into offshore, low shore, upper shore and supra shore techniques is included in Appendix 5.

Beach nourishment is a soft engineering technique which has been used on numerous sites in the US with varying degrees of success since 1955. It is discussed here as it is currently

being utilised in Rosslare and Bray, and it appears likely that beach nourishment will form an important part of future protection strategy for the Irish coast. The advantage of this technique is that it can overcome the usual erosion cause of sediment deficiency. Large quantities of sediment are dredged, usually from offshore banks, and pumped onto the beach in order to restore its level. Care is required in the selection of fill material. There is a tendency for fine material to move offshore and an imported material with particle size distribution similar or slightly coarser than the native material is recommended (CERC, 1984). Replenishment of a beach in itself will not solve an ongoing erosion problem and it has been found that periodic replenishment will be required at a rate equal to the ongoing erosion rate. In the Rosslare scheme, random boulder groynes have been constructed perpendicular to the beach in an attempt to minimise losses due to longshore drift (Figure 4). When the particle size distribution of the imported material is finer than the native material, large losses of beach fill material take place immediately after placement (CERC, 1984). In such circumstances an excess amount of fill termed the *overfill* is required. Comparisons of the particle size distribution will enable an estimate of overfill quantity to be made.

On beaches where erosion is ongoing, suitable material may be stockpiled on the updrift side of the beach to be restored. This will allow the stockpiled material to be distributed by longshore drift. The establishment and periodic replenishment of such a stockpile, termed artificial beach nourishment, creates a substitute sediment source.

CHAPTER 4

PHYSICAL AND HUMAN GEOGRAPHY OF THE COAST OF DONEGAL.

4.1 A regional perspective on Coastal Zone Management policy.

If one compares the degree of development in an industrialised region such as an estuary where a major city is located, with the relatively undeveloped coastline of the north west coast, several aspects of a required coastal management strategy soon become apparent. Firstly, that the degree of interaction between the various regulatory bodies will vary considerably in direct proportion to the level of development in that particular area. Secondly, that such interaction has its own dynamic, which will be dictated by the ongoing development trend in the area. Hence the need to structure the national policy as a framework policy (in EU terms as a parent directive) which will enable regional management policies to be put in place. Obviously the competing and overlapping demands, in terms of shipping, sailing, industrial effluent, nature conservation and ferry terminals, in an area such as Dublin Bay or Cork Harbour will require a far different approach than the coast of Donegal where fishing is still a profitable and important industry and tourism is of increasing importance.

To some extent this has been achieved using the vehicle of national planning legislation, implemented by County Development Plans and various local development plans. For example, the Donegal County Development Plan outlines planning policy for the entire county of Donegal. This county framework is then augmented by local development plans, which can be as specific as required for their own areas. An example of such a plan is the Fanad Development Plan covering the Fanad peninsula north of Letterkenny.

Such local development plans, once adopted by the County Council, are valid legal documents with as much development control potential as the original county development plan. The introduction to the Fanad Development Plan states:

“The County Development Plan is incorporated with and forms part of this plan and has effect in relation to the area to which this plan applies, save insofar as this plan includes policies, objectives or provisions at variance with the said County Development Plan.”

(Donegal County Council, 1983)

Whereas these plans are excellent instruments in their own right, both in providing a bottom-up approach to development control and also providing a list of specific objectives for the proper development of the area, they are ineffective on a number of points in managing the coastal resource:

1. Their area of control is confined to the area of responsibility of the planning authority which stops at the high water mark. Such a plan under the current planning framework is essentially a *coastal land* plan rather than a *coastal zone* plan, and is not in a position to tackle some of the major issues.
2. Both county and local development plans are formulated without the benefit of a national policy framework for the coast. Whereas the individual planning authorities will know their own areas extremely well and will draw up the development plan accordingly, a certain ambiguity may arise in relation to some issues such as development in coastal areas. Furthermore the situation regarding national heritage areas is far from clear at present leading one local authority, Kerry County Council, to exclude them from their development plan on the grounds that the implications for their inclusion were too vague (The Kerryman, 1996).

4.2 Physical character of the Donegal coastline.

The coast of Donegal has been calculated to measure 1235 km long (Brady et al, 1972), which is composed of 1031 km of mainland coast and 204 km of island coastline. It is noted that this figure is significantly higher than the total figure for Donegal of 650 km given elsewhere (Callery et al., 1992), which, on the basis of a remeasure during this work, is considered to be in error. The soft coastline of Donegal is calculated at 240 km and can be subdivided as follows:

Type of Coastline	Urban/ Leisure		Agricultural		A.S.I.		Total	
	Total	At Risk	Total	At Risk	Total	At Risk	Gross	At Risk
Dunes	40	40	20	20	40	40	100	100
Glacial Cliff	-	-	20	10	-	-	20	10
Wetland	-	-	-	-	-	-	-	-
Estuarine	-	-	120	20	-	-	120	20
Total							240	130

Table 3. Analysis of Donegal's soft coastline.

Source: Callery et al, 1992.

It can be seen from the above that 130 km of soft coast were deemed to be at risk. 10 kilometres was deemed to be in need of immediate coastal protection. The estimated cost of the required coastal protection work (principally rock armouring) was estimated at £3.56M (1992 prices).

In an inventory of sand dunes in Ireland, Curtis (1990) identified a total of 168 "sand systems" which he divided into 3 categories - sandhills, sand dunes and machair. 37 of these systems were located in Donegal, confirming the fact that a large proportion of dune systems in the country are to be found in the North West. See Appendix 6. Examination

of Curtis's paper suggests that the list is not exhaustive and within Donegal, several sites could be added to the total - for example Mountcharles and Inver on the south coast and Rathmullan and Kinnegar within Lough Swilly.

The machair habitat referred to by Curtis is internationally important. The term is used to describe fairly flat sandy coastal plains on the western coasts with a lime-rich soil. The characteristically high pH, due primarily to a significant calcareous sea-shell content in the soil, helps to create a rich grassland habitat, containing numerous species (Convie, 1995). High wind speeds and a cool moist climate are a prerequisite for this type of habitat, which is unique in Europe, occurring only on the western coasts of Ireland and Scotland.

In addition to sand systems there are a great range of coastal types along the Donegal coast from sheltered loughs to exposed high energy gravel beaches at Bloody Foreland and Dunaff. Wave refraction around offshore islands has resulted in tombolo formation at Rossguill, at Naran and at Carnboy. The indented nature of the coastline has limited the extent of longshore drift and given the coastline several distinct sediment cells, distinguishing it from other coasts such as the south-east where longshore drift is a major erosion agent. Despite the fact that Donegal has one of Ireland's most exposed coasts, it is now relatively stable in comparison with the much more sheltered south-east coast. Evidence of past erosion in Donegal is given by the number of offshore islands and extensive wave-cut platforms, such as are found at Bundoran.

Recurring features of the coast are alternating bays and headlands with long estuaries running several miles inland as are found at Gweebarra Bay, Ballyness Bay and Lough Swilly. Donegal's intricate coastline stems from its complex geology which has shaped a

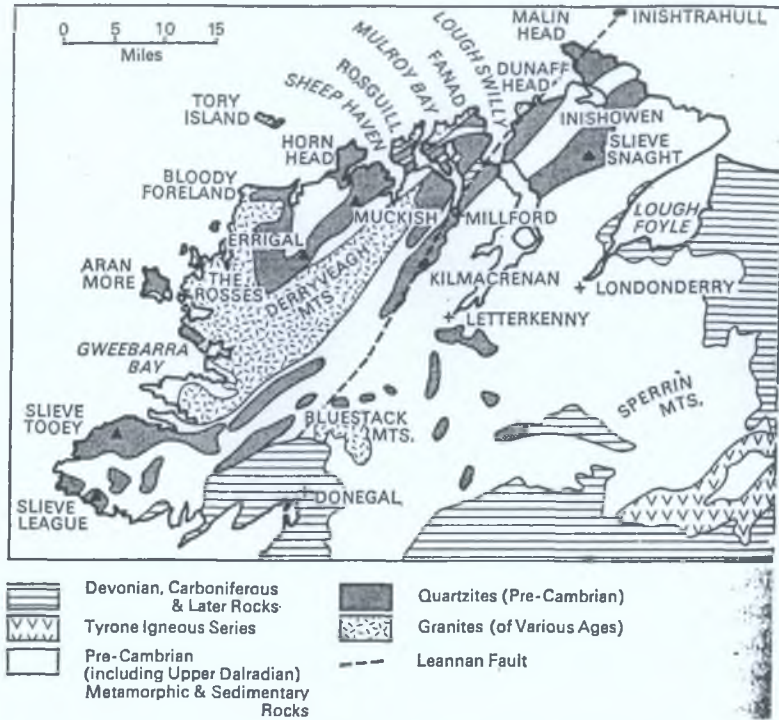
landscape “as irregular and as aesthetically stimulating as any in Ireland” (Whittow, 1975) (Figure 5).

The geology of the county includes the carboniferous limestone from Bundoran westwards to Inver, and areas of schist and quartzite around Slieve League and Ardara, while the Rosses and Northwest Donegal is primarily a granite coast. Quartzite occurs again in Inishowen and in the Fanad and Rosguill peninsula. Indeed it is the parallel layers of quartzite and the softer schistose which have helped form the fjords of Lough Swilly and Mulroy Bay with their characteristic shallow mouths. The effects of glaciation are evident both in the physical landforms and in the type and size of sediment found in many of the estuaries. Analysis has shown much of the beach forming material to be inorganic quartz, derived from local rocks and subsequently reworked by wave action (King, 1977). Much of the remaining material is biogenic, derived from sea shells. The calcareous component has been measured at 40% in beaches and estuaries in Donegal and 20% in dunes (Shaw, 1985).

This shell content in sand gives it a good lime quality which has traditionally been exploited by farmers in a small scale fashion, to improve their lands. In more recent years, ongoing and considerable sand removal has occurred at Kinnegar, Cruit Island and Doagh Island (Sheppard, 1992). This activity when carried out on a large scale depletes the potential of the beach to dissipate wave energy and causes erosion. Recognition of the scale of this problem nationally has led to the Foreshore (Amendment) Act, 1992, which increased substantially the penalties for unlicensed sand removal. The advice of the local authority is sought by the Department of the Marine on all foreshore licence applications, including those for sand removal, and Donegal County Council’s stated policy is to

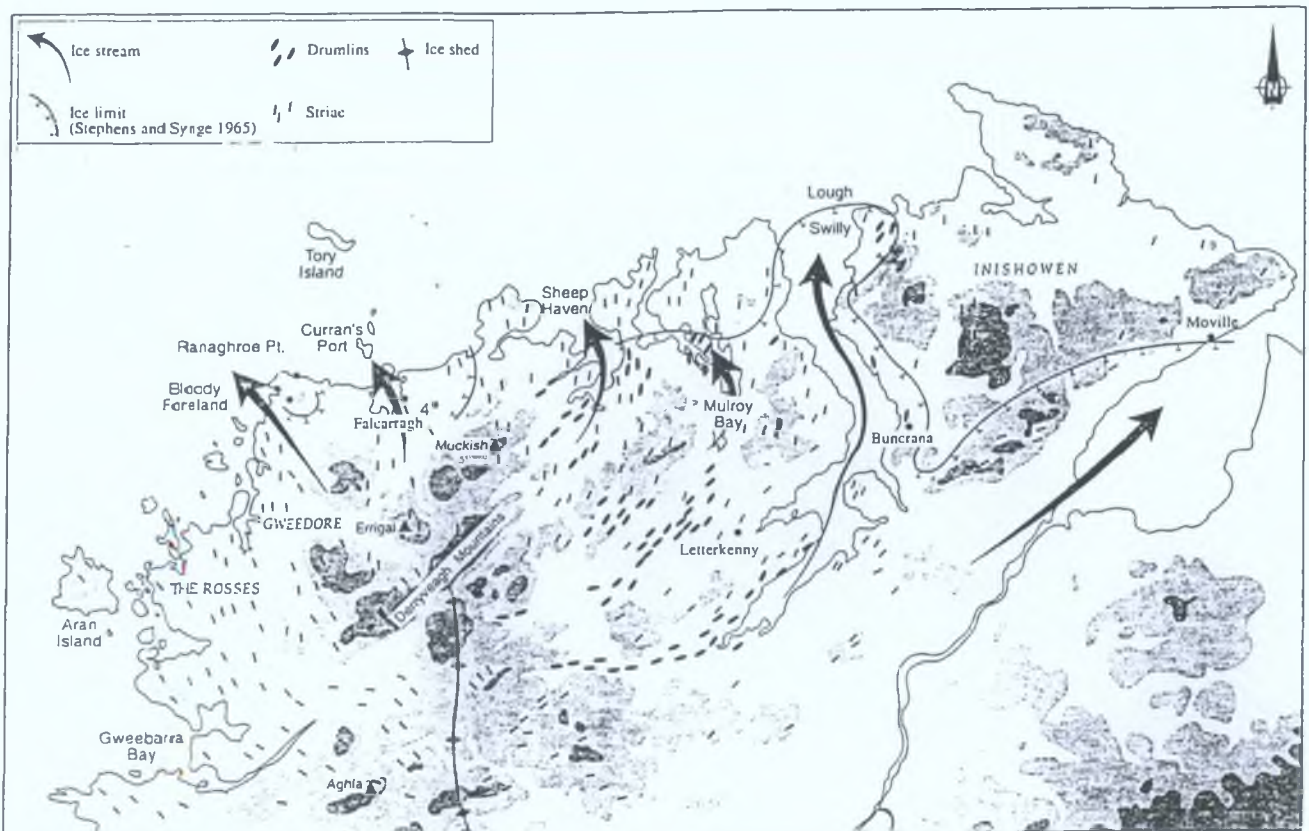
Figure 5.

Geological Maps of Donegal.



The Geology of Donegal.

Source: Whittow, 1975.



Glacial features of North Donegal.

Source: Wilson, 1995.

recommend refusal of all licences for large scale sand extraction (Donegal County Council, 1988a). As sea-levels have been relatively stable for the last 6000 years (Pethick, 1984), most available sediment has been deposited and fixed by coastal vegetation. Consequently apart from coastal changes due to man-made structures, very little dune formation is actually taking place at present due to a lack of available sand. Where dunes are forming, it is normally as a result of man-induced shoreline changes (See Figure 6).

Significant coastal changes are occurring in places in Donegal. Rosstown dunes have receded some 50 metres in the last 100 years. The area around Inch island has progressively silted up since the Lough Swilly land reclamation scheme whereby sea ramparts were constructed from the mainland to Inch in two locations in 1855 and a vast area of polder land reclaimed. This has resulted in the formation of a brackish lake, Inch Lough, which has now become the largest swannery in Ireland and an ornithological site of international importance. It has been rated as one of the twenty most important bird sites in Ireland (Sheppard, 1993). Near Dunfanaghy, a combination of over-grazing and marram harvesting in the early part of the century led to massive sand movement which blocked a narrow estuary, forming what is now known as the New Lake (Murphy, 1980). (See Appendix 7). Marram was used extensively for thatching in Donegal during World War 1, and was also exported to France for horse bedding (Sheppard, 1992). A similar but earlier occurrence of sand movement blocked the southern inlet to Trabreaga bay on the south of Doagh Island, in Inishowen (Carter et al, 1990). In the seventeenth and eighteenth century, Rossapenna village was overwhelmed by sand blown from dunes into which rabbits had been introduced and allowed to multiply, resulting in vegetation loss and sand instability (Carter, 1990b). Many dune systems were used as rabbit farms, with for example 8,000 to 10,000 rabbit skins being harvested annually from the sand dunes at

Figure 6.

Foredune formation at Buncrana.



The role of Marram grass, *Ammophila arenaria*, in trapping windblown sand is evident from this photograph. The vegetation in the foredune is entirely composed of marram. This area of Lough Swilly, to the north of Inch Island, is accreting sand at present, due to the long term effects of constructing a causeway to Inch Island in 1855.

Dunfanaghy, in the early 1800's (Murphy, 1980). Many of these coastal changes are relatively slow in evolving - present day accretion in Lough Swilly can be linked directly to the Inch Island causeway construction in 1855. This underlines the need for all involved in coastal management to understand the long-term consequences of man's activities on the coast.

4.3 Needs of the Donegal coastal communities.

Historically human habitation patterns has favoured coastal locations, for many reasons. This is a world-wide pattern repeated in Ireland and in Donegal. The population of Donegal is primarily a coastal population, which is evident from the many small piers and harbours (3 major ports and 86 minor ports) along the Donegal coast, and the many specialised types of boat which evolved in Donegal. These have ranged from the 27 foot drontheim or Greencastle yawl with its six man crew (Macpolin, 1992), to the 8 foot Owey Island currach capable of being carried and paddled by one man (Ryan, 1995). The fishing industry has been important in Donegal down through the centuries and that important role exists today. The fleet in Donegal consists of 326 vessels and lands over 60% of the national catch (IBEC, 1995). The value of fish landed at Donegal ports in 1994 totalled £32.5 M. A breakdown of this figure is included in Appendix 8. In addition to the main ports of Killybegs, Burtonport and Greencastle, the county has seven of the fifty primary ports in Ireland. While the industry accounts for 1% of the workforce nationally, in Donegal it accounts for 8.5%. When direct and induced employment is taken into account, this figure rises to 17% of the total workforce (IBEC, 1995).

Aquaculture is a large employer in Donegal, employing 250 full-time and 100 seasonal workers. Fish farms are located in Mulroy Bay, Lough Swilly, and Inver Bay, while

shellfish are farmed in Lough Swilly, Dungloe and Trabreaga Bay in Inishowen. Some 19 fish processing companies are located in Donegal, employing up to 1800 people at peak times (40% of the national fish processing workforce). The presence of the fin fish farms has caused some controversy. Some 158,000 farmed fish have escaped from farms off the Donegal coast since 1993 (Donegal Democrat, 1996). It has been suggested that these escapees will have a detrimental effect on wild salmon fisheries, by interbreeding and forcing the smaller wild fish to move from spawning areas (Lloyd, 1996). Other evidence suggests that escaped farmed fish suffer very high mortality rates in the wild, and that less than 5% survive their first year at sea (Flynn, 1996).

Until relatively recently, agriculture was the main employer in Donegal. However the structure of agriculture in the county was such that employment loss in the industry was inevitable (Drudy & Phelan, 1982). In 1975 some 42% of farms were less than 15 acres in size, compared with a national average of 24%. In addition, 80% of the land in Donegal can be classified as marginal (nationally 40%). These two factors have contributed to very low income levels from agriculture which have had the effect of constant migration from the land and constant emigration from the county since the foundation of the state up until the early eighties, when the population began to stabilise. The number of jobs in agriculture has continued to decline steadily.

Industry Sector	1926	1971	1991	net change
Agricultural	48,159	15,140	10,214	-37,945
Non-Agricultural	19,111	20,608	28,000	+8,897
Population	152,500	108,300	128,117	-24,383

Table 4 Employment trends in Donegal. (after Drudy & Phelan, 1982; CSO, 1991)

The population of Donegal's offshore islands Aran, Inisbofin, Tory and Inishfree Upper also fell substantially in the period 1961-1991. This decline has been blamed on poor infrastructure and lack of employment opportunities (Carey et al., 1996).

As traditional small holdings can no longer sustain Donegal's coastal population, attention has recently been focused on alternative income sources. The development of aquaculture is one such possibility and Donegal and its offshore islands have great potential in this regard. The recent fall off in salmon stocks, which was a great seasonal boost for many Donegal people has brought home the need to develop fisheries in a sustainable fashion. There is an increased awareness of the potential of crustacean fisheries such as lobster, crayfish, crab and shrimp, which can be productively exploited in near shore locations by small fishing vessels unsuitable for long haul voyages. Pilot projects being explored by Bord Iascaigh Mhara include the cultivation of halibut at Arranmore and promoting rope-mussel cultivation in Lough Swilly. All of this activity and employment opportunity, whether farming or processing the catch, will take place in the coastal zone.

4.4 Tourism in Donegal.

Bord Fáilte have stated their intention to develop a new marketing strategy for the North West based on the cultivation of a new image. This new image will seek to capitalise on the problems of remoteness and access by portraying the region in the European market as "the greenest part of Europe's green land" (Bord Fáilte, 1994). The region will be promoted in the domestic and Northern Ireland market as the natural breakaway place for a weekend or short holiday. Development priorities in Donegal include numerous objectives in the coastal zone. These are listed in Appendix 9.

Tourism is looked on as being a particularly suitable development for the North West (IBEC, 1995), due to it being a labour intensive industry and because of the outstanding natural beauty of the region. Tourist numbers to the North West Region have grown steadily since 1989 at an average rate of 2.9% per annum (Bord Fáilte, 1994), to reach 1,271,000 in 1993, providing a total revenue of £156M. Total tourist bednights in Donegal have increased by 10% from 1989 to 1995 and have now reached 800,000 (Donegal County Tourism Report, 1995), while it is estimated that 93% of bednights were spent in the coastal area of the county (Brady et al, 1971).

A 1995 report by Bord Fáilte and An Taisce, "Tourism and the Landscape", which advanced the concept of National Scenic Landscapes is significant. The objective behind the report was the need to find a mechanism to avoid planning conflicts in sensitive areas. This is of particular relevance to Donegal where most of the coastal landscape has been rated as "National Scenic Landscape" due to its outstanding beauty (Bord Fáilte, 1994). The report concluded that in peripheral rural regions, integration of tourism and the environment is more likely to be effective through *recognition* rather than through designation of special areas. Formal designations have less effect because such strategies are perceived as being imposed from outside. The alternative put forward is to devise a strategy which involves community consultation right throughout the process. This necessitates a shift of emphasis from the notion of sustainable tourism to the idea of sustainable communities thereby stressing the need for integration of tourism, other employment sectors and of the environment.

The report makes the point that:

“Recognition as an effective basis for protection involves continuing community ownership of the resources as a complementary strategy to State acquisition and control. Sustainable activity is promoted through awareness, understanding and consensus rather than through regulation.”

(Meldon & Skehan, 1996)

The above comments while directed principally at the visual landscape have equal relevance for resolution of development conflicts in the coastal zone.

The coastal zone, from both a land and sea perspective, can be seen to provide much potential for development in the near future. It is in everyone’s interest, particularly the coastal communities, that clear plans and policies are put in place to enable this development to take place in a sustainable fashion. As the tourism demand continues to grow, the coastal resource, particularly fragile soft coastlines, and important wildlife habitats, will come under increased pressure. The National Coastal Erosion Committee see effective management of the coast as vital to the successful development of the tourism industry:

“Traditionally Ireland could be said to have neglected this valuable asset, although this country has arguably one of the most scenic coastlines in Europe. It is now realised however that coastal systems are frequently fragile and non-renewable and that the important tourism industry of the future will depend largely on the preservation of the coast.”

(Callery et al., 1992).

CHAPTER 5

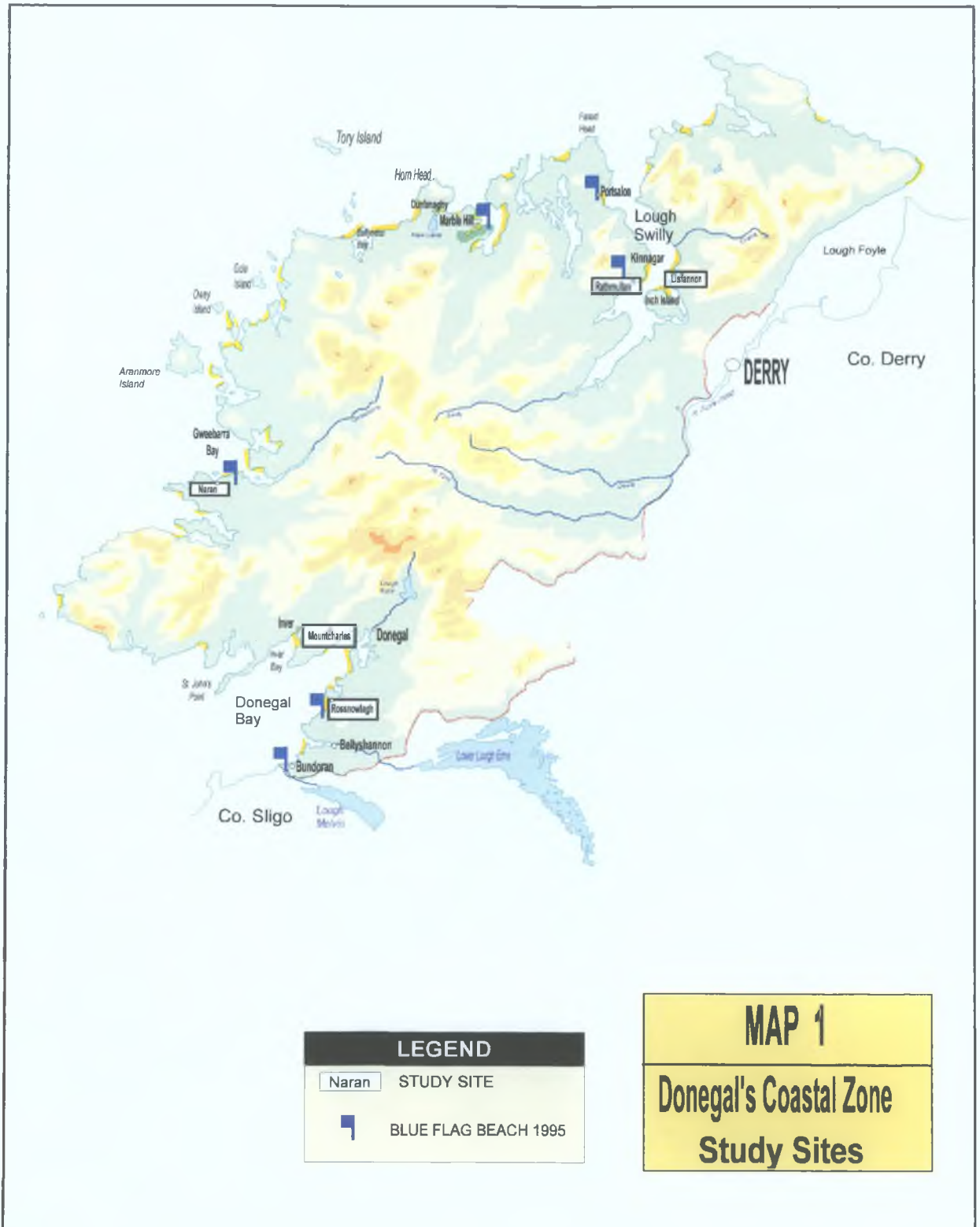
STUDIES OF SELECTED DONEGAL BEACHES.

5.1 Introduction.

In this chapter, the positive role played by the EU Blue Flag Scheme for beaches is examined and suggestions made as to how this role can be enhanced. The remainder of the chapter then deals with certain observations in relation to coastal management which were derived from fieldwork carried out while researching this thesis. It was considered more useful to focus on particular locations where general points on coastal management could be made, rather than comment on every dune system visited.

5.2 EU Blue Flag Beaches.

In Donegal, recreational pressure on the coast tends to be concentrated along stretches of fine sand with good accessibility, such as are found at Rosstown, Bundoran, Naran and at Portsalon. Many of Donegal's more popular beaches are submitted for approval under the EU Blue Flag scheme. As a mechanism already in use for beach preservation and management, it is examined here in terms of present use and future potential. The scheme is awarded on an annual basis, and it works as an effective short term incentive in promoting good beach management practices. Six Donegal beaches were awarded the Blue Flag in 1995 (Map 1), and several more beaches could qualify, with some improvement. The Blue Flag scheme promotes beach improvements on four fronts; Water Quality, Intertidal Sediment and Coastal Quality, Environmental Education, and Beach Area Management and Safety. The water quality criteria for the award of a Blue Flag are stricter than the criteria specified under the EU Bathing Waters Directive. Samples must



MAP 1
Donegal's Coastal Zone
Study Sites

be taken fortnightly during the season and for coliforms, 80% of samples must be below guideline levels. Under the Environmental Information criteria, the responsible authority undertakes “at least five environmental information or educational activities, three relating to that coastal area with information on all five publicly available.” At Naran, for example the danger of disturbing nesting birds during the breeding season is highlighted on beach notice boards. The Beach Management criteria requires the beach authority to manage users in cases of conflict, such as overlapping needs of natural environment and recreation, and this can be developed into sustainable activity.

It is considered that the EU Blue Flag scheme is a very positive development in coastal management. Donegal has already done very well in achieving Blue Flag status for six of its beaches. It is recommended that Donegal should capitalise on the large number of excellent beaches in the county by increasing its number of qualifying beaches thereby achieving international recognition for the beauty of its coast. In order to do so, good beach management strategies in terms of controlling access and damage to dunes need to be put in place and progressively improved as higher standards are reached. This will be of considerable benefit in developing sustainable tourism in coastal areas. Conversely it will also require a firm stance against unauthorised developments in the coastal region, such as unlicensed caravans, with adverse environmental impact (Figure 7).

5.3 Rossnowlagh Beach.

Rossnowlagh beach (Map 2), which qualifies for EU Blue Flag status, is one of the most popular in Donegal, attracting many cross-border visitors particularly on Bank holiday weekends. A survey of tourist numbers at Rossnowlagh indicated an average of 800 vehicles per day on the beach during the summer of 1984, with a bank holiday peak of

Figure 7.

Unlicensed Caravan Park at Malin Head.



The photograph shows 51 unlicensed caravans on a raised beach. There are no facilities provided. The site is an Area of Scientific Interest (ASI) of international importance due to its geomorphology and botany. The shorelines in this area have been described as the best preserved late glacial marine strandlines known in Ireland and unique in Europe. The beach is of botanical note because of the occurrence of two rare plants, lovage and oysterplant. (Young, 1974). A survey in 1994 counted 252 unlicensed caravans in Donegal's coastal zone. (Bradley, 1994).



MAP 2. ROSSNOWLAGH.

Source: OS Discovery Series, Map 10.

double that number (Donegal County Council, 1988b). A more recent survey (Convie, 1995) counted 5000 people using the beach on a bank holiday in 1993. Extensive caravan parking is present with some 300 licensed caravans and 90 illegally parked caravans observed (Figure 8). The presence of caravan parks at these locations creates additional pressures in that it lengthens the amount of time people spend on the beach and increases traffic in the dune area. Traffic is allowed direct access onto the beach at two locations. It is recognised that access directly onto the beach is an attractive feature of the resort, but it causes excessive sand movement when vehicles churn up the top layers of sand and also detracts from people's enjoyment.

Erosion of the dune area in which the caravans are located has resulted in large amounts of rock armouring being used. However this rock armour has been applied in a piecemeal fashion with the result that erosion is proceeding at the unprotected dune face adjacent to the rock armour. In addition the topography of the dunes has been flattened to facilitate the movement of caravans (Convie, 1995). It is noteworthy that the Rosstown Development Plan, 1988, regarded the conservation of the dunes as an "essential issue". Donegal County Council sought the advice of An Foras Forbartha on car parking and dune management in Rosstown. Their recommendations, which emphasised the importance of controlling car and caravan parking and the heightening of awareness of the fragility of dune systems, were incorporated into the Rosstown Development Plan, 1988, and it is valid to query what effect this document has had on development in the eight year interim.

The Plan recommended the provision of an extra access point at the northern end of the long beach in order to alleviate the concentration of car-parking near the southern access.

Figure 8. **Rosstown Beach.**



Rock armouring in piece-meal fashion along the beach, provides short-term protection as the armour is outflanked by the receding dunes. The look-out post in the foreground is now 50 metres from the dune face.



Caravans situated too close to the beach require protection with rock armour. Just right of the armour, a hillside of glacial material has already partially slipped.

This has been completed and has achieved its primary aim of spreading car parking over the beach area. It has led to cars travelling from one access point to the other which detracts from people's enjoyment of the beach and causes speeding. It is suggested that measures are needed to prevent vehicles speeding, possibly by means of a barrier halfway along the beach.

On the dune management recommendation, it would appear that little has been achieved. Erosion of the dune face has continued to the extent that the dune face is now some 50 metres landwards of a look-out post formerly above dune level (Figure 8). Given the positioning of rock armouring on either side of the exposed dune, it is likely that this dune will continue to retreat. An offshore sandbank indicates the destination of much of the eroded material.

Pedestrian access from caravans to beach has not been controlled thereby contributing to vegetation loss and degradation along the dune face. This highlights a problem which occurs elsewhere along the coast. Many of the dunes are in private ownership of one or more landowners. Consequently any dune management schemes require agreement from the various landowners as to where fencing should be erected, how pedestrians should be directed through the dunes and who is going to provide the finance. This has been and will continue to be a major stumbling block in dune management. In conclusion it is probably fair to say that Rossnowlagh is one of the dune systems in Donegal worst affected by tourism. The local authority prepared an excellent development plan for the resort, which recognised the environmental degradation that was occurring and included recommendations to ease the degradation. For various reasons, the recommendations have been only partially implemented and erosion of the dunes is still taking place.

5.4 Naran Beach.

Despite its Blue Flag status, Naran (Map 3) is an excellent example of how not to develop a seaside caravan park. There are sixty-four caravans spread throughout the dune system without any planned layout or set back from the dune face (Figure 9). The front face of the dune is severely eroded with large areas devoid of vegetation. Inspection of the dunes revealed that the long stemmed marram vegetation has become trampled by pedestrian traffic, leading to bare passages in the dunes and exposing the sand surface to wind. Marram grass is the most influential vegetation in the fixing of sand dunes due to its very extensive root system, which can penetrate several feet and develop side shoots to also develop laterally. Bare paths develop in dunes with sustained pedestrian traffic exposing the sand surface. With wind blow, these channels get progressively worse leading to parabolic dune shape and eventual dune blow-outs. Large quantities of sand were observed blowing off the dunes, despite the efforts of the landowner in utilising straw bales to trap sand. This is one of the few places in Donegal where soft engineering techniques have been implemented. The bales have had some effect, but as with sand fences, once sand behind the first obstruction has reached its top level, another layer needs to be put in place to build further (Figure 10).

To the east of the caravan park a golf links has been constructed, with some of the tees right on the foremost dune. Close to one of these tees, a picket fence had been erected along 15 metres of the top of dune adjacent to a place where the dune face was eroding, and the growth of marram grass behind the fence was substantially more dense than elsewhere along the top of the dune - for two reasons; greater shelter and also restricted access. A history of coastal change has been recorded at Naran (Shaw, 1985) who showed how a tidal estuary to the rear of the dunes had become overlain by windblown



MAP 3. NARAN BEACH.

Source: OS Discovery Series, Map 11.

Figure 9.

Naran Dunes: How not to develop a Caravan Park.



Sixty-four unlicensed caravans spread throughout the dune system at Naran. With no setback from the dune face and no guided access points, trampling damage to dune vegetation is widespread. This leads to bare patches of sand which are eroded by wind blow.

Figure 10. **Naran Dunes.**



Caravans, just visible behind the dune face, cause severe recreational pressure on dunes. This pressure is increased by the proximity of the nearby beach access point, visible on the extreme right (above). The straw bales have had some effect as a sand trap, but a second line is now required. This technique will not succeed without measures to curb pedestrian access,



sand, until eventually only Clooney Lake remained. This finding was based on a core taken at the site which indicated a layer of estuarine organic rich sand overlain by a metre of peat overlain by a layer of aeolian sand.

Naran would appear to be an ideal location for trial work on soft coastal engineering methods. These would include:

- fencing off the greater part of the dunes so as to control pedestrian access,
- erecting sand fences on the bare dune face to trap aeolian sand,
- moving the road entrance to the beach away from the dune face so as to direct people onto the beach rather than onto the dunes,
- planting the restricted area with marram from other less exposed parts of the dune system.

It would be necessary to form a management plan in conjunction with the landowner who for his part would be required to relocate his caravans away from the dune face and control pedestrian access from caravan park to beach by means of a single access path on which railway sleepers or similar could be laid. Public participation in the dune management scheme could be encouraged by the use of public noticeboards, which are already being put to very good effect in displaying relevant information about the area.

The above case exemplifies another point. By situating a caravan park and a golf course on the seaward extremity of a dune system, one is then compelled to defend these locations against sea ingress. Thus it is possible that the owners of the golf course will consider placing rock armouring along the dune face, as has been carried out at Buncrana, Murvagh and Rossapenna. One then gets locked into an increasing cycle of expensive coastal defence works, which grossly interfere with existing sand cycles. In this case

Figure 11. **Sand fence at Portsalon Golf Links.**



A cost effective method of erosion control, which promotes dune building by trapping wind blown sand. Compare with Figure 1.

erosion of the adjacent dune which fronts the caravan park and lowering of the beach are the likely consequences. A more sustainable policy is to set back all development from the dune face in the first instance and allow natural processes to evolve. In similar circumstances at Portsalon golf links, the club members have erected a sand fence at the top of the seaward dune. This seems to be quite effective in trapping sand and accumulations are visible along the fence in most places (Figure 11).

5.5 Mountcharles dunes.

Mountcharles (Map 4), or Beefpark as it is also ironically known, is a spit dune system that has been devastated by intensive grazing, to the extent that the size of the system has diminished dramatically with considerable loss of vegetation and trees. In all probability the dune will become an offshore island within the near future as sand levels have been reduced to near sea level at one critical near shore point. This section investigates why this degradation happened and why it has not been stopped.

The dune system was purchased some twenty years ago by a landowner who deals in cattle. Since then he has used the dunes as a feeding area for cattle in his possession with several round feeders located in the dunes (Figure 12). Despite the natural high porosity of the dunes, this practice has led to slurry building up at these locations. In order to contain the cattle, the landowner has fenced off sections of the dunes including an area below the high water mark at one location on the back strand.

Prolonged and extensive efforts have been made by the local community to alleviate the erosion problem over the years both at Mouthcharles and at nearby Inver, where an almost identical problem exists. These have included representations being made by local



MAP 4. MOUNTCHARLES.

Source: OS Discovery Series, Map 11.

Figure 12. **Mountcharles Dunes.**



Intensive agricultural practices have caused severe degradation of this dune system. Pools of slurry are visible in both photographs. Erosion has been ongoing prior to 1991, when the picture below was taken, resulting in the loss of all the bushes on the dunes.



TDs, numerous national and regional newspaper articles, the involvement of Teagasc, Coastwatch and many concerned individuals. The Mountcharles site is part of the proposed National Heritage Area for Donegal Bay which should give it an element of state protection. Despite recognising the environmental importance of the site, the apparatus of state was not capable of solving this problem.

How did this state of affairs come about? The agricultural activity on the site is exempted development under the planning act, therefore no planning permission was required. This situation prevails irrespective of the intensity and total number of livestock kept on the dunes. Planning permission is only required when a proposal to erect a structure to house these animals is submitted. This is highly unlikely to happen due to the surface of the dunes remaining dry in all weather, which makes the dunes attractive to farmers and golfers alike. However it appears inconsistent that a farmer requires planning permission to house 50 cattle in a slatted unit, where any effluent or slurry will be disposed of in a responsible fashion, but no permission is required to confine stock in a similar sized area on a sand dune in an environmentally damaging fashion.

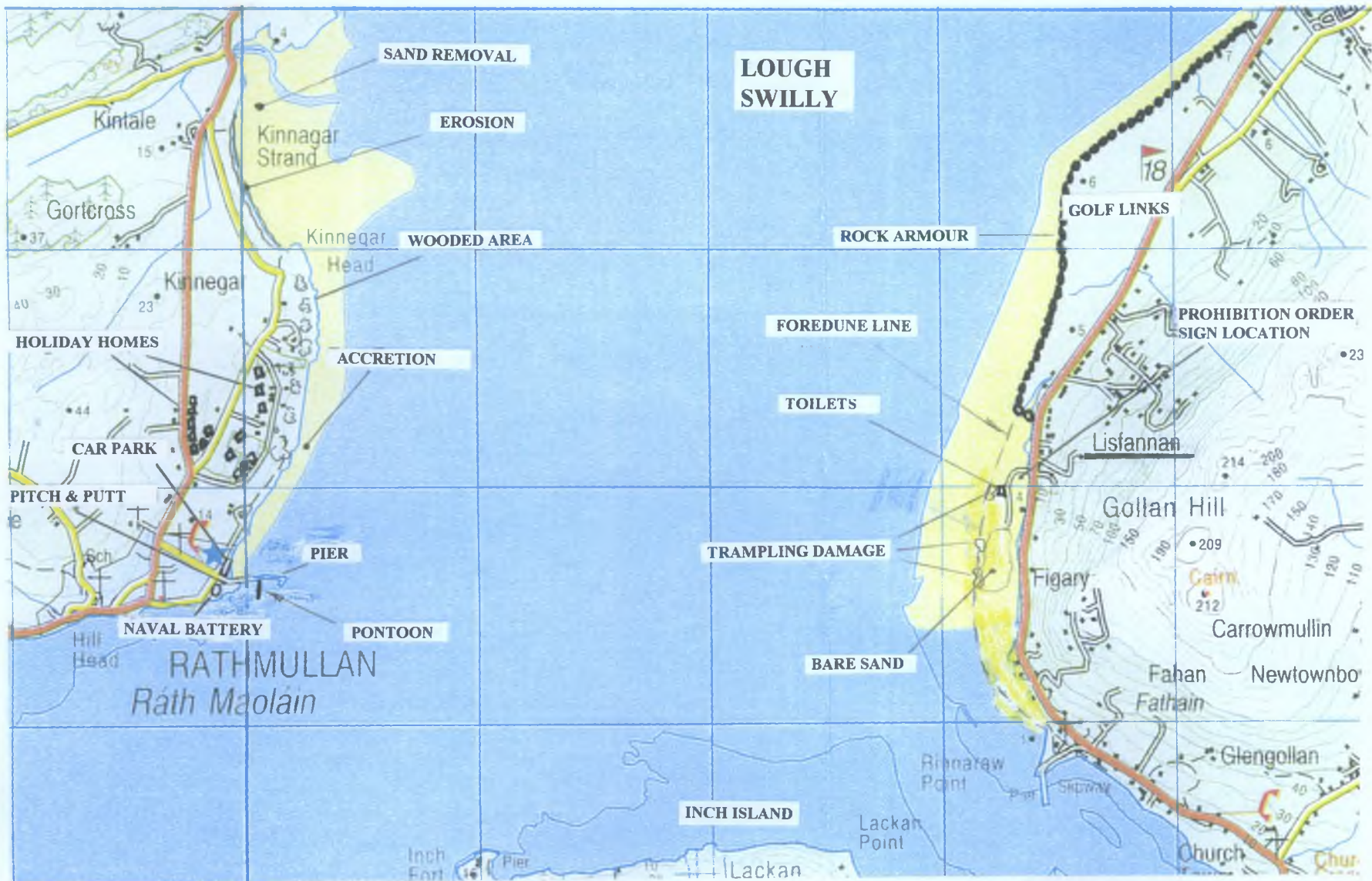
The local authority had the option of designating the area under the Planning Act, 1963. This would have prevented further usage of the dunes as a feeding lot, but the landowner would then be entitled to compensation for loss of earning. The council have no allocation for such expenditure and were therefore not in a position to pursue this course of action. A strong argument exists for not paying any compensation to anyone involved in such activity. In general, agriculture, in the form of low intensity grazing has been beneficial for coastal habitats in keeping scrub down and thus promoting ecological diversity. It is the intensive nature of modern farming which has caused degradation such as the above.

It would appear therefore that it is not sufficient for the State to set up National Heritage Areas and Special Protection Areas if the responsible authority is not given adequate powers to enforce the designation. The type of situation exemplified above, or a parallel situation involving forestry or land drainage, which are also largely exempted development, may arise in many fragile locations. From the information available in relation to NHAs, it is clear that no restriction will be placed on existing farming methods and that grazing, turbary and sporting rights will not be affected (OPW, 1995). Designation as NHA will not improve situations such as the above. It is suggested therefore that a funding mechanism should be available to the National Parks and Wildlife Service which will enable them to purchase outright a number of sand dune systems and machair. If the habitat is seriously threatened, as in the above example, the NPWS should be allowed seek a compulsory purchase order on the land.

As it is not practicable to consider State purchase of every threatened site, it is to be hoped that the enacting legislation for Special Areas of Conservation, under the Habitats Directive, will be framed in such a fashion as to empower the NPWS sufficiently to enable them to control situations such as the above. Whether or not this will be the case remains to be seen.

5.6 Rathmullan.

Rathmullan (Map 5) is considered an excellent example of what can be achieved in terms of sustainable tourism in Donegal. Many different interest groups use the pier, beach and surrounding area to great effect with minimal environmental damage and little user conflict. This section examines how this has been achieved through effective separation of the facilities into different areas.



MAP 5. RATHMULLAN & LISFANNAN.

Source: OS Discovery Series, Map 2.

The village has a fine pier which, together with an adjacent naval battery, indicates the rich maritime history of the locality. The coastline in the area faces east into Lough Swilly and is relatively protected. It is one of the few locations in Donegal where longshore drift is evident. Material is eroded north of Rathmullan at Kinnegar and transported southwards where its movement is partially arrested by the structure of the pier, which acts as a groyne, leading to accretion in the vicinity of the pier.

The beach is very popular with tourists and Donegal people alike. It is within 14 miles of Letterkenny, Donegal's largest town and many people avail of the long beach for a weekend stroll. No vehicle access is allowed onto the beach, but adequate car-parking has been provided at a convenient location behind the beach. To the rear of the car park is an area where Fanad Fisheries have a store for their fish farm operation further north in Lough Swilly. Adjacent to the car park is a pitch and putt course, with magnificent views over the lough, and the naval battery is now in use as a heritage centre during the summer months (Figure 13). There are several shops, licensed premises and a restaurant within walking distance of the pier all of which benefit considerably from the tourist trade.

In recent years many holiday homes have been constructed in the area. These have all been set back from the beach and their impact on the coast effectively limited. Despite the number of houses constructed, their visibility has been reduced by the sensitive preservation of the deciduous wooded landscape of the area. This has enabled attractive pedestrian pathways to be constructed through the woods, parallel to the shore.

Figure 13.

Rathmullan.



Pontoon berthing facility located to the south of the pier. The military battery in the background is now the Flight of the Earls Heritage centre.



The deciduous woods to the north of the pier effectively screen recent holiday home development.

In 1994, a floating pontoon was positioned south of the pier to encourage boat owners to the locality. This publicly-owned facility has proved a great success, both for sailing yachts and angling boats, and Donegal County Council are actively considering replication of the facility at strategically positioned locations around the coast (Moynihan, 1995). Two local well equipped boats operate a charter service for anglers and have experienced great demand for their services (Coll, 1995). Lough Swilly Yacht Club normally sail from Fahan on the eastern shore of the lough, but they have held an increasing number of events in Rathmullan since installation of the pontoon.

While all the above tourist related activity was ongoing, Rathmullan pier was being used extensively for commercial fishing purposes. The pier was used by so-called factory ships who landed £5.2 M worth of pelagic fish in 1994 (Department of Marine, 1996). Donegal County Council put in place arrangements whereby the pier area was hosed down and swept clean after unloading of a ship's catch, which helped to minimise conflict between different resource users. In a more extreme case, it would probably be necessary to restrict access to the pier during certain periods. The pier itself requires repair and a report submitted to the Department of the Marine estimated the cost of repair at £737,000 (Donegal County Council, 1992). The situation at Rathmullan is repeated at Moville, where hampered by structural damage to the pier, over £1 M worth of fish was landed in 1994 (Department of Marine, 1996). Despite the income and employment generated by these piers, no funding has yet been received from the Department. In the current climate of developing a coastal tourism product, it is important to remember how significant our national fishing industry can be.

5.7 Lisfannan Beach.

Lisfannan Beach (Map 5) illustrates a concise but important point. The beach is situated on the eastern shore of Lough Swilly, just south of Bunrana and is accreting sand, due mainly to changes caused by the construction of the Inch island causeway in 1855. The beach is a short drive from Derry and a consistent problem in the management of the beach was the use of the dune area as a trial bike scrambling track (Figure 14). The beach was submitted for consideration under the EU Blue Flag Scheme in 1995 but was deemed ineligible due to lack of protection of the environment. The report of the national jury described Lisfannan as “the worst case of destruction by trail bikes on a dune system seen anywhere in the country” (An Taisce, 1995).

Donegal County Council were fully aware of the damage being caused to the dunes and were keen to prevent further scrambling at the location. However, the only mechanism by which the council could achieve this was to apply to the Department of the Marine under Section 3 of the Foreshore Act, 1933, for a Prohibitory Order. Proposals requesting the Minister to make such an Order were submitted in June 1994 in relation to Lisfannan, Fahan and Carrickfinn beaches, all of which had experienced degradation due to scrambling. Following several reminders from the Council, the Department published the required public notice in the local papers in July 1995. There were no objections received to the making of the Order during the twenty-one day statutory period, yet the confirmation of the Order was only transmitted to the Council in April 1996.

The delays in this case indicate clearly the need to reform legislation relating to coastal matters. If the local authority have good reason to prohibit a specified activity, and are prepared to publicise and enforce that prohibition from their own resources, they should

Figure 14.

Lisfannan Beach.



The dunes at Lisfannan have been badly damaged by recreational pressure. The area adjacent to the toilet block shows severe trampling damage, while uncontrolled vehicle access has resulted in large areas of bare sand.



be allowed get on with the job. Alternatively a more rapid response is required from the Department of the Marine than is evident heretofore. It should not be necessary to experience the same delay if a new activity, outside the scope of the Prohibition Order, started up, or to repeat the exercise for another location.

This example indicates the danger of uncontrolled vehicular access to dune areas. At Magheraroarty development of a roadway into the dune area has resulted in considerable vegetation loss, while the presence of cars takes from the pleasure of walking in such a rare natural environment. At Rossnowlagh, it has already been shown where provision of a second access to the beach relieved parking congestion but indirectly contributed to a excess traffic along the beach. At Magheragallon in west Donegal, ten unlicensed caravans have been recorded off the access road on the machair (Bradley, 1994). All of these situations will cause serious environmental degradation if not actively managed with a minimum response time for problematic situations. Resolution of the problems at Lisfannan and Carrickfinn, which are both now under control, highlight the importance of local support for any statutory initiative. Public pressure from residents of these areas and their elected members played a significant role in finally obtaining the Prohibition Orders from the Department of the Marine. Similarly local awareness of the fragility of the dunes will greatly assist the local authority in its ongoing monitoring of the situation. This point reinforces the point made earlier; that widespread recognition of the value of the coastal resource is likely to be far more effective than designation alone. That would appear to be a strong foundation for any proposed coastal zone management programme.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS.

This thesis has outlined the concept of the coastal zone as an area straddling existing administrative and legal boundaries. It has been shown to be an area particularly rich in resources which are used by many different user groups. No integrated management or planning strategy exists for the Irish coastal zone. This inadequacy was highlighted nationally by efforts to remedy the damage caused by the severe storms of the winter of 1989/1990. The huge costs estimated for defence of coastal areas at risk has resulted in much of the affected shorelines remaining unrepaired. It has now been generally accepted that erosion control in isolation is neither financially possible nor environmentally sustainable in an Irish situation (Carter, 1990a; Callery et al., 1992). A policy of land and water use management, termed coastal zone management, is proposed as an alternative.

The existing management arrangements for the Donegal coastal zone have been described together with an outline of the varying roles played by the different agencies with a responsibility for coastal matters. Areas of difficulty and lack of cohesion in coastal policy have been highlighted, principally due to three factors; the number of different actors involved, deficient legislation and the lack of a coherent overall development strategy. It is suggested that the present administrative divide of the High Water Mark inhibits effective management of the coastal zone.

On a national level, legislative changes are required. The existing legislation dealing with the coast zone was shown to be as divided as the administrative framework. The

Foreshore Act, 1933, was shown to be an unsuitable device for the control of development in the coastal zone. The Lisfannan case study indicated a legal mechanism unsuitable for dealing with urgent situations. The Coast Protection Act, 1963, which is the principal piece of legislation dealing with coastal defence structures, was described as unworkable (O'Flynn, 1992). An earlier recommendation (Callery et al, 1992) that both pieces of legislation be replaced by a new Coastal Zone Management Act which would, inter alia, empower a new National Coastal Authority with overall responsibility for the coastal zone and enshrine the public's right of access to the foreshore, was endorsed. Alternatively, extension of a local authority's administrative boundary in a seaward direction, by use of the Local Government (Reorganisation) Act, 1985 would solve some of the problems associated with the Foreshore Act.

The coastal zone has been shown to be an area of fragile habitats with much of the Donegal coast being designated as National Heritage Areas. Other important wetland sites have been designated under the Ramsar Convention. It is thought that many of the coastal NHAs will be further designated as Special Protection Areas. Such designation should prevent development in these areas, when such development comes within the powers of the Planning Act. Instances have been given of environmental degradation caused by agriculture and it has been shown that designation is ineffective in these situations. Similar situations could also develop involving land drainage or forestry, which are also largely exempted development under the Planning Act. This is of particular relevance to Donegal given the rural nature of the county. Three areas of mutually complimentary action were suggested;

1. National designation of sensitive areas is sometimes perceived as being imposed onto an area from outside and thus becomes ineffective. A management strategy, which encourages community involvement and ongoing consultation, will lead to a greater public recognition and sense of responsibility for heritage areas and is likely to be more effective.
2. A funding mechanism, coupled with powers of compulsory purchase, should be provided to the National Parks and Wildlife Service where habitats are threatened.
3. The forthcoming legislation which will give a statutory basis for Special Areas of Conservation should be framed in such a manner as to empower the National Parks and Wildlife Service to enable them take preventative action, such as a court injunction, without significant cost to themselves.

The coast was also described as an area of prime recreational potential with many recreational facilities both natural and man-made located in the coastal zone. Tourist numbers in Donegal were shown to have risen by 10% in the last five years. From experience gained elsewhere, tourism growth has been shown to be the cause of environmental degradation in coastal areas. This trend is clearly visible in Donegal. Developments, such as the golf links recently constructed in Ballyliffen, result in restricted public access to coastal areas and habitat loss. In order to minimise the environmental impacts of such growth, it is suggested that principles similar to those adopted by Wexford and included in Appendix 4 be adopted by Donegal County Council and

✕ incorporated into the County Donegal Development Plan. Central to these principles is ✕ the enforcement of development setback lines for all soft coastlines. Cost benefit analysis will argue against conventional coastal protection works in many rural locations. If predicted sea-level rise materialises, managed retreat is likely to be the most sound strategy, from both an environmental and an economic viewpoint.

In order to manage the coast effectively, it is essential to understand the physical forces shaping the Donegal coast. This will require a broadening of the existing approach of erosion control to one which incorporates a multi-disciplinary approach to coastal management. The absence of Donegal beaches from the ECOPRO project is to be regretted as those counties which participated in the programme will benefit from a valuable database of local coastal processes. It is suggested that the desk-top study of erosion and accretion on the Donegal coast, carried out by Donegal County Council for input into the National Coastal Erosion Committee Report in 1992, would be improved upon by field measurement, and that such field measurement should be carried out on a regular basis at sites where erosion is perceived as a problem, in order to give currently accurate data on such processes. The use of modern technology such as aerial photogrammetry and electronic surveying can be usefully employed.

The successful development of the tourism industry in coastal areas is dependent on effective and sustainable coastal management, particularly in the more popular beach ✕ locations. The EU Blue Flag Scheme is regarded as a useful short-term incentive in promoting good dune management practices and also in highlighting the fragility of dune systems to the general public. It was suggested that Donegal's tourism industry will ✕

benefit by increasing the number of beaches eligible for Blue Flag status and an increased investment is warranted in this regard, in terms of personnel, funding and research. The scheme fulfils the important role of highlighting the value and fragility of the soft coastline resource. As of yet, dune management techniques have not been implemented in Donegal and many dune systems are degrading, primarily due to recreational pressure.

Donegal was seen to have a high proportion of the country's dune systems, including important machair sites unique to western Ireland and Scotland. The machair sites in particular are above the HWM and within the administrative area of the local authority. In the circumstance, it is suggested that Donegal County Council take a pro-active role in coastal management within the confines of their existing area of responsibility. With the county's richness in soft coastline, it is considered that Donegal should be leading the country in coastal management techniques. Given the distinct crenelated nature of the Donegal coast, management techniques particularly suited to Donegal and other western counties may be required.

Donegal's relative isolation as the most northern county in Ireland has led to a situation where the county has a high proportion of the country's scenic landscapes, an equally high proportion of the country's beach and dune systems, but a surprisingly low proportion of the national tourism industry. With some noted exceptions, this circumstance, together with a lack of funding for coastal defence structures, has left the Donegal coast reasonably intact. The growth in tourism in Donegal has been consistent in recent years and the rate of growth is likely to increase with the current improvement in the Northern situation. The tourism industry brings opportunities for coastal communities

but also carries the very real threat of environmental degradation, an issue which has not had to be addressed in Donegal to date. In all efforts to promote Donegal in the tourism market, an equal effort should be made to ensure that this beautiful unspoilt resource remains, in the words of Bord Fáilte's 1994 report, the "greenest part of Europe's green land."

Co. Donegal



LEGEND	
Naran	STUDY SITE
	Beaches
	Border
	County Boundary
	National/Forest Park
	Lake and River
	BLUE FLAG BEACH 1995

Appendix 1

Donegal's Coastal Zone
Locations in Text

APPENDIX 2.

AGENCIES WITH RESPONSIBILITY FOR THE DONEGAL COASTAL ZONE.

STATUS	AGENCY	ROLE
International	Dept. of the Environment, N. Ireland.	Foyle estuary development control. Control of Pollution.
	Foyle Fisheries Commission.	Foyle fisheries control.
National	Dept. of Environment.	Development and Pollution Control.
	Dept. of Marine.	Foreshore licences. Killybegs Harbour.
	Dept. of An Taoiseach.	Offshore Islands Development.
	Dept. of Arts, Culture & Gaeltacht (National Parks & Wildlife Service).	National Heritage Areas. Special Protection Areas. Ards Forest Park.
	Dept. of Defence.	Finner Dunes.
Regional	Sligo County Council. Leitrim County Council.	Donegal Bay Development Control. Control of Pollution.
County	Donegal County Council. Letterkenny Urban District Council. Buncrana Urban District Council. Bundoran Urban District Council. Ballyshannon Town Commissioners.	Development Control. Designation of Coastal Areas.
Semi-states	Bord Iascaigh Mhara.	Fisheries and Aquaculture Development.
	Udarás na Gaeltachta.	Development of Gaeltacht areas.
	Environment Protection Agency.	Industrial Pollution Control.
	Bord Fáilte.	Tourism Development.
Harbour Authorities	Ballyshannon Harbour Commissioners. Buncrana Harbour Commissioners. Letterkenny Port (Privately Owned).	Harbour Development.
Local Groups	Inishowen Leader Group. Donegal Tourism. Local Development Associations.	Local Interest.

APPENDIX 3.

DATA ON INTERNATIONAL COASTAL ZONE MANAGEMENT PROGRAMMES.

Landward and seaward boundaries of CZM programmes.

Country/state	Landward	Seaward
California	Variable depending on issues.	3nm from baseline.
Costa Rica	200m from Mean High Tide.	Mean Low Tide.
China	10 km from Mean High Tide.	15m depth contour.
Ecuador	Variable depending on issues.	
Queensland	400m from Mean High Tide.	3nm from Baseline.
South Africa	100m from Mean High Tide.	
South Australia	100m from Mean High Tide.	3nm from Baseline.
Sri Lanka	300m from Mean High Tide.	2km from Mean Low Tide.

Set Back Distances.

Hawaii, USA		40 ft.
Philippines	mangrove greenbelt	20 m
New Zealand		66 ft.
Oregon, USA		Permanent veg. line.
Norway	no building	100 m
Sweden	no building	100 m
Costa Rica	restricted zone	200 m
Italy	no construction	300 m
Greece		500 m
Denmark	no summer houses	3 km

Source: Gubbay, 1995.

EXTRACT FROM SECTION 5 (DEVELOPMENT CONTROL)
OF 1993 WEXFORD COUNTY DEVELOPMENT PLAN.

The Coastline.

- 5.10.5 In order to ensure the management of the limited strategic resources of the coastline in the interests of sustaining economic activity and environmental protection, the following control measures will apply to the coastal zone;
- (a) No buildings (including caravans and other temporary dwellings) shall be permitted within 50m of “soft” shorelines. These are indicated in the Schedule of Maps;
 - (b) Further reclamation of estuary land will be prohibited;
 - (c) The removal of sand dunes, beach sands, boulders or gravel shall be prohibited. A prohibitory order under the Foreshore Act 1933 is in force covering the whole coastline of County Wexford;
 - (d) All coastal defence measures will be assessed for environmental impact;
 - (e) The Council will determine setbacks for all coasts and these will be revised as appropriate;
 - (f) The Council will encourage developers to storm proof all coastal buildings;
 - (g) Infill development will be open to consideration in established resort or built up areas particularly where coast protection works are in progress or planned.
- 5.10.6 The following developments will be prohibited on the coastline;
- (a) Erection of new structures and extensions to existing structures, and siting of caravans or other temporary structures in the sand dune tracts, sand hills and burrows adjoining beaches. Any development which is an integral part of the management of these areas will be considered;
 - (b) The erection of any structure so close to any beach as to intrude on the enjoyment of the beach by the public;
 - (c) The erection of structures in coastal areas which detract from the views, prospects and the special amenity value of the coastline;
 - (d) Erection of structures on lands between the coastal roads and the shoreline, which detract from the views, prospects and the special amenity value of the coastline.
- 5.10.7 The “Wexford Coastline; Coastal Zone Management Plan” identifies a number of “cells” as areas with different problems, needs and development potential along the coastline. The types of cell and management / control measures specific to each cell are outlined in Appendix 1 and The Schedule of Maps.
- 5.10.8 In order to protect the integrity of the main resorts and settlements in the coastal zone, the Council will exercise control over development which would be likely to result in a merging of these settlements in accordance with the rural settlement and community development policies in this Plan (Section 4.2 and 5.3).

ECOPRO SOFT ENGINEERING TECHNIQUES

Offshore Techniques
Seaweed planting (artificial, natural)
Offshore breakwaters
Moored breakwaters
Offshore bar building (nourishment)
Submerged groynes
Configuration dredging

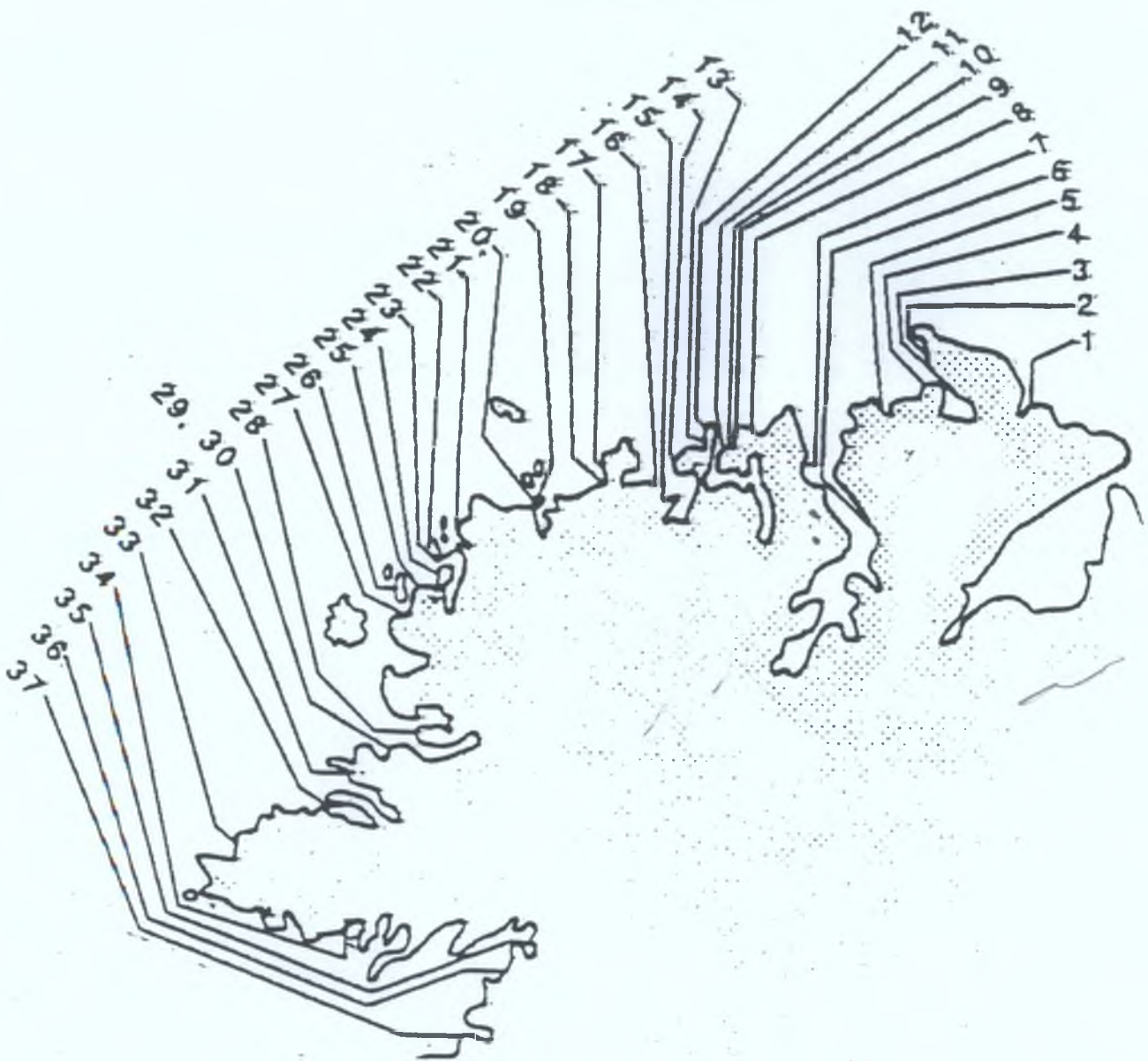
Low Shore Techniques
Beach nourishment
Create hard points
Beach drainage
Sediment polders

Upper Shore Techniques
Marram grass planting
Sand fencing
Wind traps
Walkways
Dune fertilisation
Cliff drainage
Dune recontouring
Artificial dune ridge building
Slope stabilisation using mesh, mattresses, straw bales.
Pinning cliff faces
Buried dune toe protection

Supra shore Techniques
Land use restrictions
Managed retreat
Do nothing

Source: Dollard, 1994.

SAND SYSTEMS IN COUNTY DONEGAL

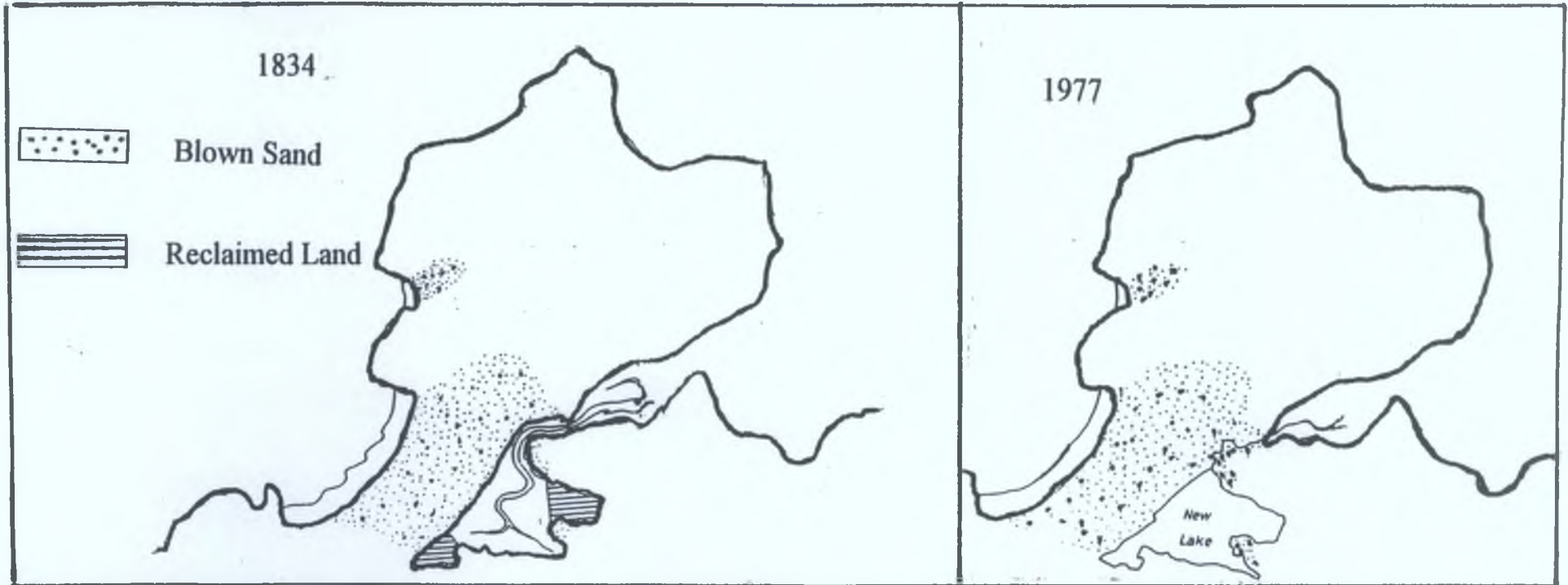


01	Culdaff	11	Lough Nagreany	21	Lunniagh	31	Sheskinmore
02	White Strand	12	Melmore	22	Gola Island	32	Maghera
03	Lagg	13	Tranarossan	23	Derrybeg	33	Glen Bay
04	Doagh Isle	14	Rosapenna	24	Carnboy	34	Fintragh
05	Tullagh	15	Ards	25	Kincaslough	35	Mullanasole
06	Fahan	16	Marble Hill	26	Cruit Lower	36	Rossnowlagh
07	Ballymacstocker	17	Dunfanaghv	27	Keadew	37	Finner
08	Maheradrumman	18	Rinclevan	28	Lettermacaward		
09	Gortnatraw	19	Ballyness	29	Roshin Point		
10	Doaghmore	20	Doey	30	Clooney		

Source: Curtis, 1990

COASTAL CHANGES AT HORN HEAD

APPENDIX 7.



By 1834, large areas of the estuary had been reclaimed. The consequent reduction in the tidal prism may have had a strong influence on subsequent events. In the 1920's, intense sandstorms were common in the area as the dunes destabilised (Murphy, 1980). Blowing sand blocked the estuary and a freshwater lake formed which flooded the former reclaimed areas.

Source: Shaw, 1985

**VALUE OF FISH CATCH IN DONEGAL
PORTS IN 1994.**

PORT	VALUE OF CATCH (IR£)
Bunbeg	190,697
Buncrana	110,300
Bundoran	8,878
Burtonport	1,391,944
Downings	915,442
Dunfanaghy	48,495
Glengad	267,436
Greencastle	3,618,045
Killybegs	18,847,488
Kincasslagh	87,493
Malin Head	692,902
Malinmore/Malinbeg	42,391
Moville	1,038,503
Rathmullan	5,248,203
Rossbeg/Portnoo	48,517
Teelin	71,709
Total	£ 32,628,443

Source: Department of the Marine.

TOURISM DEVELOPMENT OPPORTUNITIES
IN CO. DONEGAL.

BUNDORAN	<ul style="list-style-type: none">• Angling facilities and self-catering development at Bundrowes and Bunduff Rivers.• Centre to introduce the visitor to the Erne system.• Conservation of Lough Melvin water resources.• Fishery restocking project at Rossinver.• Winter camp at Glenade outdoor pursuits centre.
NORTH-WEST DONEGAL.	<ul style="list-style-type: none">• Reconstruction of Portsalon Hotel.• Registered accommodation at Falcarragh & Milford.• Restoration of 18th-century house and gardens at Ballyconnell Estate, Falcarragh.• Pre-famine village complex restoration at Fanad.• Deep-sea angling boats at Rathmullan, Downings and Port na Blagh with a deep-sea angling centre on Sheephaven Bay.• Visitor facilities at Doe Castle.
WEST DONEGAL.	<ul style="list-style-type: none">• “People of the Rosses” visitor centre at Dungloe.• Development of Fintown Steam Railway as a working attraction.• Deep-sea angling facilities and boats at Burtonport.• Development of a fishing lodge at Bunbeg.• Accommodation development at Kincasslagh, Dunlewy and Arranmore Island.
DONEGAL TOWN.	<ul style="list-style-type: none">• Maritime centre at Killybegs celebrating Ireland’s premier fishing port.• Donegal tweed traditional craft centre.• Barnesmore Gap Steam Railway, linking Donegal town to Ballybofey.• Gardens development at Ardnamona Estate, Lough Eske.
LETTERKENNY.	<ul style="list-style-type: none">• Hotel development at Ramelton Heritage Town.• Rented cottage development at Kilmacrennan.• Log cabin development and other accommodation at Churchill.• Newmills flax and cornmill industry centre.• Arts theatre and craft centre at Letterkenny.• Outdoor pursuit centre at Carrickfinn.

Source: Bord Fáilte, Tourism Development Plan, 1994-1999.

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