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**From Single Use to Multiple Use:
Co-operation and Conflict in Marine Resource
Management in North West Connemara (Ireland)**

Nathalie A. Steins
1996

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ABSTRACT

Of particular importance for the study of resources that are held in common is the issue of co-operation or collective action. The extensive body of literature on this subject suggests a number of factors that encourage collective action. However, these factors are mainly related to 'internal' characteristics of the resource system and stem from empirical research on commons that are characterised by one, single extractive use. In multiple use scenarios, where activities by different user groups take place within the same resource system, the issue of co-operation becomes even more important, since each user group's action will have an impact on the resource use by other user groups, and on the management of the resource as a whole. The objective of this paper is to examine the factors that affect co-operation between user groups in a multiple use setting. The empirical basis for this paper is laid by two case studies of multiple-use scenarios in North West Connemara, Ireland: Killary Harbour and Ballynakill Harbour. Both estuaries accommodate inshore fishermen, a salmon farm, shellfish producers, aquatourism enterprises and freshwater fisheries.

Unlike many estuaries in the south and east of Ireland, the estuaries in North West Connemara are relatively unspoilt areas, where traditional users have only recently witnessed the arrival of new user groups. Incentives by the government to stimulate socio-economic development has resulted in favourable policies for new entrepreneurs. The promotion of the area for tourism and infrastructural improvements have made this part of Ireland more accessible to tourists. As a result, aquaculture and aquatourism enterprises are being set up all along the area's coast. The new status of many estuaries as multiple-use resources place new demands on resource management and the user groups.

A comparison of the two case studies revealed the evolution of management strategies and inter-user relationships must be seen as an outcome of interactions between the internal and external characteristics or resource management in a dynamic environment.

The paper identifies seven factors that affect co-operation between user groups in a multiple-use setting: (1) the relationship between the technology of the activity and the physical characteristics of the resource system; (2) the extent to which the user groups perceive each other's activities as a threat to their own specific use; (3) past experiences with other users; (4) the rate of participation in external policies affecting local resource use; (5) the extent to which producers have secured their position in the market; (6) the role of external agents involved in resource management; and (7) external factors.

These factors will help researchers and practitioners to organise information about the networks that have been established between different user groups that use the same resource system for their individual activities.

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ACRONYMS

ADO	Aquaculture Development Officer
BIM	Bord Iascaigh Mhara (Irish Sea Fisheries Board)
DoM	Department of the Marine
EIA	Environmental Impact Assessment
EU	European Union
FAS	Foras Aiseanna Saothair (Training and Employment Authority)
TBT	Tributyltin

1. INTRODUCTION

1.1 Introduction

The study of collectively used resources has gained increasing popularity in the discussion on the exploitation of the earth's natural resource base. Such resources are often referred to as 'common property resources', 'common pool resources', 'open access resources' or 'the commons' (Edwards & Steins, 1996), and have become the focus of an ongoing debate about their ecologically sustainable management. The foundations for this debate were laid by Garrett Hardin in his 'Tragedy of the Commons' thesis, which predicts the overexploitation, degradation and eventual ruin of all commonly held resources due to the user's rational incentive to maximise his own utility (Hardin, 1968). Privatisation and government control have been suggested by advocates of the thesis as solutions to the commons dilemma. Their opponents claim that resource users are capable of creating effective governance rules (Knudsen, 1995).

The commons debate has been complicated by the fact that many researchers and practitioners use the words 'common property', 'common pool', 'open access' and 'commons' interchangeably. Whereas all these resource types are characterised by the fact that each user is capable of subtracting from the welfare of others, they essentially differ in terms of access possibilities. Hardin's thesis refers to an open access resource, which is characterised by a 'free for all to use' situation where exclusion is impossible. Common pool resources are a sub-set of open access resources; exclusion is hard to achieve and costly. A common property resource (CPR), however, refers to a situation where the users have devised rules concerning allocation of and access to the resource. In this latter category, co-operation between the individuals within the user group is a key issue, since a collective effort is required to manage the access to the resource and the allocation of the 'resource units' that are produced by the resource.

The question 'under what circumstances are people likely to co-operate?' is of particular importance for the study of CPR management regimes. The extensive body of literature identify a number of factors that increase the chances for (voluntary) co-operation, such as clearly defined boundaries of the CPR, costs of exclusion technology, the presence of a set of democratically formulated governance rules, conflict resolution mechanisms, the importance of the resource for the user group's survival, the accountability of the user group, and the facilitation of self-organisation by external agents (see Ostrom, 1994; Pinkerton & Weinstein, 1995; Wade, 1988; White & Runge, 1995).

To date, theoretical and empirical work on the analysis of both common pool and CPR has primarily focused on resources that are characterised by one single, extractive use, such as fisheries and grazing lands. However, this assumption is unrealistic. Firstly, natural resources produce a multitude of resource units. It is not realistic to assume that people will only use a resource for one use (e.g. cutting timber), if the same resource also yields other resource units (e.g. the same forest can be used for grazing cattle). Secondly, commons evolve due to demographic changes, technological developments and the integration of the resource in the market. In this context, the resource system will increasingly become subject to multiple uses (Edwards, 1996; Edwards & Steins, 1996; Selsky & Creahan, 1996).

As commons evolve from a single use resource into a multiple-use resource, the number of user groups will increase. The issue of co-operation will then become even more important, since each user group's actions will have an impact on the resource use by other user groups, and on the state of the resource system as a whole. In order to guarantee the long term use of a multiple-use resource, collective management by the different user groups is crucial. The objective of this working paper is to study the factors that affect co-operation in a multiple-use setting.

The empirical basis for this study is laid by two case studies of multiple-use scenarios in North West Connemara: Killary Harbour and Ballynakill Harbour. Both bays can be regarded CRP regimes, since the access to and allocation of the resource units that are produced by the resource are regulated through the presence of a number of different user groups, which each have their own rules (formal and informal) for the management of their 'share' of the resource.

Killary and Ballynakill Harbour both accommodate a finfish farm, a shellfish co-operative, individual shellfish producers and aquatourism activities, such as sea angling and sailing. The Killary's history as a multiple-use resource goes back fifteen years. In Ballynakill Harbour, the presence of multiple user groups is a more recent development. The management structure of the user groups in the two bays are different, which has an important impact on management of the bays as a whole. The socio-economic background in which the evolution of the two bays into multiple-use resources took place, is of particular importance in this context.

1.2 Objectives of the study

The overall aim of this study is to examine the factors that have contributed to the development of multiple-use resource management in Killary Harbour and Ballynakill Harbour in North West Connemara, and to explore the resource management outcomes of both the separate types of uses within the two areas and the bays as a whole. In order to achieve this overall aim, the study has the following secondary objectives:

1. to make an inventory of the different marine activities taking place in the research areas;
2. to explore interactions between different user groups;
3. to assess the various user groups' concerns relating to their activities;
4. to compare the two case studies; and
5. to discuss the demands that the multiple-use scenario places on resource management in the two bays.

1.3 Methodology

Background

Data for the case study was collected during a five weeks' field research period. A previous research period in the area facilitated the field work in terms of making contacts and knowledge of the area (see Steins, 1995).

Secondary data

Reports by FORUM (a community development project), BIM (the Irish Sea Fisheries Board) and the two co-operatives, and publications on aquaculture and rural development in the area were the main sources of secondary data.

Primary data

The main method for primary data collection was the semi-structured interview. A total of 39 interviews were held with 29 different representatives of the user groups and supporting agencies. Seven informants were interviewed twice because of their knowledge of the area or their engagement in more than one marine activity.

Personal interviews (32) took place with the following informants:

- FORUM (Acting) Director (2);
- Aquaculture Development Officer (2);
- Killary Salmon Ltd. (1);
- members of Killary Fish Farming Co-operative (5);
- Killary Fjord Shellfish Ltd. (2);
- Delphi Adventure Holidays (1);
- Errif Fishery (1);
- Gaelic Seafoods Ltd. (1);
- members of North Connemara Marine Co-operative (5);
- Ballynakill Oyster Fishing Company Ltd. (1);
- individual shellfish producers (4);
- inshore fishermen (7);
- boat trip company (1).

Telephone interviews (7) were held with:

- Department of the Marine (1);
- Fisheries Research Centre (1);
- Little Killary Adventure Centre/Killary Lodge (1);
- Delphi Fishery (1);
- Scubadive West (1);
- Ocean's Alive (1);
- Kylemore Fishery (1).

Site visits to the shellfish production areas, salmon farms, freshwater fisheries and the marine resources heritage centre, fishing trips with inshore fishermen and boat trip companies were an important way of familiarising with the research areas and the various marine activities.

1.4 Structure of the report

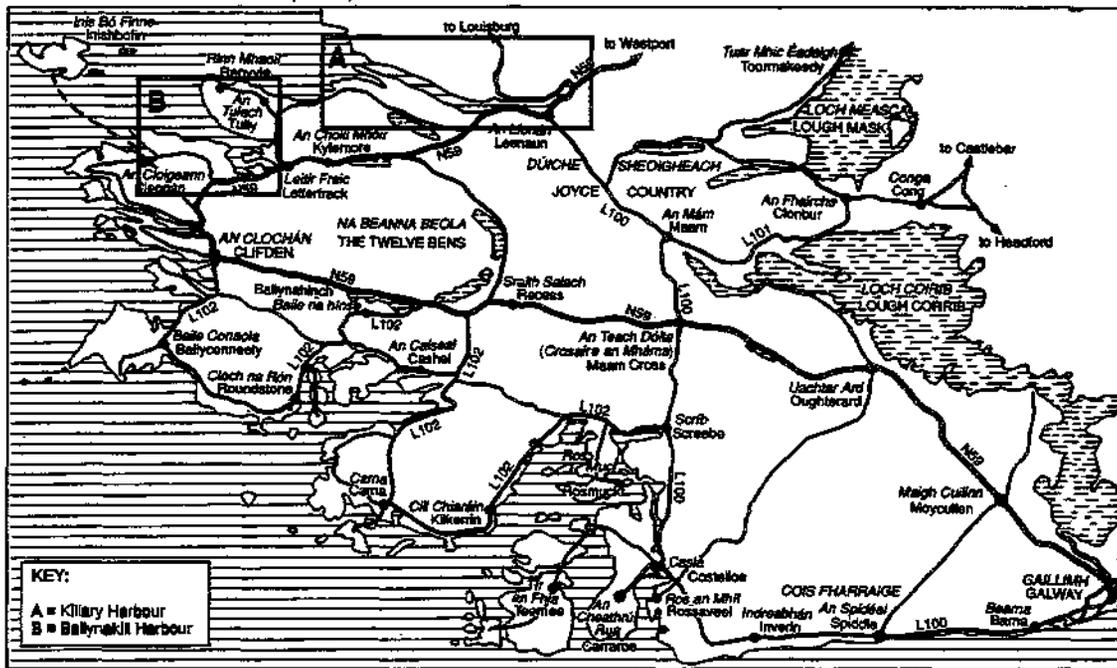
Chapter 2 introduces the research area and its marine resource. Resource management in Killary Harbour and Ballynakill Bay is examined in Chapters 3 and 4. Chapter 5 concludes by comparing the two multiple-use settings and discussing implications for their management. It also discusses the factors that have contributed to co-operation and non-co-operation between the user groups.

2. NORTH WEST CONNEMARA

2.1 Introduction

North West Connemara is an isolated region located in Co. Galway on Ireland's western seaboard (Map 1). The area is dominated by rocky mountains and bogs. The main source of livelihood is agriculture, which is mainly focused on raising dry stock cattle and sheep. Fishing is another source of income, but the inshore fishing season only covers the period from May until September. The breath-taking scenery of the area attracts many tourists in summer, and the tourism industry is the most important activity to supplement agriculture and fishing. Many people in the area live on income support and the lack of permanent employment opportunities has resulted in high levels of emigration (Ruddy & Varley, 1991).

Map 1: Connemara
Source: Tim Robinson (1990)



2.2 Socio-economic development strategies

The past two decades, the Irish government has attempted to bring about socio-economic development in this area. Social, economic and infrastructural problems have to be tackled through the implementation of community development projects and by creating favourable conditions for new entrepreneurs. The establishment of FORUM, a community development project initially funded under 'Poverty 3', the European Union's Community Programme to foster economic and social integration (1990-1994), was an important step in this light. The project has sought to improve the situation of unemployed and under-employed by concentrating on developing the area's natural resource base. Initiatives have been undertaken in agriculture, tourism and aquaculture (Curtin, 1994).

One of the project's major achievements is the creation of a partnership with Bord Iascaigh Mhara (BIM, the Irish Sea Fisheries Board) in an attempt to stimulate aquaculture development in the area. As a result, BIM employed its first locally-based Shellfish Development Officer in 1992. Her tasks were to provide three shellfish co-operatives in North West Connemara with technical and managerial/administrative assistance, and training, and to provide an interface between the shellfish co-operatives and BIM. In 1995, the Officer's job description was reviewed and the job title was changed into Aquaculture Development Officer (ADO). The ADO's task is to provide professional assistance to all groups and individuals engaged in aquaculture in Connemara.

The European Union's PESCO programme, which aims to enable the fisheries sector to meet the challenges arising from reductions in fleet capacity, stock depletion and marketing problems, is a major new development strategy for the fisheries sector in the area (BIM, 1995a). Although the fishermen get a lot of assistance with the applications for a PESCO grant, the fact that they have to raise 45% of the proposed investment themselves is considered to be a major problem of the programme.

Developments in the aquaculture and tourism sector are also sponsored by Foras Aiseanna Saothair (FAS, the Training and Employment Authority) through Social Employment Schemes, which aim to help long-term underemployed to re-enter the active workforce, and to help voluntary groups and public sector bodies to do worthwhile work which they could not otherwise have undertaken (FAS, 1990), and financial assistance in training programmes.

2.3 Marine resources

Unlike many estuaries in the south and east of Ireland, the estuaries in North West Connemara are relatively unspoilt areas, where traditional users have only recently witnessed the arrival of new user groups. For a long time, inshore fishing used to be the main way of exploiting the marine resources in the research area. However, the depletion of stocks, reductions in fleet capacity and marketing problems that affected the fishing industry all over the European Union (EU), and have also left their marks on traditional fishing in North West Connemara. In addition, the wild salmon fishermen have suffered from the increased competition with salmon farms resulting in a drop in the market price for wild salmon despite reduced availability.

The past 15 years have witnessed a diversification in the exploitation of marine resources in the area with aquaculture as the dominant new activity. Aquaculture is the farming of aquatic organisms including finfish, crustaceans, molluscs and edible aquatic plants which implies some form of human intervention in the rearing process and some form of ownership over the cultivated species (O'Connor *et al.*, 1992).

Aquaculture in Ireland is still in its development phase and has been heavily dominated by finfish farming with salmon (*Salmo salar*) as the main cultivated species. Large scale international production of farmed salmon started in the late 1970s with Norway as a leading producer. Salmon farming in Ireland started in the early 1980s. In 1991, Ireland produced 9,000 tonnes of salmon, which accounted in total for approximately 75% of the country's aquaculture output (O'Connor *et al.* 1992). The finfish farms are predominantly controlled by large scale private investors, many of whom are Norwegian or Scottish. North West Connemara accommodates three salmon farms, a salmon hatchery and a sea trout hatchery.

The development of shellfish farming in the area has started about ten years ago with mussels (*Mytilus edulis*) and Pacific oysters or *gigas* (*Crassostrea gigas*) being the dominant species. Experiments with the production of native oysters (*Ostrea edulis*) and scallops (*Pecten maximus*) are another activity. In 1989, Ireland produced 12,300 tonnes of mussels. The output of *gigas* rose from 60 tonnes in 1980 to 361 tonnes in 1990 (O'Connor et al., 1992). In 1995, Ireland produced 800 tonnes of native oysters and 3,000 tonnes of scallops (ADO, pers.comm.). In contrast to finfish production, which is characterised by high capital and expertise requirements, shellfish farming is more accessible to local people (Ruddy & Varley, 1991). Other advantages are:

- its status as a 'green' industry (no chemical external inputs);
- no feed costs;
- shellfish are a very marketable product;
- shellfish landings are not subject to quota;
- aquaculture vessels do not have to be registered; and
- a generous BIM grant system for starting entrepreneurs.

In North West Connemara, there are three shellfish co-operatives, eight individual shellfish producers, an oyster company and a shellfish hatchery.

An advantage of both finfish and shellfish farming is that the aquaculture sites are licensed and thus create property rights for the producers (Figure 2a). Fisheries licenses are granted by the Department of the Marine (DoM). The nature of the license depends on the type and location of the proposed project (sea-based, land-based or freshwater). Effluent Discharge Licenses and Planning Permission need to be obtained from the relevant County Council (BIM, 1995b).

Figure 2a: License requirements for aquaculture (Republic of Ireland)
Source: BIM, 1995b

TYPE OF SITE	FINFISH FARMS	SHELLFISH FARMS
Sea-based	<ol style="list-style-type: none"> 1. Aquaculture or Fish Culture License 2. Foreshore License 	<ol style="list-style-type: none"> 1. Aquaculture or Fish Culture License 2. Foreshore License
Land-based	<ol style="list-style-type: none"> 1. Fish Culture License 2. Foreshore License (in cases where installation uses the State's foreshore) 3. Planning Permission 4. Effluent Discharge License 	<ol style="list-style-type: none"> 1. Fish Culture License 2. Foreshore License (in cases where installation uses the State's foreshore) 3. Planning Permission 4. Effluent Discharge License
Freshwater	<ol style="list-style-type: none"> 1. Fish Culture License 2. Planning Permission 3. Effluent Discharge License 	

A new activity is 'aquatourism'. Although the area has a long history in the tourism industry, the marine resource was not developed as a marine tourism target area. Occasionally fishermen took tourist on sea angling trips, but there was no organised structure. About five years ago, the first

boat trip company was established, organising sea angling trips and trips to Inishbofin Island. At present, there are four boat trip companies in North West Connemara. Recent aquatourism developments include the opening of a marine heritage centre in the Ballynakill Harbour area.

The development of the marine industry sector in this peripheral area will continue to be a major issue on the agenda of policy-makers at the national and local level.

3. MULTIPLE USES IN KILLARY HARBOUR

3.1 Introduction

Killary Harbour is located in North Connemara. The inlet is approximately 13km long and at maximum 1km wide, and is the only fjord outside Scandinavia. Killary Harbour is divided into three areas, namely the Inner Killary, Middle Killary and Outer Killary. The Errif River and Bundorragha River drain into the Killary from its north side. To the south west of the fjord, there is a small inlet called Little Killary, which is exclusively used for leisure purposes and mooring of some small fishing vessels. The fishing industry is located in the fjord, which is considered to be the best spatfall area for mussels in Europe. However, mussel farming, although it is the major activity in the fjord, did not start until the mid 1970s.

Under EU Directive 91/492/EEC, shellfish harvesting areas need to meet certain bacteriological criteria before the shellfish can be placed on the market (BIM, 1995b). The waters of the Killary are classified as Grade B, which means that shellfish must be depurated, heat treated or relayed in Grade A water before they can go for human consumption.

In summer, there are periods that the Killary is closed for shellfish harvesting due to the presence of toxic algal blooms or phycotoxins (also called Red Tides), a natural phenomena that does not harm the shellfish but pose a threat to human consumption (Box 3A). In the winter of 1995/1996, two unidentified phycotoxins were detected in the Killary, which is a great concern for the aquaculture industry in the area. Harvesting of mussels is strictly prohibited when the fishery is closed and *'firm action will be undertaken against anybody who was found harvesting'* (DoM, pers.comm).

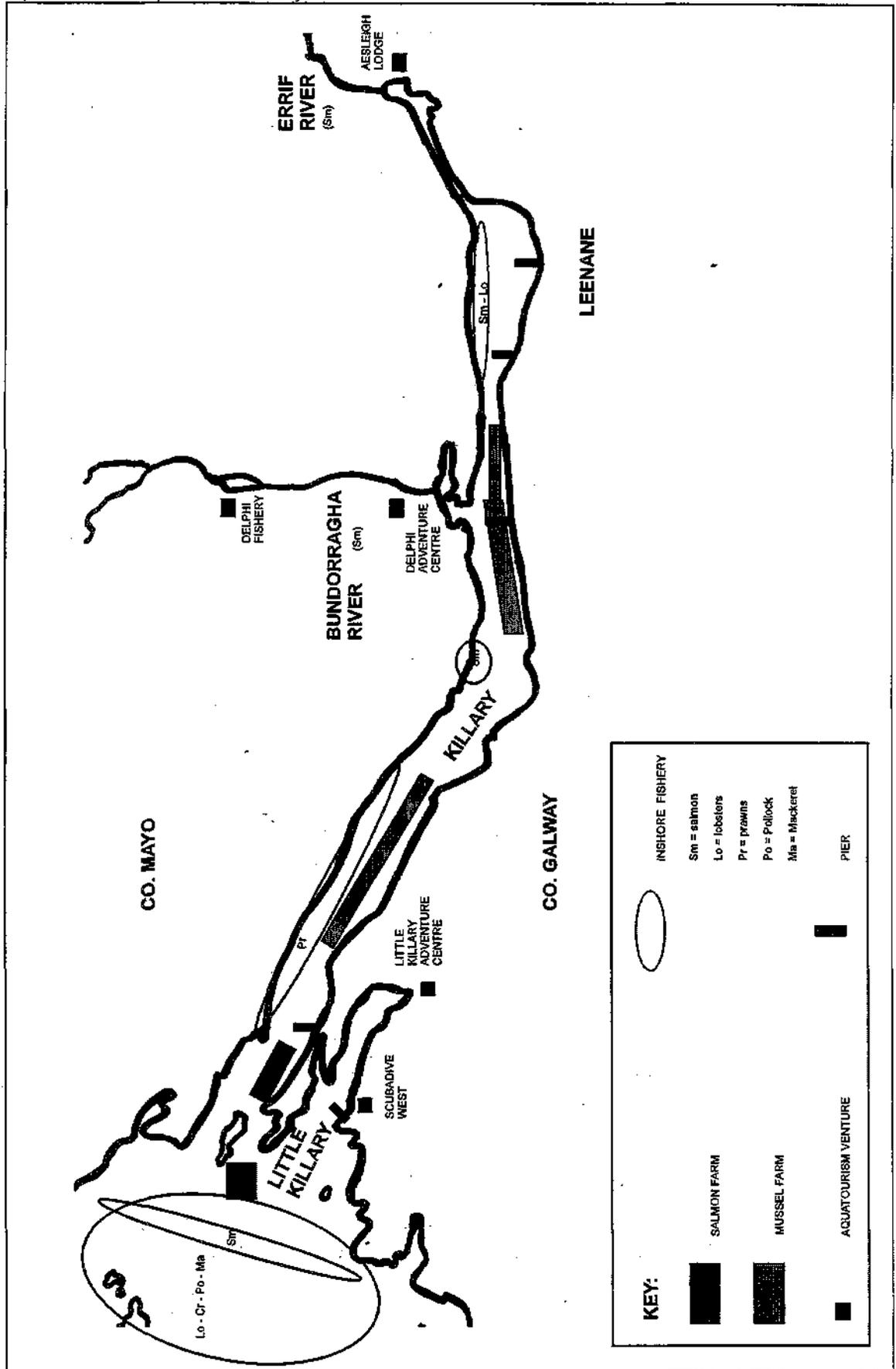
Box 3A: Phycotoxins

Source: Fisheries Research Centre (n.d.)

Bivalve shellfish (e.g mussels and oysters) feed directly on microscopic plants (phytoplankton) in the water. Approximately 2% of the several thousand phytoplankton species can cause problems by producing natural toxins (phycotoxins). These toxins can occasionally accumulate in the shellfish. Although they do not cause any harm to the shellfish, consumption of shellfish containing toxins can result in various forms of shellfish poisoning, the most common being Diarrhetic Shellfish Poisoning (DSP). Because of the risk to human health posed by the presence of phycotoxins in shellfish, monitoring programmes have been established which involve the monthly screening of water samples and the testing of product toxicity in compliance with EU Directive 91/492 during the months of May to November. If toxins are detected at levels which are unsafe for human consumption, the harvesting and sales of shellfish from the area is prohibited until the waters are clean again.

This Chapter describes the user groups of the Killary: the fishermen, the salmon farm, the mussel farming co-operative, a private mussel farm, the three aquatourism centres and the two freshwater fisheries. Their location is shown in Map 2.

Map 2: Multiple uses in Killary Harbour



3.2 Inshore fishing

Background

Inshore fishing in the Killary has been taking piece form times immemorial. Until the mid 1800s, fishermen fished for their landlords. An 85 year old fishermen proudly remarked: '*my great-grand father was the first fishermen in the Killary who got a license to fish salmon. That was a very important occasion, because it opened the way for the fishermen to keep and sell their own catches*'.

Salmon, mackerel, herring, lobster, shrimp, periwinkles, native oysters and scallops are the main species that are fished in the fjord. Fishing for salmon, mackerel, herring, pollock, lobster and brown crab takes place outside the entrance of the Killary. Lobsters, brown crabs and salmon are the main commercial species. Finfish such as pollock and mackerel are fished for own use or serve as bait for the lobsters and crabs. Oysters and scallops are fished on public beds and provide fishermen with some extra money when the fishing season finishes in September. Salmon is the only species that requires a fishing license.

Resource management

Lobsters (*Homarus gammarus*) and crabs (*Seyllidae spp.*) are fished in 'pots' that look like a cage. The bait is put in the pot and once the lobsters and crabs are in the pots, they are trapped. The pots are tied to a rope with a distance of 10 vadmets between them. Each line holds approximately 10 pots. The pots are placed on the seabed, a buoy marking their location. Every two days, the fishermen have to pull the pots, empty them, fill them with new bait and, depending on the catch, relocate them. In the 1996 season, only one (part-time) fisherman fished lobsters in the actual fjord; the commercial fishermen prefer the area outside the fjord because of the presence of more stocks.

A fisherman needs approximately 200 pots to make a living from lobster fishing. Each year, he has to buy 50 new pots since their nets are vulnerable to the claws of the crabs, the sea water and storms, representing an annual investment of £1,100. The fishermen sell the lobster to a local buyer or directly to hotels and restaurants which give them '*a couple of pence more*'. The market price for lobsters is £5 a pound. Crabs are sold at 60p a pound to hotels.

The past decade, the lobster catches have declined because of overfishing: *fishermen used to make their own pots during the winter and couldn't make that many. [...] Their currachs [traditional boat] couldn't handle too many pots. Now we buy the pots and have better boats, so everybody has put out more pots*'.

In 1994, the first attempts were made to conserve the lobster stocks in Ireland. The Irish Lobster Association in co-operation with BIM and other state agencies now work on the enhancement of the stocks through a v-knotting programme², release of hatchery-reared juveniles and strict compliance with minimum size regulations.

There are two ways of catching salmon (*Salmo salar*) for commercial fishermen. '*Drift netting*' is not allowed within the Killary and has to take place outside the fjord. The drift net floats to the surface and penetrates 10m deep. The net is left in the water and the salmon swim into it and are caught in the mesh. Drift netting is carried out during stormy weather, and can only take place between the 1st of April and to 31 July.

'Draft netting' takes place in the Inner Killary. Each crew has their own area which is based on silent agreement or 'convention' (Swallow & Bromley, 1995). Each crew is led by a license holder and the size of mesh and net length are governed by legal restrictions. The net must not be fixed; it is only cast when a fish is spotted and the crew in the *currach* row towards the area where the salmon is thought to be located. Draft netting is done when the weather is nice and the sea is calm. A dry season is beneficial for the netsmen, since the salmon depend on heavy rainfall and flooding to return to the river system (Box 3B). Theoretically, the draftnetting season starts in the 15th of February, but very few crews start before May. Killary Harbour, with its two freshwater fisheries, is the main hunting ground, with up to ten crews working in the June/July peak season. In 1995, approximately 5,000 salmon were caught by the netsmen in the peak season (DF, 1996a). The local price was only £2 a pound, which reflects the national trend in the drop of the market price for wild salmon due to the ongoing increase in farmed salmon output (Fingleton & MacCann, 1996).

The salmon season starts in February and ends mid June. The 1996 season was a 'disaster' in terms of catches. Whereas the total catch is 700-800 salmon in a good year, in 1996 catches were as low as 60 salmon. The decline in catches is also reflected in the national salmon catch levels which have continued to decline after 1986 (Fingleton & MacCann, 1996). These lower catch levels are caused by lower stock availability, reduced fishing effort due to decreasing catch rates and reduced fishing effort due to reduction in international salmon prices (*ibid.*).

Box 3B: Life cycle of Atlantic salmon

Source: Fingleton & MacCann (1996)

Around the month of December salmon deposit their eggs in the gravel of rivers and streams. After emerging, the young fish remain in freshwater for a period from one up to four years. In the months of April to June, they move to salt water. At this stage the salmon is called a *smolt* and weighs up to 80g. they smolts then migrate to their feeding grounds in the mid North Atlantic, feeding on shrimps and small fish.

After about one year at sea, approximately 80% migrate back to their rivers of origin, having reached weights of 1.5 to 2kg. These salmon are known as *grilse*. Most of the remaining 20% remain at sea for another year and return the following spring, weighing 3 to 13kg. These *spring* or *multi-sea winter salmon* are especially high prized by anglers.

Relationship with other users

The relationship between fishermen and other users of the Killary differs from person to person. The major difference in attitude concerns the salmon farm. While one group of fishermen has no problems with the salmon farm (*not a bad word about Killary Salmon, they provide great employment opportunities*), the other group objects to the presence of the salmon farm. Statements such as: *'they are taking over our bay'* and *'they are responsible for the pollution of the water and decline of our stocks'* clearly reflect the latter group's attitude. These fishermen objected to Killary Salmon's proposed expansion to a site in the Outer Killary, but failed. They perceive that the government has let them down: *the government doesn't care about small fishermen, they only see big money. That's why they gave the salmon farm loads of grant aid and the bloody licenses to expand. The department [DoM] says they do environmental checks, but there's no control. [...]* *Look at the decline of the sea trout and the bad salmon catch of this year; it's all because of that bloody farm'.*

Overall, the fishermen seem to have a good relationship with the mussel farmers although they do not necessarily agree with their activity. Abandoned rafts, a smaller fishing area due to the presence of mussel structures and the risk that salmon are caught underneath the structures are the main factors affecting inshore fishing.

In general, the fishermen do not see any difficulties in their relationship with the leisure user groups. Some of them mentioned that *'the people in the speedboats often get a bit carried away, but if you ask them to slow down they will do that'*.

Interestingly, there seems to be some friction amongst fishermen themselves over the drift netting for salmon. According to some of the fishermen, there is a group of fishermen who put their drift nets right in front of the Killary's entrance: *'the drift nets catch too many salmon. [...] We want them out, especially because some of them are put in the fjord which is illegal!* This conflict must be seen in the light of a general conflict over salmon catches between the draftnet and driftnet fishermen that was also reported by Fingleton & MacCann (1996). The efficiency and effectiveness of improved driftnets causes severe declines in the salmon stock available to draftnet fishermen from the late 1960s onwards.

Concerns

Loss of territory

Loss of territory is an important concern for all the fishermen that were interviewed. However, their opinion on how they are losing territory differed.

A first issue is the mussel farming. The rafts and longlines occupy approximately 72ha of the Killary. Fishermen can't navigate their boats in the areas where the structures are located. Despite the fact that the mussel co-operative agreed with fishermen to use a certain area in the bay, 15 years later fishermen don't seem to be too happy about it: *'the mussel farms are a disaster. They continue to expand. We can't fish underneath the structures. [...] The Killary starts to look like a garbage dump. Last year they couldn't even sell, so why do they have to expand?'*

The salmon farm is a second threat to the fishermen's loss of territory. As was discussed above, one group of fishermen feel that the farms are taken over the Killary and, consequently, their fishing grounds: *the salmon farm put their cages exactly on top of our best [public] oyster bed. I mean, we couldn't make loads of money on those oysters, but there were still enough to earn a few bucks'*.

A major issue of concern is the closure of the Killary for inshore fishing: *'the bailiffs want us out of the Killary because of the decline in sea trout stocks. They are looking for a scapegoat. We aren't even allowed to catch sea trout, so the decline can't be our fault [...] We dragged them to High Court and expect a decision any day now. I don't know what the judges will decide, but it looks good for us'*.

Water pollution

The fishermen link the quality of the water directly to their fish stocks: *'if the water is polluted, the fish will die or won't come back'*. They identified two reasons for the pollution of the water. The raw sewage from the village of Leenane that is discharged into the Inner Killary is a first factor.

A second, more controversial, cause is the perceived pollution from the salmon farm. One statement clearly illustrates the ideas of anti-fish farm fishermen: *'there's also talk that pollution comes from droppings of the sheep that are washed into the water. But these sheep have always been there, so I can't believe that they suddenly cause pollution. I tell you, it all started when the salmon farm moved in'*. The fact that the number of sheep has decreased as, amongst others, a result of favourable EU policies for sheep farmers is not taken into consideration in this line of thought. Other fishermen have a more balanced view: *'there is talk that the salmon farm pollution and that they create the sea lice problem. But they need to do much more research to prove that. If the salmon farm is responsible, we have to find a way to solve the problem.'*

Ban of commercial salmon fishing

Fishermen mentioned that the government might ban commercial salmon fishing to conserve the stocks. The conservation of the wild salmon stocks has been on the political agenda since the 1930s. The Commission on Inland Fisheries in 1933-35 proposed the abolishment of all sea and freshwater netting with compensation for displaced fishermen and fishery owners; only the freshwater ban was implemented. The 1987 Salmon Review Group recommended to the DoM that a series of measures aimed at controlling driftnet should be introduced, but their recommendations were never implemented (Fingleton & MacCann, 1996). The Salmon Management Task Force Group has just submitted a report to the Minister. If fully implemented and properly policed, the report would result in the most far-reaching changes to netting and angling regulations in Ireland for several decades (DF, 1996b). Proposed measures include amongst others: a ban on drift netting before the 1st of June; a ban on draft netting before the 15th of May; quota for netting; reducing the netting week to four days; a ban on drift netting more than 6 miles offshore; decreasing the number of net licenses; a tagging system on net-caught salmon; and extending the end of the netting season (*ibid.*).

Although the Killary fishermen acknowledge that the salmon stocks need to be protected, the ban of net fishing would be disastrous for many small fishermen, who depend on multiple species for their livelihood: *'we would loose a lot of money. If we can't fish salmon, it will be hard to make a living from fishing. This year the catches have been really bad and we can just about manage.'* Besides the money, 'the sport, the excitement of the unknown, the tradition and the camaraderie are all elements of their [the netsmen's] enjoyment. These factors will have to be taken into account by those who wish to see commercial netting abolished or restricted in line with international trends' (DF, 1996a:5). Lessons can also be learned from similar cases in Europe, for example, the ban on driftnetting outside the fjords of Norway has had severe socio-economic impacts. Fishermen did not receive compensation for their losses and typical driftnet communities have experienced recession and immigration. On the whole, however, the ban on driftnetting has not made a great impact on the conservation of salmon stocks, since other users, such as the recreational fishermen, have managed to increase their shares. The total harvesting of salmon has increased since the driftnetting ban in 1989 (Otterstad, 1996).

Future

Fishermen generally are pessimistic about the future of inshore fishing: *'the government and the EU are not interested in us. They don't even know we exist. [...] The big Spanish trawlers catch all the fish outside the 12 miles zone and there isn't much left for us. Our sons are not interested in fishing anymore. I doubt that any fishermen will invest in new boats!*

The success of the v-knotching to enhance lobster stocks and the continuation of net salmon fishing along with the conservation of stocks are considered to be important factors for the future of the inshore fishery.

3.3 Killary Salmon Company Ltd.

Background

Killary Salmon Company Ltd. was established in 1986 by the owners of Mannin Salmon, the first finfish farm in North West Connemara, in partnership with a Norwegian who lived in the area. When the farm applied for the required licenses the local community objected fiercely. By this time, concern about the externalities caused by finfish farming, such as chemical pollution of the water, had aroused as a result of problems experienced in the Ballynakill area (see Chapter 4.3). Nonetheless, the farm was granted the licenses (Ruddy & Varley, 1991).

Killary Salmon started with four cages. The farm received considerable financial assistance from BIM and the EU. The owners of Mannin Salmon sold their shares after a couple of years and for a while the farm was Norwegian-controlled. In 1993, the farm was taken over by a local man. The farm now has 30 cages and employs 12 full-time and 36 part-time staff. The farm does a lot of research on the most efficient and environmentally friendly methods of salmon production, according to the manager its annual output is 300 tonnes³ which is sold through a marketing organisation.

Resource management

The company grows the salmon in round cages. The bottom of the cage is 15m below the water level. Small fish (60g weight) are bought from a hatchery and put in a cage. One cage can accommodate 30,000 small fish. When the fish are half-grown they are divided in two cages until they reach marketable size (3.5kg). At Killary Salmon, feeding is done through a computerised system. The computer is linked to pipes which supply the food in controlled quantities (usually 20x50kg) over a 24 hour period.

The owner of Killary Salmon is very aware of the attitude of many locals concerning finfish farming. The fact that many farms are controlled by foreigners and benefits do not stay in the area is an important issue of frustration for the locals. The finfish farms are also accused of polluting the water.

On the long term, salmon farming can have a serious impact on the physical environment. The accumulation of waste matter such as uneaten feed and faeces on the seabed below the cage and the release of nutrients such as nitrate, may alter the seabed ecology substantially and leads to the release of further nutrients into the water column. The latter on its turn may alter the phytoplankton ecology and, at worst, lead to toxic algal blooms (Soley et al., 1992). Vaccines, antibiotics and pesticides, that are used to maintain salmon prior to harvesting, are examples of other external inputs having a negative effect on the marine environment, and, in particular, on shellfish farming near salmon cages (Phyne, 1996). The spread of parasites and disease directly into their surrounding environment and indirectly via escaped salmon, is another externality associated with salmon farming (Fingleton & MacCann, 1996).

Killary Salmon tries to be one step ahead of the environmental groups in an attempt to manage the farms as environmentally friendly as possible. For this purpose, it has implemented a number of

policy measures:

- divers go down to the seabed to collect feed residues;
- controlled feeding through a computerised system to minimise waste food sinking to the bottom of the cages;
- food residues and weed from cleaning the fish nets is recycled into agricultural fertiliser;
- after a cage is harvested there is a fallow period of 3-4 months, which is a recommended policy of the Irish Salmon Growers Association (see Phyne, 1996);
- tank for effluent water from cleaning fish nets;
- biodegradable anti-fish lice treatment;
- 'environmental friendly' anti-fouling paint for nets;
- minimum stress policy for fish (maximum 15,000 adult fish).

All these measures are good for the environment and good for our fish. It costs us a lot of money [...]. Other farms just want to maximise output and minimise input, but my boss is very aware of the environment and is willing to pay for it'.

The owner also tries to keep the farm as local as possible. Equipment and fish feed are purchased in Ireland as far as possible, and 90% of the employees are local people. The 10% who are non-locals are mainly French students who are on a training course.

Relationship with other user groups

Killary Salmon feels it has 'a good relationship' with other users: We know all the fishermen and mussel farmers personally and encourage them to use our jetty. They can borrow equipment from us and they help us. We employ four fishermen to police the fish cages at night. [...] There isn't much interaction with the Adventure Centre and Scubadive West [...] everybody uses their own area...[...] We don't have a good relationship with the Delphi freshwater fishery [...] they accuse us of pollution and want us to get out'.

The farm tries to encourage people to have a look around. Guided tours usually take place three times a week.

Concerns

Fish lice

The most important concern of Killary Salmon is the presence of fish lice. According to the manager, the salmon get the lice from wild fish in the bay. The salmon in the cages have to be monitored constantly on the number of lice. To keep the numbers down, a biodegradable treatment is used.

Licenses

Another concern is related to the application for aquaculture licenses. The application for the license a very long and costly process, but the most important issue is that the licenses are only temporary and DoM can withdraw them at any time. This makes it extremely difficult to find investors.

Conflict between sea trout fisheries and finfish farms

Five major sea trout fisheries have launched a law suit against the Irish government and against nine salmon farms over their alleged failure to rectify the sea lice problem (DF, 1996a; 1996b). Amongst the plaintiffs is the Delphi Fishery; Killary Salmon is one of the defendants (see Chapter 3.8). Delphi has also accused Killary Salmon from producing more than their legal maximum. A High Court hearing on this subject is scheduled for December 1996 (DF, 1996b).

The conflict with the Delphi Fishery does not worry the salmon farm in terms of the environmental issue, since they feel they comply with all the standards. Their concern is the fact that Delphi tries to get back up from the tourism industry which *is not fair*'.

Future

Despite the controversy about finfish farming, Killary Salmon feels that finfish farming is the way forward for the area *'provided that we keep it as local as possible and do the maximum for the environment'*. Other marine-related sectors such as shellfish farming and aquatourism are not considered to create many full-time employment opportunities for the area.

Many local people and the Delphi freshwater fishery still need to be convinced that the salmon farm is trying to minimise its impact on the environment. The only way to do that is *'to keep going like this [...], do more R&D, [...] and show them that we are important for local employment'*

Killary Salmon has applied for an increased annual harvest limit from 450 tonnes to 1200 tonnes. The farm also applied for a fallowing site further inside the Killary Harbour (DF, 1996b).

3.4 Killary Fish Farming Co-operative Society Ltd.

Background

The Killary Fish Farming Co-operative Society Ltd. is a service co-operative and was established in 1980 to provide a business structure and service for local mussel farmers. In the 1970s, the Killary was recognised as having extraordinary mussel farming potential. Research and experiments with mussel farming were carried out by, amongst others, University College Galway and the development agency Beirtreach Teoranta to determine the production potential of the fjord. An important reason for the establishment of the co-operative was that locals realised that the potential of the area for mussel farming would attract entrepreneurs from outside the area. In this case the locals would hardly benefit from the resource, as happened with tourism development in the 1970s. In 1986, Beirtreach Teoranta ceased operations in the fjord and the co-operative, on behalf of its members, negotiated the purchase of its assets (Ruddy & Varley, 1991).

The co-op's main objectives are to increase the volume of mussel production and to increase the number of members actively involved in mussel farming. The co-operative is managed by a Board of Management elected by its 18 members.

Initially, the co-op had a large membership because of *'a low fee [£10]'* and the idea that *'it was easy money'*. This resulted in a difficult beginning. The Board decided that people could get their £10 back and the new fee was set at £100. Only the hard core of the co-op's members remained. The co-op received financial assistance from BIM (approximately £25,500), and has also been provided with scientific and technical assistance with larvae and mussel sampling, output measuring techniques, disease control, license application and harvesting equipment. The co-op

is also assisted by the local Aquaculture Development Officer. The co-op covers an area of 90ha, its annual production is estimated at 300 to 400 tonnes per annum.

Resource management

Members of the co-op apply for individual licenses at DoM. It was agreed that an individual can farm maximum 4ha, the idea being to keep the co-op as local as possible: *We don't want big mussel farms managed by people who are not living in the area*⁴. The maximum size of 4ha ensures a balanced situation among the different members. The three full-time members have their own company (Box 3C); the other members are part-time mussel farmers.

The co-operative uses an intensive method of cultivation, the hanging culture. Traditionally, the members grew their mussels on rafts but recently they started to use longlines. Rafts and longlines are floating structures to which the ropes holding mussels are tied. The mussel spat (microscopic size) is set on a collector (hairy ropes or knitted mesh strips) that are hung on the rafts or longlines. The mussels feed from the water current and reach marketable size between eighteen months and two years. The only thing the producers have to do is to check the mussel ropes on the amount and size of the mussels. If there are too many on a rope, they have to strip them off and put them on a new rope. The mussels also have to be graded.

The advantages of the longlines are that they do not damage easily in stormy weather and that the producers can also work on the structures during rough weather circumstances. Mussel production is a green process, since the mussels feed from the water current. Another advantage of mussel farming is the good and stable market for mussels (market price £430 per tonne).

Whereas the role of the members is to produce mussels, the co-operative's role is to market the mussels and to provide training and equipment to its members. The co-op also provides incentives to stimulate young people to become engaged in mussel farming, such as leasing rafts for two or three years to help them starting off.

The co-op has just bought a new boat and new equipment with assistance from the PESCA Programme. Members can rent the fully-equipped boat. The grading of the mussels, an important step in the production process, can be done much faster and efficient now.

Box 3C: A full-time mussel producer

Source: Interview data, August 1996

The owner of one of the member companies of the Killary co-op was an electrician from 1968 to 1985. He always had an interest in the sea, but saw no future in conventional fishing. He ended up owning his own mussel farming company owning 16 rafts and 9 longlines. His annual output is 120 tonnes and he employs one full-time and two or three part-time workers.

'In 1979, there was a series of lectures on mussel farming by Beirtreach Teoranta, There a lot of experiments with mussel farming in the Killary and the idea was to make these accessible to local people. We learned some basic techniques during the course. We put out two small rafts. In the end, three of the original seven were left. Two did not want to become full-time and then I decided to start my own company in 1983. After two years I realised that I needed to put in more work. Another problem was finance. At the same time I was offered a two-year contract as an electrician which suited me well. Since 1988, I'm a full-time producer'.

Relationship with other users

At the time of the co-op's inception, fishermen thought that the Killary would be filled up with rafts, which would lead to minor conflicts. The co-op's members seem to be very aware of the fishermen's position. One of their policies is to keep the fairway and the area near the shore where lobsters are caught, free from rafts and longlines despite the fact that DoM has designated sites in those areas for mussel production: *'it took a long time to convince the department [DoM] that they should follow this policy when individuals applied for licenses. [...] The fishermen were here first and we must respect that'*.

The co-op's relationship with Killary Salmon is perceived to be good. Mussel farmers mentioned that they can use the salmon farm's jetty, and they *'help each other out if there's a problem with the boats'*.

The level of contact with the individual mussel producer, Killary Fjord Shellfish Ltd., depends from person to person. The general attitude is that *'he does his own thing'*. The fact that the co-operative cannot control this individual producer's actions is an important issue to the co-op.

Nowadays, the co-op's members only perceive a problem with one of the leisure users: *'one of them is okay, but the other one is badly run. There is a general irresponsibility on their behalf and no supervision. [...] They sail into our rafts and longlines and damage them and put the children's safety at risk. Yachtsmen are usually very perceptive but they are throwing that out of the door. [...] Our attempt to communicate with them failed!'*

The co-op has put forward the idea of introducing *'single bay management'*, the creation of a FORUM where *'everybody who is associated with the bay comes together and talk about collective management'*. However, the *'discussion is tied up by the Delphi Fishery who accuse Killary Salmon for the demise of their sea trout!'*

Concerns

Phycotoxins

The major concern for the co-operative is the presence of toxic algal blooms in the bay. In the Killary, phycotoxins are usually detected during the summer. However, in the winter of 1995/1996, an unidentified species was detected. The fact that the toxin was found in winter, a very unusual time of the year, causes a lot of concern among the producers, or as one of them commented: *'we've had summer closure and learned to live with it But now there is a mystery toxin which has baffled everyone. We didn't sell anything from November [1995] and it created a lot of problems' In 1995, the co-op's annual output was only 160 tonnes as opposed to 300-400 tonnes in other years. The closure of the fishery causes three problems for the producers:*

1. *'when you can't harvest the mussels, they grow too big and this affects their market price';*
2. *'it is hard to keep our customers satisfied because of the unpredictability of the disease [...]. The closure upsets the regularity of our supply,'*
3. *'the toxins cause a break in the production cycle. [...] if we can't sell the mussels it means that they will occupy the space for the new spat!'*

Policing of the closure of the fishery

Although the DoM allows for a minor level of toxicity, the members of the co-op agreed to stop the sales once toxicity was detected. This policy was made to protect the name of Killary mussels and to protect consumer's health. Although the co-op complies with this rule, there is *'one producer who ignores toxicity at any level and who's putting the Killary's reputation at stake.'* The co-operative feels that the closure should be much better policed and actions should be undertaken against anyone not abiding the rules.

Aesthetic problem related to mussel structures

The co-operative received some complaints about the *'unsightful rafts'* from representatives of the tourism industry. The co-op is trying to respond to these complaints by trying to have a unified design and colour for all the rafts and longlines. However, some members perceive that the unsightful rafts are more a problem felt by the representatives of the tourism industry than the tourists themselves who *'seem to be very interested in what we're doing.'* One area of the Killary is prohibited for mussel farming since it is a viewpoint for tourists.

Raw sewerage inflow from Leenane

The sewage from the village of Leenane is discharged directly into the Killary. The co-operative is concerned about its impact on the water quality and the presence of phycotoxins, and has requested the DoM *'to actively participate in developing a solution to the raw sewerage inflow from Leenane'*. In the summer of 1996, Leenane has been given financial assistance for the building of a sewage treatment plant.

Future

In 1991, the co-operative produced 200 tonnes of mussels. In a development plan that was prepared to attract promoters, it was projected that production levels could be increased to 1,200 tonnes in 1995 (FGS&C, 1990). The obstacles to expansion include the lack of adequate landing, washing, grading and packing facilities. Overcoming these obstacles would require substantial capital investments. The co-operative was not successful in finding external promoters. The output was an estimated 300-400 tonnes in 1995.

With help of the PESCA Programme, the problem of grading has now been solved by the purchase of a fully equipped boat. It is felt that despite the barriers to increase production, the co-operative has done very well and is now in a position to expand. Future actions include the encouragement of new members to join the co-operative and negotiations with BIM to get landing and trading facilities under the PESCA Programme.

3.5 Killary Fjord Shellfish Ltd.

Background

Killary Fjord Shellfish Ltd. is located in the Middle Killary and was established in 1989. It is a one-man's business. Its owner was born in the south of Ireland, worked as a fisherman in Canada and then came back to Ireland with the idea of starting a shellfish business. He started a partnership with a marine biologist who was using the company's site for experiments with mussel cultivation on three longlines. A year later, the marine biologist left the company.

Initially, the owner wanted to join the Killary Fish Farming Co-operative Society Ltd., but the co-op's Board did not allow him to become a member for reasons he did not know. One of his

employees reckoned that *'they [the Board] didn't let him in because he's an outsider!* The owner then decided to start the business on his own.

During its development stage, the company received grants from BIM under the EU's FEOGA grant system. Now he employs a full-time and four part-time workers, depending on the amount of work. The company's output was 200 tonnes in 1995.

Resource management

The company has 30 longlines which each can hold 25 tonnes of harvestable mussels, a big raft and three smaller rafts. The owner only uses the longlines, however, since *the rafts are awkward [and] don't look very nice'*. The owner hopes to replace the rafts with longlines next year. He also has a fully-equipped boat. The machine that pulls the mussel ropes out of the water can handle up to 4 tonnes of mussels per hour.

There is a landing site for the mussels on the shore with a road leading to it, so that the trucks that collect the mussels can drive all the way to the site. Once the mussels are harvested, they are dropped on the landing site at high tide. When the tide goes out, the mussels' shells close. The mussels have to be trained to close their shells when they are out of the water to ensure a safe journey to the buyers.

The company has two buyers: a local buyer who trades with France, and a mussel processor in Co. Donegal. A small amount of mussels is sold to a local restaurant, but the owner does not want to focus on local restaurants since *'it is a lot of hassle to sell 11 kilos to this restaurant and 15 to that. I did it when I'd just started but now I don't want to do it anymore'*

Relationships with other users

The owner feels that there is *'no problem with the other users'* of the Killary: *7 know all the fishermen personally and they are quite happy that I'm here. [...] The boys that work for me are all fishermen's sons. [...] I don't see much of the co-op, but if they don't want to talk to me then that's their problem'*.

One of his workers later remarked: *'some of the people from the co-op came down to have a look at our equipment and the way we're doing things here, they were very sceptical about the equipment and thought my boss wasn't going to make it. A year later they bought exactly the same equipment and it looks as if they all follow our example!'*

Concerns

Phycotoxins

So far the presence of phycotoxins has not affected the company significantly. The owner harvested mussels at one of his sites in the Inner Killary which *'was not affected by Red Tide'* when the fjord was closed. However, if the presence of phycotoxins becomes a regular phenomenon during the winter months, *'it will affect the company'*.

Future

The owner envisages a growth in production: *'It was a seven days a week job in the beginning and now I have finally reached the stage that I can start thinking about time for myself. [...] My first*

output was 20 tonnes, the next year it was 40, the year after it was 60, then 80, 160 and now it's 200. [...] I want to put in some more longlines once I get rid off the old rafts'

He also wants to extend the landing site, since it can only accommodate 10 tonnes of mussels. The road to the landing site will be improved, so that big trucks can drive down. Another improvement will be the building of a shed for storing gear near the landing area.

The owner hopes that somebody will come forward whom he can employ as a manager in future. However, *'it is hard to find people who have got the kind of commitment I need. [...] One of the lads who is working for me is really promising. He has been working here for two years now, hut he's still at school'*.

3.6 Adventure centres

Background

There are two adventure centres in the Killary area, Little Killary Adventure Centre/Killary Lodge and Delphi Adventure Holidays. Both centres are privately-owned.

Little Killary Adventure Centre and the Killary Lodge were established in 1978. The centres offers a variety of water-based and land-based activities to day visitors and visitors who stay for a longer period. While the Adventure Centre targets the young and active people, the Lodge is more orientated at the adult who wants *'a bit more comfort such as an en suite room!* The centre employs 11 staff members. The owners could not provide details on the total visitor numbers, but estimated that the Adventure Centre attracted some 3,000 visitors who stayed one or more nights. For Killary Lodge, this number was estimated at 2,000.

Delphi Adventure Holidays was founded in 1982. It is located in the Delphi Valley on the northern shores of Killary Harbour. The centre offers a wide range of water-based and land-based recreational activities for groups and individuals. Delphi Adventure Holidays employs 70 people. Approximately 15,000 people, the majority being Irish, visit the centre each year.

Resource management

The Little Killary Adventure Centre/Killary Lodge uses the Little Killary for sailing, sailboarding and canoeing. Waterskiing and paradescending take place in Killary Harbour.

The Delphi Adventure Centre uses the Inner Killary for canoeing, sailing, windsurfing, power boating and raft building. The centre wants to offer activities that are *'appropriate'* in the unspoilt environment of the area. For this reason, activities such as jet-skiing will not be developed.

Relationship with other users

The owners of the Little Killary Adventure Centre feel that the relationship with the other users of the Killary is *'quite okay'*. *'We don't have a lot of contact but everything is fine as long as we stay away from fishermen's nets. [...] The net fishermen object to our boats passing the nets too closely, but we seem to get on fine with everybody else.'*

The owners have a good relationship with Delphi Adventure Holidays. *We are in the same business and try to separate our activities'*.

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The owners have a good relationship with Delphi Adventure Holidays. *We are in the same business and try to separate our activities'*.

The Delphi Adventure Centre considers its relationship with the other user of the Killary to be good: *'we exist in harmony with the others. [...] We know them all personally!* This centre has some agreements with other users concerning the use of certain areas. In June and July, when the salmon net fishermen are active, the centre's activities do not take place in the Inner Killary. From October to January, the centre is allowed to use the river of Delphi Fishery for canoeing.

The only area of potential conflict is *'the mooring of the boats'*. The centre has its own side of the quay on the north side of the Killary.

Concerns

Overdevelopment

Overdevelopment is the main concern for both adventure centres. Little Killary Adventure Centre does not want to see more fish cages in the bay, but did not give a reason why they were against such a development. The quality of the water is an issue that will become a major concern for the centre if more users are allowed access to the bay: *'already you can see more visible evidence of waste from the salmon farm and mussel farms such as old buoys, ropes and plastic bags'*

The Killary is an *'unspoilt area'* and it *'should not be overdeveloped with rafts, etcetera'*. Delphi Adventure Centre emphasised that *'development needs to be managed'*.

Future

Little Killary Adventure Centre wants *to keep going'*. They do not expect any expansion in the near or distant future.

Delphi Adventure Holidays wants to continue the current programme. Development of new activities should be in line with the area's environmental characteristics. On the long term, the centre may expand.

3.7 Scubadive West

Background

Scubadive West is a diving school and also organises package holidays. The centre was founded in Dublin in 1974 and moved to the Little Killary in 1992. The water pollution in Dublin urged them to move and North West Connemara offered good opportunities for tourism development. The centre employs five full-time staff and is directed at the English and continental market. In summer, during a period of 25 weeks, Scubadive West will have 30 to 40 people a day on site.

Resource management

The scubadive centre provides for two types of divers; leisure divers and commercial divers. For beginning leisure divers, the centre offers a *'try-a-dive'* afternoon and diving courses leading to a certificate. For the experienced divers, there are diving trips to the islands of Claire, Inishbofin and Inishturk. The centre also offers commercial diving courses.

The diving activities mainly take place in the Little Killary, where the water is very clear. The centre also uses the Killary, but activities there usually take place in winter when the deep and sheltered fjord is ideal for diving.

Relationship with other users

Scubadive West has a *'very good relationship'* with Little Killary Adventure Centre/Killary Lodge. *'There is a very strong linkage. They put Scubadive West in their brochures as part of their multi-activities package and we send a lot of our people to the accommodation they provide.'*

'The fjord is taken over by the fishing industry such as the salmon farm and mussel and net fishermen. We have a good relationship with the owner of the salmon farm. We help each other out with boats. We are also friendly with the Killary Fjord Shellfish and the co-op. A lot of the mussel farmers have done our commercial diving course, so we know them well!'

Concerns

Lack of marine planning

The manager's major concern is the lack of marine planning in Ireland which can lead to future resource use problems. *We've got more coastline per head of the population than any other country and still the government manages to plunge a fish cage in front of the beach in Mannin Bay [bay in the southern part of North West Connemara]. There is no need for that, there is plenty of room for everybody to do their thing. The fact that the Killary is the way it is, is all due to the efforts of local people. The government grant aids everybody who is involved in marine resources, but they don't have a clue about coastal planning'.*

Future

Scubadive West hopes to grow in the future. *We've started here four years ago. There is a huge market in Europe that we've only begun to scratch at. There is nothing like this in Europe. We are at the most westerly coast in Europe with lots of inlets, the offshore islands, beautiful seas and an unspoilt area'.*

The manager emphasised that *'Little Killary is exclusively for leisure purposes and I hope it will stay that way in the future'.*

3.8 The freshwater fisheries: Delphi and Errif River

Background

The Errif River and Bundorragha River drain into the Killary from its north side. The Errif freshwater fishery is owned by the State. The Delphi Fishery is privately owned.

The Errif River is one of the premier salmon fishing rivers in Ireland. It has approximately 13km of angling water, divided into nine beats. The fishery also includes Tawnyard, a 250 acre sea trout lake and Derrintin Lough which holds wild brown trout. The fishery can accommodate 22 anglers who stay in Aesleagh Lodge or Aesleagh Cottage. The Errif Fishery was bought by the State in 1992. It has a small hatchery. In 1995, 662 salmon were caught by the anglers.'

The Delphi Fishery runs for 8km through the Delphi Valley and consists of Loughs Glencullin, Dhu and Fin, and the Bundorragha River which drains into the Inner Killary. The current owners bought the fishery in 1986 and employed 25 people in 1996. Guests stay in either the Delphi Lodge or Delphi Cottages. The Delphi Fishery has its own hatchery to rear 50,000 sea trout. In 1996, 217 salmon were caught at Delphi (DF, 1996b).

Resource management

Grilse and summer salmon arrive at the freshwater fisheries from late May onwards, with the runs peaking in June and early July (Box 3B). They normally weigh between three and seven pounds. The fish depend on heavy rainfall leading to floods to get back into the rivers. A dry April-September season means that the fish have few chances to return which is beneficial to the net fishermen.

Sea trout (*Salmonidae spp.*) arrive in July and August. Due to the declining number of sea trout in the Connemara area, a statutory ban on the taking of sea trout was introduced in 1990. Accordingly, all fish are returned alive. In 1995 only 181 small sea trout were caught at the Delphi Fishery as opposed to 305 in the original 'collapse year' of 1989 and 1169 in 1986 (DF, 1996a). In 1996, the trout catches doubled to 412 (DF, 1996b).

The decline in the population of sea trout is attributed to the decrease in the population of sea lice, caused by the salmon farms. A sea louse is a 'fingernail-sized crustacean that feeds on the dorsal fins and heads of salmonids' (Phyne, 1996:288). Research on this suggested causal relationship is still at an early stage, and research findings by DoM in 1995 'have been interpreted differently by salmon farming and angling interests' (Phyne, 1996:289). In 1994, the Government's Sea Trout Working Group, composed entirely of scientists reported that a highly significant relationship between linear distance from the nearest salmon farm and the level of juvenile *Scø* has been demonstrated and recommended that 'management should proceed on the basis of a connection between the collapse of sea trout stocks and juvenile lice production on salmon farms located less than 20km from sea trout fisheries' (DF, 1996a:2). Hitherto none of the Working Group's recommendations have been followed. In 1992, the SOS/Save Our Sea Trout Campaign started in Connemara, and went nation-wide in 1993 (*ibid*). The SOS organisation recognises that the fallowing of salmon production sites, as recommended by the Irish Salmon Growers Association, reduces sea lice levels, but opposes new licenses for fallowing sites. The organisation claims that salmon producers use these sites for increasing production rather than fallowing (Phyne, 1996). The use of offshore sites to alleviate the disease problem in inshore waters, is, due to its capital requirements, only feasible for large scale salmon farms (Phyne, 1996).

Relationship with other users

Representatives of both of the freshwater fisheries were reluctant to describe their relationship with other users. The Errif manager's only comment was: *I've got no problem with the fishermen, the mussel farmers and the adventure centres. It's a big area and there's no competition for space* He did not want to comment on the problems the other freshwater fishery experienced with the salmon farm or the fish lice problem in general.

The owners of the Delphi Fishery did not want to comment on the relationship with other users at all. Their involvement in the law suit against Killary Salmon, a number of other salmon farms and the Irish Government prevented them to provide the author with any but general information.

Concerns

Decline of the sea trout

The decline of the population of sea trout is of concern to both of the Freshwater Fisheries. Representatives from Errif and Delphi did not want to comment on the causes of this demise. The owner of Delphi was constrained by what he could say because of his involvement in the law suit,

but sent the Delphi Fishery Newsletter in which some 'facts' are recited: 'Killary Salmon Farm commenced operations in 1986' [...] Killary Salmon Farm took in more fish (c. 300,000) for the 1994/95 production cycle than any other year' [...] Killary Salmon Farm was found to have some of the highest lice levels in Ireland during the spring of 1995' [...] 'large numbers of small, medium and large sea trout were recorded in the lower pools of Delphi's river in May and June of this year. Severe lice infestations and consequent physical damage were plainly visible on these fish' (DF, 1996a:2). In the article, nobody or nothing else but Killary Salmon is blamed for the decline in sea trout population. Research findings by an independent consultant in the Killary suggest, however, that the hydrography of the Killary did not accommodate the dispersal of lice larvae. The maximum concentrations of lice recorded were in the mouth of the Errif River. Settlements recorded inside Killary Salmon's fish cages were of the order of only 1-2 lice per fish (ADO, pers.comm.).

The manager of the Errif Fishery is also concerned about the decline of the sea trout stocks. According to him, trout fishing extended the season for the local tourism industry: *'the trout fishermen arrive in this area when the other tourists have gone.'*

Draft netting

The owners of the Delphi Fishery are concerned about the draft netting for salmon. They perceive that draft netting is 'not in the interests of the local community [and] is a major barrier to the creation of better quality, long-term employment' (DF, 1992:5). In their Newsletter, they compare the economics of fly fishing with draft netting. Delphi's statistics indicate that the total income for netsmen in 1995 was around £40,000 or £4,000 per crew over a period of 35-80 working days. In contrast, they state that salmon fishing at Delphi is worth around £150,000 per year to the local economy. In addition, they estimate that the Errif Fishery generates another £300,000 (*ibid.*). Their reasoning is as follows: 'in that context, the commercial netting income from Killary [...] is peanuts. [...] The more fish caught on the rod, the greater the demand, the greater the local income, and the greater the employment' (*ibid.*:5). Fingleton & MacCann (1996) report that at national level, 'the economic value of the commercial sector is equivalent to 13% of that of the angling sector. The employment provided is equivalent to 13.5% of that provided through angling. [These figures suggest] that if driftnetting was ceased the value of the salmon resource to the national economy [...] would likely to increase by between 20 and 30% with a roughly equivalent employment increase' (p. 16).

One of the guests at Delphi stated: *'the problem is that the netsmen take all the salmon. Anglers bring more money into the economy. If the government starts talking about banning commercial salmon farming, the fishermen will probably say that it's their traditional right to fish. But now the time has come that common sense has to rule.'* In the Delphi Newsletter it was acknowledged that traditional rights, the elements of the sport and camaraderie should be taken into account by those who want to see the net fishing banned or restricted (DF, 1996a).

Impact of land use changes on the salmon rivers

Both the managers of the two freshwater fisheries mentioned the impact of land use changes, such as afforestation and sheep farming, on the salmon rivers. The past years the EU has stimulated sheep farming by giving subsidies to sheep farmers. The EU policies encouraged farmers to hold more sheep than the natural environment could sustain. The consequent overgrazing has resulted in severe erosion problems, especially of the loose peat which is characteristic to the area. The eroded peat gets into rivers and streams, causing, amongst other, siltation. This, on its turn, obstructs the circulation of fresh water, which is a necessity for the

survival of the salmon's eggs which are buried in the gravel on the beds of rivers and streams (cf. Fingleton & MacCann, 1996).

Future

The Errif Fishery is working on the improvement of the fishery. Erosion control and the construction of new fishing pools their main activity. These measures will '*hopefully increase the stocks in the fishery*'.

The Delphi Fishery has also started a river improvement programme which includes the construction of new fishing pools, the improvement of access to the left river bank, the construction of a foot bridge halfway up river, and to create individual beats for each of the river rods. The programme is due to finish in 1997 (DF, 1996a). The owners hope that the law suit will have passed through all its stages within four years, with a positive outcome on their behalf and the consequent regeneration of the sea trout stocks (*Ibid*).

For the coming 1997 season, Delphi is to take over responsibility for managing and improving the Kylemore Fishery and Dawros River, which are part of the resource management system of Ballynakill Harbour, the second research area (DF, 1996b).

3.9 Conclusion

The history of the Killary as a multiple-use resource dates back to the early 1980s when the traditional users - fjord and freshwater fishermen - witnessed the development of aquaculture and aquatourism enterprises. The presence of these multiple user groups had an important impact on resource management by the traditional users. Whereas in the past fishermen could use the whole fjord; the development of other activities has resulted in restricted access to fishing grounds, competition for space, a changing physical environment and changing socio-economic conditions.

Hitherto, collective resource management has happened on an *ad hoc* basis and mainly comprised of informal agreements between different groups, such as the mussel farmers' policy to keep the fairway and lobster grounds clear from rafts and longlines. The idea of starting a voluntary FORUM for 'single bay management' is tied up because of a conflict between the Delphi Fishery and Killary Salmon. Figure 3a presents a diagram of co-operation and conflict between the different user groups.

The diagram shows that inter-user conflicts that have evolved are mainly centred around the traditional users. However, one has to be cautious not to lapse into generalisations by stating that the fishermen play a key role in conflicts in the Killary. Fishermen are not a homogenous group, but comprise several sub-groups. The main area of tension evolves around and amongst the sub-group of salmon fishermen. The draftnet salmon fishermen feel that the use of driftnets near the Killary's entrance is negatively affecting their salmon catches which are already getting less. There is also tension between the draftnetmen and the freshwater fisheries, who are putting pressure on the government to conserve the salmon stocks. Fishermen fear that future salmon conservation measures will affect their fishing activities negatively, the potential ban on draftnetting being the worst case scenario. Despite these conflicts, however, the commercial salmon fishermen (both drift and draftnet) and the freshwater fisheries share their frustration about the drop in wild salmon prizes, which is the result of the large scale production of farmed salmon, and the decline of

The concerns regarding resource management are related to access to the resource, physical characteristics of the Killary, the influence of the market, and national marine planning. Figure 3b gives an overview of the different concerns listed by these three categories.

Figure 3b: Resource management concerns in Killary Harbour

User group	Access	Physical	Market	Marine planning
Fishermen (TU)	Loss of territory Competition (salmon)	Decline of fish stocks Water pollution	Oversupply salmon Drop market price	Top down approach
Freshwater fisheries (TU)	Competition (salmon)	Decline of fish stocks Fish lice and disease Nature conservation		Recommendations by Salmon Working Groups not followed
Salmon farm (NU)		Fish lice		License application
Mussel farmers (NU)	Policing Overdevelopment	Phycotoxins Water pollution	Unstable supply	Top-down approach Not sensitive to local needs
Aquatourism (NU)	Overdevelopment	Nature conservation		Lack of planning

Key: TU = traditional user; NU = 'new' users

The concerns of the traditional users are strongly biased towards 'competition' and 'loss of territory' due to the development of the bay into a multiple-use resource. Although fishermen acknowledge the presence of other factors leading to 'water pollution' and the 'decline of fish stocks', they perceive a direct relationship with the estuary's new status as multiple-use resource. The commercial salmon fishermen also perceive marketing problems due to the national and international oversupply of farmed salmon.

The 'newcomers' do not perceive the actual access to the resource to be a problem, but look at 'overdevelopment' in terms of aesthetic problems and its impact on the physical characteristics of the resource. In terms of the physical characteristics of the resource, all user groups of the Killary are concerned about the impact of ecological changes on their activities. The salmon fishermen and the mussel farmers are in particular concerned about the market for their product. However, whereas the fishermen are concerned about how the market affects their activity, the mussel farms are more concerned about how the physical characteristics of the bay (presence of phycotoxins) will affect the marketing of their product.

Bottlenecks in marine planning are central issue for all users, but are of a different nature for each group. The salmon farms concern is related to the license application procedure and refers indirectly to access to the resource, fishermen and mussel producers perceive problems with the DoM's top-down approach. However, whereas the fishermen perceive a total lack of participation, the mussel co-op feel that DoM does communicate about mussel production strategies in the Killary, but is reluctant to respect the 'keep the activity as local as possible' strategy. The

aquatourism enterprises perceive a lack of planning of the different marine activities which enforces inter-user conflicts.

In comparison with the other user groups, the traditional users have a more pessimistic view of the future of their activity within the Killary. Stock enhancement and water quality control still have to show their results. Conservation policies for salmon may affect their fishing activities negatively. In general they feel that government policies and support structures are more targeted towards the development of aquaculture and aquatourism. The latter groups are more optimistic. The aquatourism enterprises and mussel farmers feel they have not yet reached their full potential. However, water quality control remains an issue that has to be safeguarded. The aquatourism centres expect that the socio-economic trend to spend more leisure time outdoors will continue. However, in this context, the opening of new outdoor centres in the west of Ireland may result in increased competition with centres elsewhere.

This chapter discussed multiple uses in the Killary Harbour. The next chapter will focus on an estuary that has a more recent history as a multiple-use resource: Ballynakill Harbour.

4. MULTIPLE USES IN BALLYNAKILL HARBOUR

4.1 Introduction

Ballynakill Harbour is located in North West Connemara and includes a number of smaller inlets such as Bearna Dhearg Bay, Roeillaun Bay, Fahy Bay and Derryinver Bay. The river Dawros drains into Derryinver Bay from its north east side. The majority of the aquaculture and aquatourism activities in the area are still in a development phase. Aquaculture development has focused primarily on extensive and intensive oyster cultivation.

In the 19th century, the Ballynakill area was a relatively important native oyster fishery. Between 1860 and 1889, ten oyster licenses were granted, six of which were managed as a unit by the West of Ireland Oyster and Fish Company (Wilksins, 1989). By 1890, all licenses had been revoked. In 1903, the oyster beds had become completely derelict for unknown reasons (*ibid.*). Thereafter, the exploitation of the native oyster beds did not occur on a commercial basis until 1990.

Ballynakill Bay is classified as a Grade B shellfish harvesting area. Hitherto, phycotoxins at a level that is dangerous for human consumption have not been detected. There is, however, another problem related to the water quality. In 1991, it was discovered that 1.5% of the bay is infested with the protozoan *Bonamia edulis*, which causes the *Bonamia* disease. The disease affects mature oysters, which begin to show disease symptoms when they are three to four years old. Eventually, the oysters will die. Once *Bonamia* gets into a fishery it is impossible to eliminate (O'Connor *et al.*, 1992). Trials in the Netherlands to eradicate the disease looked promising initially, but failed on the long term (DoM Fish Health Unit, pers.comm.). *Bonamia*, along with pollution of the sea water and over-fishing has resulted in a drop in European output from 100,000 tonnes in the early 1950s to 12,000 tonnes in 1989 (*ibid.*). In Ireland, the disease was first discovered in Cork Harbour in the mid 1980s, and has gradually spread along the western sea board, nearly wiping out ail native oyster stocks in Galway Bay, the west's most important oyster fishery. In the Ballynakill area, *Bonamia* does not seem to be very active and has remained at the same level.

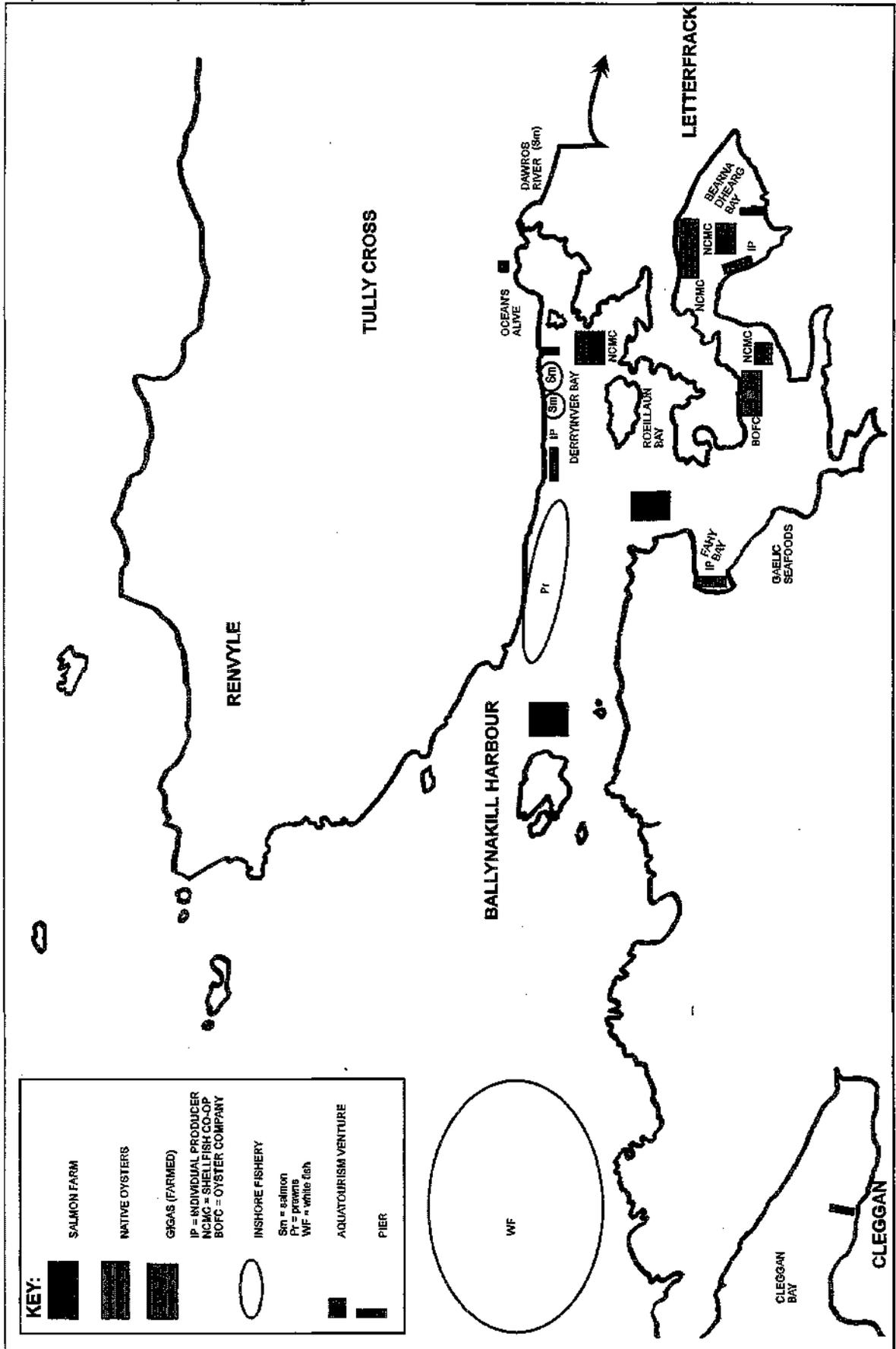
In this Chapter, the users of Ballynakill Bay are introduced, namely the inshore fishermen, the salmon farm, the shellfish farming co-operative, a private oyster company, individual shellfish producers, the marine resources heritage centre and the freshwater fishery. Their location is shown on Map 3.

4.2 Inshore fishing

Background

Ballynakill Bay has become a less interesting fishing ground for commercial fishing over the past years. The bay is very shallow which is a problem for trawling. Additionally, there is no market for such fish as mackerel, herring and plaice, which can be found in the bay. The population of sea trout, which used to be abundant, has become nearly extinct. As a consequence, fishing for finfish in the inner bay has become a domestic rather than a commercial activity. Trawling for white fish takes place in the outer part of the bay near the village of Cleggan.

Map 3: Multiple uses in Ballynakill Harbour



The only species that is fished commercially in the inner bay is shrimp (*Palaemon serratus*). There are two fishermen who fish shrimp. The shrimp season starts in September and lasts about 20 weeks till about January. Provided he has the proper equipment (approximately 200 shrimp pots), a fishermen can easily fish 60kg a week at a value of £10 a kilo.

In June and July, three draft net crews fish salmon from the two stands in Derryinver Bay, but data on this activity was restricted to the information of the Fisheries Officer of the Kylemore Fishery

Resource management

Shrimps are fished with pots. The fishermen put bait in the fish pot (usually mackerel) and once the shrimps swim into it, they are trapped. Every two or three days the fishermen have to lift the pots out of the water. The shrimps are then stored in a big tank and sold to a local dealer who boils and processes them before selling them at foreign markets. The fishermen also sell directly to local chefs.

Whereas the shrimp stocks in the bays around Galway, Ballyconneely and Clifden have declined dramatically due to overfishing, the stocks in Ballynakill Harbour have remained stable. As a result of the decline in stocks, the market price has increased from 60p a kilo to £10 a kilo over the past ten years. Theoretically, any fishermen who wanted to catch shrimp in Ballynakill Harbour is free to do so, which would put more pressure on the stocks. However, *'it's too expensive to fish shrimps if you don't have the equipment. A pot costs about £16 and you need at least 200 for any serious fishing'*.

The fishermen emphasised that the stocks need to be managed: *'in Galway and Clifden Bay, they took out all the shrimp they could get, even the small ones. We have agreed that we leave the small ones in the bay. They are the broodstock for the next season. If you don't leave them in the water, you won't find a lot of shrimp the year after'*.

Relationship with other users

The relationship between the shrimp fishermen and the other users of the Ballynakill Bay is *'quite good'*. Both of them are members of the shellfish co-operative in the bay.

The fishermen are not too happy with the presence of the salmon farm. One of them stated: *'I don't see any reason for the demise of the sea trout than the explosion of fish lice caused by that farm [and] the built up of feed under the cages is damaging the sea bed and the oysters. [...] Each of the fish farms want new sites to move their cages. Why would they move their cages if the water in the existing areas is okay?'* When the fish farm applied for a third site in the outer bay where the fishermen trawl for white fish, the fishermen strongly objected against the Environmental Impact Assessment that is part of the license application process. The fishermen were successful: the fish farm did not get the license.

Concerns

Decline of fish stocks

The shrimp fishermen's concern is the potential decline of the shrimp stocks due to problems created by the salmon farm. *'In 1982, the shrimp population was virtually extinct because of the TBT [Tributyltin anti-fouling paint] used by the salmon farm. The government carried out a study*

of the bay. Once TBT was banned, the shrimp came back. Something like this may happen again and affect the shrimp and the oysters of the co-op'.

Future

According to the fishermen, their future is insecure. One of the shrimp fishermen used to be a full-time fishermen during the fishing season (May to September). He gave up fishing for finfish and now only fishes shrimp. Provided the shrimp fishermen can manage the fishery and '*secure the stocks*', and provided that externalities do not take place, shrimping can continue as a viable inshore fishing activity that provide the fishermen '*with a few weeks of really good wages*'.

4.3 Gaelic Seafoods Ltd.

Background

Gaelic Seafoods Ltd. used to be called Tullymountain Salmon Ltd. The finfish farm was established by two Dublin producers in 1978 and focused on the production of rainbow trout (*Salmo gairdneri*), but once the company started to expand it shifted to the production of salmon. The small scale of the farm, with its two owners virtually performing all the work themselves, contributed to its initial acceptance. In 1984, the company lost all its fish in a heavy storm and the farm faced bankruptcy. With help of the National Development Corporation, which bought 40% of the shares, the company could reinvest. Later, two international cigarette producers owned a great number of the shares. Gaelic Seafoods Ltd., a Scottish multi-national and Europe's largest seafood producer, took over from Rothmans in 1992. The salmon farm is a fully integrated company having its own hatchery and own processing and marketing line. The farm employs 9 full-time workers and 2 part-timers. It has two sites in Ballynakill Bay. It has 16 fish cages and produces 600 tonnes of salmon per growth cycle.

Resource management

Gaelic Seafoods Ltd. has a different approach to salmon production than the salmon farm in the Killary. The company buys all its small fish at the same time and sells them all once the growth cycle is completed. The past years, the company produced less. Production has declined from 1,000 to 1,200 tonnes to 600 tonnes. According to the site manager this decline was caused by '*a change of production tactics*' and the fact that '*the farm changed hands a couple of times*'. This decline in production also had its impact on employment in the area. In 1989, the company employed 33 full-time workers and 10 part-timers compared to 9 full-time and 2 part-time staff in July 1996.

In the past, the farm had '*a bad history of disease problems*', such as Pancreas disease and fish lice. The site manager emphasised that this resource management problem is '*much better controlled*' now due to '*better medicine*'.

The salmon farm does not have any special measures to reduce its impact on the environment, such as a computerised feeding system. It complies with all the rules set by EU Directives and government rules. However, the site manager feels that the farm has '*higher standards than other farms in the country. [...] For example, we stopped using TBT long before it was officially banned [and] the fishermen were still using it⁵*'.

In 1989, the company applied for licenses for a third site in the bay. '*The objective was not to increase the tonnage but to spread the fish over more cages to make diseases more*

controllable'. However, the application was not successful because of local objection on the Environmental Impact Assessment (EIA). The locals *'were afraid of an increase in the population of sea lice and the impact of chemicals'* on the water quality. According to the site manager, the third site *'would have been better for the bay [but] we could not convince them'*.

The salmon farm used to have an aquatourism programme, which provided tourist with an opportunity to visit the farm. A visit included a lecture, audio-visual material, a boat trip to the cages, followed by tea and cake. If there were too many people, the farms rented the boat of the owner of Ocean's Alive. When Gaelic Seafoods took over the programme finished, since this company was not interested in the profitable tourism business.

Relationship with other users

The site manager described the company's relationship with the other user groups of the bay as *'generally quite good'*. However, *'I think they want us out. People here are very suspicious about fish farming and the fish farms are used as the scapegoat if there is a problem in the bay such as the decline of the fish stocks. [However,] when we lost a lot of jobs here, people had a different opinion on the farm'*.

When he was asked about his opinion on the decline of fish stocks was, the site manager replied: *'I think their [the fishermen's] approach to fishing is wrong. First, they all fish for lobsters and when the lobster stocks decline and one of them successfully fishes shrimps, they all start fishing shrimps till those stocks have gone'*.

The salmon farm has a good relationship with the owners of the Dawros river, a freshwater fishery. The site manager believes that the company's hatchery in one of *the loughs* is *'good for the fishery of the nuns [Kylemore Abbey]'*.

The manager also mentioned their relationship with Ocean's Alive, the recently established marine heritage centre. *'When we did tours for tourists and we had too many visitors, we rented [the current owner's] boat. [...] I think our programme gave him the idea for his centre, which is good'*.

Concerns

Licenses

The application for licenses is the company's only concern. Licensing is a long and costly process and the public has an important impact on the granting of the required licenses. The company lost an application for a third site due to local objection. *'A lot of jobs would not have been lost if we would have gotten that third site. [...] the license application is still in the works, but I don't know if Gaelic Seafoods wants to invest the money and help to convince the locals about the advantages of the new site'*.

Future

The site manager hopes that the salmon farm will expand a bit and will create more jobs. However, *'we will never reach the production levels we once had'*. It is not clear if Gaelic Seafoods Ltd. is willing to invest in the farm.

4.4 North Connemara Marine Co-operative Society Ltd.

Background

The North Connemara Marine Co-operative is a production co-operative and was established in 1991. The co-op's main priority was to revitalise the derelict native oyster beds in Ballynakill Bay. In 1993, the co-op started a second project: a demonstration farm for the production of Pacific oysters of *gigas* to assess the bay's suitability for growing this species, and to encourage individual members to start off their own project. The co-op also did some trials with scallop production. The co-operative sub-leases its sites from the Ballynakill Oyster Fisheries Company Ltd.

The co-operative is managed by a Board of Management, elected by its members on the Annual General Meeting. In 1996, the co-operative had 92 members who pay an annual fee of £20. Seventy-five members have a share in the restocking project. Their share consists of a cash payment of £150 plus 18 days of voluntary work valued at £25 a day.

Problems with the restocking programme, the collapse of the market price for native oysters in 1992 and the *Bonamia* scare in 1992/93 prompted the co-operative to diversify resulting in the adoption of the *gigas* and scallops projects. During the period 1991-1995, the co-op received financial, technical and managerial support from BIM, FORUM, FAS and the local Aquaculture Development Officer. At least 66% of an estimated grant aid sum of £77,500 was donated by BIM. The co-operative still relies heavily on the external agents, and some of its members have a very opportunistic attitude towards these agencies, which are seen as the 'guardians' of the co-op's continuation (see Steins, 1995; 1996a). In December 1995, the co-op harvested its first 500kg of *gigas*. In August 1995, the co-op sold 1 tonne of *gigas*, with a prospect of selling another 6 tonnes to the same buyer.

It must be noted that, although the co-operative's main objective is to develop shellfish farming in the bay, for many members its establishment was a reaction to the expansion of the salmon farm in the local bay (Steins, 1995; 1996a), or as one member put it *'actually, the first objective for the co-operative was to create our own territory which the salmon farm couldn't get'*.

Resource management

The North Connemara Marine Co-operative had a lot of problems during its development stage. At start-off it was estimated that once the beds were restocked, they would yield 200 tonnes per year at a value of £4,000 per tonne. This prospect attracted a lot of members. In 1992, the price for native oyster collapsed with 50% per tonne, and on top of this it was discovered that 1.5% of the bay was infested with *Bonamia*. The most critical problem, however, was the failure of the voluntary work scheme, which was a fundamental part of the restocking programme. Although all the members have paid the cash part of the share, only a third has also fulfilled their labour days.

The failure of the voluntary work scheme is a combination of many factors, such as conflicting individual interests, the long waiting period between start off and first yield, opportunity costs in tourism-related activities at the time when the voluntary work needed to be done, and frustration because free-riders were not punished (see Steins, 1995). The co-op successfully applied for a Social Employment Scheme in 1992, 1994 and 1995. However, the restocking programme still was not successful. Only 1 % of the spat reached marketable size. Additionally, a study carried

out by Aquafact Ltd. in 1995 showed that the carrying capacity of the bay is only 70 tonnes a year rather than the projected 200 tonnes (Aquafact Ltd., 1995). The original restocking programme was then abandoned. The Board now has to make a decision on the future utilisation of the native oyster sites. The ADO has outlined two options: (i) to buy in native broodstock or half grown oysters; or (ii) to use the beds for the bottom culture of Pacific oysters.

The *gigas* project, which began as a pilot project in 1992, is now the co-op's prime focus. The work at the project is done by the workers of the Social Employment Scheme. *Gigas* are grown in bags on trestles. In July 1996, the amount of trestles had increased from 225 in the summer of 1994 to 1,200. In December 1995, the co-operative sold its first output of 500kg. A second output of 1 tonne was sold in August 1996. In the summer of 1996, another 500,000 spat will be put on trestles.

The scallop project that was undertaken in 1993, has now been abandoned due to poor results. The scallops were sold to Killary Salmon Farm Ltd. where *'they are doing alright'*.

Although it was the co-op's intention from the beginning to stimulate individual members to start their own *gigas* farm, attempts were not successful until 1995. The first member has begun his own farm with assistance of the PESCA programme and a second member is currently applying for licenses. The individual producers will be discussed in Section 4.5.

Relationship with other users

Many fishermen, one of the owners of the Ballynakill Oyster Company, and the owner of the marine heritage centre, are members of the co-operative which encourages friendly relationships between these groups. In the past, fishermen members would lend their boats to the co-operative when the sea-based sites of the co-op (scallops) had to be checked; since these sites are not used anymore, this agreement automatically ceased. Nowadays, the co-operative only has an agreement with one of the owners of the oyster company to use equipment (e.g. shellfish grader) at his hatchery.

Concerns

Membership issues

The membership problem is the co-op's most critical concern. Physically, it is impossible to provide 92 members with an add-on income from *the gigas* project. The bay *'can only handle six or seven producers'*. Even if the Board would decide to pay the 92 members a share from the co-op's profits, they will still have to resolve the fact that nearly two-third of the members are not fully paid up and do not seem to be willing to pay their outstanding dues.

The most likely solution to the problem is to *'pay back the people who are not interested anymore'*. However, at present the co-operative does not have the financial means to do this. In addition, this strategy implies that the Board will have to discuss a new management structure for the co-operative. Questions such as: *'what are we going to do with the members who are interested?'* and *'what are we going to do with the gigas site?'* will be major focus points during such discussions. The prevailing attitude seems to be that *'individual production of gigas is the only way forward'*. In this scenario, where the co-operative becomes a service co-operative, the *gigas* farm could become both a demonstration farm and a way for the co-op to get some additional financial assets.

Coliapse of market price for *gigas*

In 1995, the price for *gigas* collapsed from £1,000 to £700 a tonne, and at one stage even went down to £600. This is a major setback for any producer of *gigas*: *'at a market price of £600, you only make a profit of £60 a tonne. [...] To employ somebody full-time, you need at least 20 tonnes per year and I'm talking about a normal market price here. [...] So you see it is not really worthwhile to produce when the market price is this low'*.

Although the North Connemara Marine Co-operative does not (yet) employ anybody, they experience another problem regarding the collapse of the market price: *We can't sell the *gigas* at such a low amount. [...] If we could sell them for £1,000, we may be able to pay back the shares of the people who are not interested anymore'*.

Success of the 500.000 *gigas* seed

In the summer of 1996, the co-op put in another 500,000 *gigas* spat. If this spitting programme is not successful, the co-operative will loose a big investment. One of the informants went as far as to state: *'if this spat does not grow into marketable oysters, the co-operative will be finished'*.

Future

The co-operative's future is insecure. A first output of 1.5 tonnes of *gigas* have been sold in the summer of 1996. The co-operative has good prospects to sell another 6 tonnes in this same period, but the low market price and the Board's indecisiveness on whether or not to sell are major obstacles. The successful growth of the 500,000 spat that were put on trestles in 1996 is another factor of insecurity. Only successful growth and an increase of the market price can cover the co-op's investments, and provide them with capital to increase production in order to deal with the membership problem. However, even in a situation where the Board is able to buy the non-interested members out, this strategy will not be without its problems for, in this small community, people are not willing to sanction fellow community members (Steins, 1995).

4.5 individual producers

Background

Three individual producers have a site for *gigas* production in Ballynakill Harbour, each being members of the North Connemara Marine Co-operative. The first producer started in September 1995. His brother started a farm in that same period, but for this producer the farm is an experiment to see if he wants to go along with shellfish production. The third producer has just been granted the required licenses and has not yet started farming.

The only 'active' producer started his farm after he had been working for the co-operative's Social Employment Scheme: *'without the scheme, I would never have become involved in individual farming [...]. I thought it was a good thing to do. When you work for yourself, you will work much harder because it's your own property'*. This producer got free seed for experimental purposes from the PESCA Programme to examine the relationship between density and growth of scallops and to examine the productivity at different sites. The operator gets assistance from the local Aquaculture Development Officer (ADO).

Resource management

The site can hold a total of 500 trestles. The producer has 250 trestles now and hopes to have his first output (approximately 12 tonnes) by the end of 1997. The producer still works at the Social Employment Scheme of the North Connemara Marine Co-operative, since he does not get any returns from his own farm yet.

The other, already established, individual *gigas* producers in North West Connemara sell their *gigas* to local hotels and restaurants. The producer in Ballynakili Bay has no intention to sell his future produce locally: *'there will be too much competition if I would do that. I will sell to buyers in Westport'*. It is not clear whether or not sales will go through the co-operative.

Relationship with other users

Since this producer has just started he has not experienced any problem with the other users in the bay: *'they don't bother me'*. He never experienced any problems during his work for the co-operative.

Concerns

Market price

The market price for *gigas* *'goes up and down'*. The past years, the price has collapsed to a minimum of £700 a tonne. If the price goes down even more, it will not be viable to produce *gigas*.

Future

The individual producers in the area between Ballynakill Harbour and Mannin Bay (to the south) with help of the local ADO are negotiating to start a producers group to organise sales and provide facilities for its members. One of the ideas is to buy a mobile grader that can be used turn by turn by the individual producers. At present, the individual producers use the grader of the shellfish hatchery in the area, but *'it's a lot of hassle to bring the oysters to the hatchery, especially for people who live far away [...], and the fact that you depend on the tide makes it even more problematic'*.

The individual producers are trying to set up a constitution now and make rules. *'It's not going to be a co-operative, but a kind of FORUM. But we need rules, without that it won't work'*.

4.6 Ballynakill Oyster Fisheries Company Ltd.

Background

Ballynakill Oyster Fishing Companies Ltd. is owned by two local Frenchmen' and was established in 1982. The company started with the experimental production of *gigas*. The spat (5-6 tonnes) grew well. However, in 1985 the company experienced a setback when the *gigas* started to grow out of shape as a result of the use of Tributyltin (TBT) anti-fouling paint on the nets of the salmon farm in the bay. The company could not sell its *gigas*. In 1986, scientific research revealed that Ballynakill Harbour had the highest concentration of TBT in Ireland (Ruddy & Varley, 1991). In 1990, the company also started to focus on the production of native oysters. The company employs one full-time worker and two or three part-timers, depending on the amount of work.

Resource management

The company subleases 20ha from a private individual who has a license for 70ha in the bay which dates back to the beginning of the century. At present, the company uses 5ha.

After the TBT-ban in 1987, the production of *gigas* once again became the company's main priority. *Gigas* are grown in bags on trestles on the foreshore. The Pacific oyster reaches marketable size in two to three years, but it cannot reproduce because of low water temperatures. When the tide is out, the bags have to be shaken and turned in order to stop the *gigas* from growing against each other. The bags also have to be graded from time to time.

In 1996, the company had 500 trestles. The spat is grown outside Ballynakill Harbour in Streamstown Bay and when the *gigas* are half-grown, they are transferred to the site in Ballynakill Harbour. Recently, the company also started an experiment with bottom cultivation of Pacific oysters. Half a tonne of spat was put in the bay and so far the results have been promising.

The production of native oysters has been kept at a very low level after it was discovered that 1.5% of the bay was infested with the protozoan *Bonamia ostrea*. In Ballynakill Harbour, the disease does not seem to be very active, but the company remains cautious. The disease has no impact on the production of *gigas*.

Relationship with other users

Ballynakill Oyster Fisheries Company Ltd. has a very good relation with the North Connemara Marine Co-operative. The latter group subleases part of their licensed area from the company. The company's representative, who has a shellfish hatchery in Streamstown Bay, is a member of the Board of the co-operative, and *'the people of the co-operative sometimes grade their oysters here at the hatchery'*.

The relationship with the former Tullymountain Salmon Farm (now Gaelic Seafoods) used to be bad due to the setback the company experienced due to TBT-pollution in the mid 1980s. The salmon farm changed hands a couple of time and the company *'does not see much of them at the moment'*.

Concerns

Pollution caused by salmon farm

Although TBT has been banned and TBT-related pollution gradually disappeared from the bay, the company still identifies problems related to the presence of the salmon farm. The first problem are the micro-algae that settle on the *gigas'* shells which affects their market price. These micro-aigae are related to the release of nutrients, such as nitrate and phosphate in the water which is the result of the dropping of waste feed and faeces on the seabed under the cages. This used to be a major problem, but has become less the past years.

According to the company's owner, the presence of the salmon farm has increased the number of algae in the bay significantly. When there is a western wind, these algae drift to the end of the bay where the whole population of clams (*Meretrix lusoria*) has completely disappeared. The same could happen to other bivalve molluscs.

Grade B water quality

The water in Ballynakill Harbour is classified as Grade B. This does not cause any problems for the growth of the oysters, but is a problem in terms of marketing. All oysters have to be depurated, heat treated or relayed before they can go for human consumption.

Development of tourism

The company does not have problems with the development of tourism as long as the facilities for tourists are developed in such a way that they cause minimum impact on the bay. However, the company opposes the presence of facilities such as a marina. The presence of a lot of yachts would have an important impact on the water quality of the bay since '*boats do not have septic tanks*'.

Future

It is the company's intention to extend the 5ha they have got in use now. Bottom cultivation of *gigas* is the major development issue for the future: '*the gigas grow much better and have a better shape when they are not grown on trestles*'. The company has also started some experiments with the production of abalones (*Haliotis discus hannai*).

4.7 Ocean's Alive

Background

Ocean's Alive is a marine resources heritage centre located at the shore of Derryinver Bay. Although the centre will be officially opened in the summer of 1997, the centre opened its doors to visitors in July 1996. In 1990, the owner of the centre started to organise boat trips and sea angling trips for tourists in the bay. From this experience he knew that tourists were very interested in the sea and its resources. Since there was no sea centre in the area, he decided to start one himself.

Resource management

The centre has an indoor exhibition including aquariums with shellfish, finfish and seaweed, seabirds, the history of fishing in Connemara, and an audio-visual show. Outdoor displays feature old boats and marine equipment. There is a tea-room and a playground for children. It is also possible to book a sightseeing cruise or sea angling trip on the centre's boat.

Since the centre is not officially opened yet, the exhibitions are still in a development phase. However, the centre had to open its doors twelve months before the official date to generate funds. The owner had to make an enormous investment to start the centre, and did not receive any substantial grants. He is awaiting a £19,000 grant from one of Co. Galway's development agencies, but that's only '*a minor grant*'. He also hopes to receive support from the PESCA Programme.

Relationship with other users

The owner is a member of the North Connemara Marine Co-operative and also knows a lot of the fishermen who use the bay. His relationship with the other users is '*good*' and '*there is a fair amount of communication*'.

Concerns

Competition for space

The owner's only concern is the potential expansion of 'no go areas'. He would not like to see any company successfully applying for a license for a big area and put structures in it that prevented the other users of the bay to use that area. He mentioned the example of the sites of Gaelic Seafoods Ltd, where the cages prevent access to that part of the bay.

Future

The future *'looks very good'*, according to the owner. *'The visitor numbers are very promising'*.

The number of people engaged in aquatourism activities such as sea cruises and angling trips is gradually increasing. There are a number of other boat trip companies in North West Connemara that organise trips to the islands of Inishbofin and Inishturk and sea angling trips. Hitherto, these companies have all advertised separately in hotels, B&Bs, restaurants and pubs. The idea is to start advertising together in newspapers and local radio station.

4.8 The freshwater fishery: Kylemore fishery

Background

The Kylemore Fishery comprises three loughs and over three miles of river, and drains into Ballynakill Harbour through the Dawros River. In 1863, the owner of the Kylemore Estate commenced fish farming. Over the years, salmon breeding continued successfully and when the Estate was sold the new owners continued the hatchery (Wilkins, 1989).

In 1920, the Estate became the Kylemore Abbey. Besides its religious function, the Abbey accommodates a girl's (boarding) school, a craft centre and shop, and a restaurant. The Benedictine Order did not become involved until 1994, when the Abbey started to manage the fishery directly. Besides the Abbey, the Kylemore fishery is owned by two other owners: Kylemore House and the McCormick family (Dublin). In total, the Kylemore Fishery can accommodate 16 anglers. It is believed that the fishery produces around 150-200 salmon a year. In 1996, the total estimated salmon catch was 250 (DF, 1996b).

Resource management

Kylemore Abbey owns the right hand side of Kylemore Lake and the right bank of the Dawros River. Kylemore House owns the other side of the lake. The other bank of Dawros River is owned by the private owner from Dublin; he also owns the other lake. In 1994, the owners of the Kylemore Fishery, in collaboration with the Western Regional Fisheries Board, restarted the old derelict salmon hatchery. The project is backed up by the EU, which provides subsidies for the restocking of freshwater fisheries. The project is a pilot scheme on a five years' grant.

Although there are sea trout in the fishery, it is advertised as a salmon river. Kylemore used to be a classic sea trout fishery, but has also suffered from the sea lice problem. In 1996, the sea trout population has increased in this fishery. The fallowing of Gaelic Seafoods over the springs of 1995 and 1996, is mentioned as a major factor that contributed to this positive development (DF, 1996b).

In order to fish, recreational fishermen need a state license and, in addition, need to buy a permit for the different parts of the fishery from the different owners. The prices for these licenses differ per owner. For example, a boat (including a permit) at Kylemore House costs £30 a day; a license for fly fishing issued by Kylemore Abbey is £25 a day. *We are no commercial fishery like Delphi. The Abbey does not depend on the fishery, it's more an added attraction.* The owners employ bailiffs to control the fishery.

Relationship with other users

According to the Fisheries Officer, the relationship with other users is good: *'when you work as a Fisheries officer you have to be friendly with all users. This year there was no hassle, relationships were fairly friendly. [...] Ballynakill [Harbour] has two stands for netsmen. There is no problem with the fishermen, they have got a license. [...] The fishermen who are licensed to catch salmon are a kind of guardian as well.'*

The Fisheries Officer perceives that the salmon farm is the most controversial user. When he was asked about his opinion on the salmon farm, he answered: *'the fish farms are as keen to solve the lice problem as the Fisheries Board. [...] I don't know anymore [...]. The law suit is going to bring something in the open.'*

Concerns

Decline of the sea trout

The Kylemore Fishery first experienced a decline in the sea trout population eight years ago. According to the Fisheries Officer, *'many factors [for the decline] have been mentioned, such as diseases and the salmon farms. It hasn't been proved what caused it.'*

Future

The Fisheries Officer remarked that there has been *'a slight improvement in the number of sea trout. [...] We had a fantastic sea trout fishery. We hope to improve it with the hatchery.'*

The responsibility for the management of the parts of the fishery that belong to the Abbey and to the McCormick family, will be taken over by the Delphi Fishery (Killary area) in 1997. Kylemore House will continue to operate their own boats from the lake at the top of the system. The restoration of the fishery and facilities will be primary objectives for the new managers, since the Kylemore Fishery has suffered from lack of full-time management (DF, 1996b). The fishing week will run from Sunday to Friday inclusive, with Saturday being kept mostly for local anglers who will be able to take advantage of special rates (*ibid.*).

4.9 Conclusion

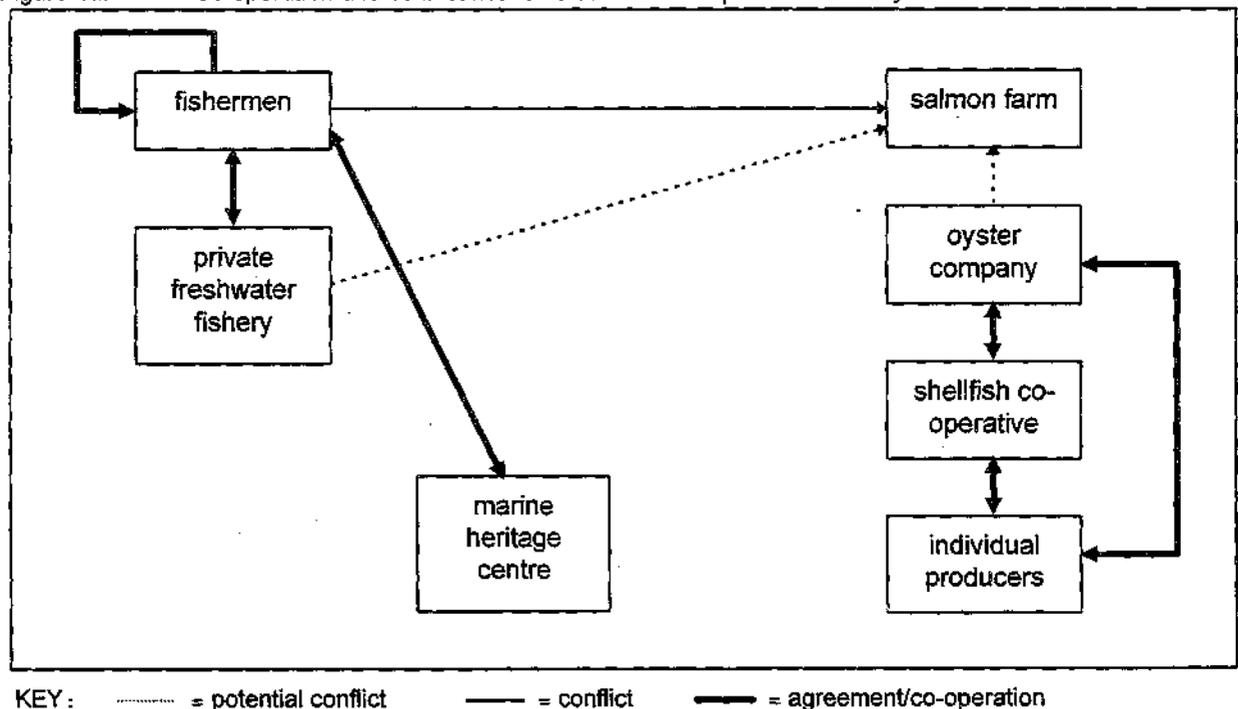
The development of Ballynakill Harbour into a multi-use resource is a relatively recent development. Although the first 'newcomers' - the salmon farm and the Ballynakill Oyster Fisheries Company - were established in respectively 1978 and 1982, the nature of these operations at the time can be described as experimental. The development of Ballynakill Bay into a more complex multiple-use resources dates back to the end of the 1980s. In this period, the salmon farm's production reached its peak and Ballynakill Oyster Fishery Company moved from its experimental stage into a production-orientated phase. During the same period, the first

steps towards the development of aquatourism in the bay were made. In 1991, the shellfish farming co-operative was established, partly as a reaction to the expansion of the salmon farm.

Collective resource management strategies have not yet been developed. The different user groups seem to be working in isolation from each other. Figure 4a presents a diagram of conflicts and co-operation between the users of Ballynakill Bay.

Conflicts and potential conflicts evolve around the activities of the salmon farm. The small scale of the operations contributed to its initial local acceptance (cf. Ruddy & Varley, 1991). However, as the size of the salmon farm expanded and the use of chemicals in the production process became known, concern amongst fishermen and other locals about the potential chemical pollution of the water was aroused. In addition, fishermen felt that access to the bay was restricted by the expansion of the area that was farmed. The oyster company used to have a conflict with the salmon farm as a result of production losses due to TBT used by the farm. This issue is resolved now. However, future conflicts over negative effects on bivalve molluscs due to the increase of micro-algae caused by salmon production, are not unlikely to evolve. The Fisheries Officer of the Kylemore freshwater fishery would like to see some scientific prove on the suggested link between salmon farming and the demise of the sea trout stocks. If this link appears to be present, a potential conflict between this fishery and the salmon farm will only be avoided if immediate action is undertaken.

Figure 4a: Co-operation and conflict networks between multiple users in Ballynakill Harbour



In terms of informal relationships the co-operative, which is very much a 'newcomer', has the strongest links with the other users because of the involvement of its members in these other activities. Agreements between user groups are more orientated towards using each other's equipment than towards the allocation of marine resources. The latter are present within user groups only, such as the fishermen's agreement not to fish shrimp under a certain size.

Agreements on using equipment mainly take place between the shellfish producers. Although there are no agreements between draftnet salmon fishermen and the owners of the Kylemore fishery, the Fisheries Officer regards the licensed fishermen as guardians of the wild salmon stocks.

The concerns regarding resource management are related to access to the resource, physical characteristics of the resource, the market, marine planning and the operational management of the specific resource use. Figure 4b lists the different concerns.

Figure 4b: Resource management concerns in Ballynakill Harbour

User group	Access	Physical	Market	Marine planning	Operational management
Fishermen (TU)		Decline of fish stocks Water pollution			
Freshwater fishery (TU)		Decline of fish stocks			
Salmon farm (NU)				License application	
Shellfish co-op (NU)		Success of <i>gigas</i> ' spat	Drop market price		Free-riders Weak financial position
Individual <i>gigas</i> producers (NU)		Experimental stage	Drop market price		
Oyster company (NU)		Water pollution	Development of tourism & leisure		
Aquatourism (NU)	Competition (space)				

Key: TU = Traditional User; NU = New User

Although perceived access problems were an important incentive to start the shellfish co-operative, competition for space is now only a concern for the aquatourism operation. Obviously, those people who feared a loss of territory, have secured their space by creating property rights through their membership of the co-op. The traditional users share their concern about the 'decline of the fish stocks'. The fishermen, however, perceive a direct link between the operations of the salmon farm, water pollution and the potential decline of the stocks; the Fisheries Officer of the freshwater fishery is more reserved in pointing out this link due to lack of scientific evidence. 'Water pollution', for which in general the salmon farms are blamed, was also mentioned by Ballynakill Oyster Fishery Company which experienced pollution problems before the TBT-ban. In this respect, the 'impact of tourism development' on the water quality was also an issue of concern for this user.

Problems concerning government regulations are only felt by the salmon farm that was refused permission for a new site in 1989. The co-operative experiences operational management problems related to its free-riding members and its weak financial position. Their concerns seem to be more linked to short term developments. A shared concern for the user groups engaged in the production of *gigas* is the low 'market price'.

The future for many of the user groups in Ballynakill Harbour is relatively insecure: shrimp fishing provides the fishermen with a good income, but will only continue if the fishermen are able to secure the stocks and if the market price will remain high. The future of the freshwater fishery depends on the success of the hatchery and a solution to the sea lice problem. The co-operative is still waiting for sufficient returns from their venture, and the individual producers have just started their experiments. Although the salmon farm has a stable production, it is not certain what the Scottish owner's future plans are.

The only two producers who see a bright future are Ballynakill Oyster Fishery Company and Ocean's Alive. The former intends to increase its production, the latter bases its optimistic ideas on the very promising visitor numbers to the only sea-life centre in the area in its first year of operation.

In the final Chapter, the two case studies will be compared and implications for resource management will be examined.

5. MULTIPLE-USE RESOURCES AND CO-OPERATIVE LINKS

5.1 Introduction

Of particular importance for the study of resources that are held in common is the issue of co-operation or collective action. The extensive body of literature on this subjects suggests a number of factors that encourage collective action. However, these factors are mainly related to 'internal' characteristics of the resource system and stem from empirical research on commons that are characterised by one single, extractive use. In situations where activities by different user groups take place in the same resource system, the issue of co-operation becomes even more important, since each group's actions will have an impact on the resource use by other user groups, and on the management of the resource as a whole (Chapter 1). This final chapter examines the factors that affect co-operation in a multiple-use setting, based on the examination of the two case studies in Chapters 3 and 4.

In Chapter 3, resource management in Killary Harbour was discussed. The Killary's history as a multiple-use resource dates back to the early 1980s when the traditional users witnessed the development of aquaculture and aquatourism enterprises. These developments had a significant impact on freshwater and inshore fishing activities. Although friendly relationships between users have evolved over the years, collective resource management in the Killary takes place on an *ad hoc* basis. The idea of organising a user group FORUM for 'single bay management' is tied up due to a conflict between one of the freshwater fisheries and the salmon farm.

Ballynakill Harbour, as discussed in Chapter 4, developed into a more complex multiple-use resource by the end of the 1980s. In this area, the user groups seem to work in isolation from each other and collective resource management strategies have not yet been developed.

5.2 A comparison of the case studies

Figures 3a (p.31) and 4a (p.32) presented an analysis of agreements and conflicts between the user groups in Killary and Ballynakill Harbour. An analysis of the concerns of the user groups was presented in figures 3b (p.49) and 4b (p.50). A comparison of these figures shows some striking differences and similarities between the two multiple-use situations. These will form the basis for the examination of factors that have affected co-operation. It should be noted, however, that each setting is unique in terms of its physical and socio-economic characteristics. Any comparison will have to take these 'context-specific' factors into account; conclusions should not be based on the assumption of the presence of two identical research areas.

The following differences can be identified:

- a. in Ballynakill Harbour, the salmon farm operates in isolation from other user groups, whereas in the Killary the salmon farm has established co-operative links with other user groups;
- b. aquaculture user groups in the Ballynakill area co-operate closely, but they do not co-operate with other users of the bay; in the Killary, only two aquaculture users work together and have reached agreements with other users;

- c. shellfish producers in the Killary are much more concerned about long term factors that have an impact on resource management than producers in the other area;
- d. in the Killary, there is a potential conflict among fishermen on the use of drift nets for salmon. In Ballynakill, this does not seem to be the case. In Ballynakill Harbour fishing activity is restricted due to its shallow waters and, as such, is not an important finfish fishing ground; this may be a possible explanation for this difference. However, missing data on net salmon fishing in this case precludes further analysis of this issue.

The following similarities were found:

- e. the traditional users perceive (potential) conflicts with the activities of the salmon farm;
- f. traditional users are concerned about the decline in fish stocks;
- g. the salmon farms indicate problems regarding license applications.

How can these differences and similarities be explained? And why are they significant for the study of multiple-use resource management?

The differences in the relationships that the salmon farms have established (see factor a) must be seen in the light of the changing attitude of local communities with respect to this activity. When the two Dubliners started their farm in Ballynakill Harbour in 1978, salmon farming was in a pioneering stage in Ireland. Regulations for finfish farming on sea sites were not made until the 1980 Fisheries Act and many aquaculture enterprises were established without the required licenses. Community involvement in the licensing process was not an issue (O'Connor *et al.*, 1992; Ruddy & Varley, 1991). Thus, the local community was suddenly confronted with the establishment of the salmon farm. However, the small scale of the farm and the fact that the owners carried out the work themselves contributed to its initial local acceptance. Things changed during the mid 1980s when (i) the farm expanded, (ii) foreign multi-nationals took over, (iii) the use of chemicals in the production process became known, and (iv) research revealed that the bay had the highest concentration of TBT in the country (Ruddy & Varley, 1992). By the time the farm in the Killary applied for licenses, many locals objected to salmon farming. Despite strong local objections to the license application, which was made possible through the 1980 Fisheries Act (DoM, 1980), Killary Salmon gained permission to begin operation.

The Ballynakill farm was the first new user in the bay, whereas Killary Salmon was a newcomer in a fjord that was already characterised by a multiple-use setting. Being a newcomer in rather turbulent times for the local finfish farming industry, the establishment of links with the other user groups and the wider community was an important strategy for acceptance and survival. This is also reflected in the fact that the initiators appointed a local as a director⁶, and in the current owner's policy to keep the farm locally controlled. For the farm in Ballynakill, the development of inter-user relationships did not seem to be necessary at its inception. Once public objection was aroused and these relationships became more important, the development of durable relationships was prevented by (i) the technical problems the farm experienced, and (ii) its instability as a result of a 'coming and going' of new owners. The attempts that were made to establish links with the community, largely through the aquatourism programme, came to an abrupt end when the farm was taken over by the Scottish multi-national.

From the mid 1980s onwards, the three salmon farms in North West Connemara have been subject to a strong anti-fish farm lobby. Although the farms have an important role to play in the generation of employment opportunities in the area, their impact on the physical environment and tourism development, the increasing number of restricted areas for fishing and the fact that two of the farms were foreign-controlled, are important issues of frustration for the local communities (Steins, 1996a). Recently, the aversion against the presence of the farms has seen a new development when the Delphi fishery, in collaboration with other freshwater fisheries, launched a law suit against some finfish producers including Killary Salmon (DF, 1996a). For the local communities and the fishermen, this was a 'proof that the salmon farms were to be blamed after all for the decline of the fish stocks (see factor f). However, research in the Killary Harbour suggested that the hydrography of the Killary does not accommodate the dispersal of sea lice larvae. The maximum concentrations of sea lice recorded where in the mouth of the freshwater fishery, while settlement recorded inside the fish cages of Killary Salmon were of the order of only 1-2 lice per fish. As regards to the decline of finfish stocks and water pollution, some other factors are critical, such as sewage effluent, acidification by pine forests, the increasing number of sheep and the development of the tourism industry. Only an integrated scientific research project can shed light on the current conflict situation of accusation and denial between the traditional users, local communities and the finfish farms (see factor e).

The outcome of the law suit will be critical to the relationship of the salmon farms with the other users of the Killary and Ballynakill Harbour. It will also have an impact on the license application process, which both salmon farms perceive as a major concern (see factor g). In Ireland, aquaculture licenses can only be granted in so-called designated areas. The 1980s Fisheries Act provides for public participation in the designation of these areas. Once an area is designated, individual licenses can be granted 'without fuss' (O'Connor et al., 1992:2). In practice, however, great difficulties arose in getting public approval for the designations due to the opposition mounted against the designation process. As a result, Ministers reverted to granting aquaculture licenses under Section 15 of the Fisheries Act 1959, which gives the minister wide powers to grant fish culture licenses subject to conditions 'as he thinks fit' (DoM, 1959: 73; O'Connor et al., 1992). In order to secure the broadest possible views prior to decisions on licensing proposals by the Minister, all development proposals must be published in one provincial newspaper in the locality of the proposed site and maps delineating the development and the EIAs must be displayed publicly (DoM, n.d.:2).

The license application is a long, expensive and time-consuming process, which is a major problem to the salmon farms that want to respond quickly to new consumer demands and environmental demands. For example, in order to follow the Irish Salmon Growers Association's recommendation to fallow salmon sites in order to break the sea lice cycle and to allow the sea bed to recover from waste accumulation, new sites are required (Phyne, 1996).

Another problem related to the license application procedure is the issue of public participation. Public participation seems to be a formality only, which gives the locals the feeling that their voice does not count (Steins, 1996a). In one case this had a disastrous outcome for a third farm in North West Connemara, when locals sabotaged a fish cage and released £250,000 worth of juvenile salmon as a protest against the Minister's decision to grant the farm new licenses (*ibid.*). Current legislation has been questioned in a High Court Action in the early 1990s. It is believed that, regardless of the outcome of the case, new licensing legislation will have to be

introduced (O'Connor et al., 1992). The outcome of the law suit between the freshwater fisheries and the finfish farms will influence this new legislation. If recommendations by the Government's Sea Trout Working Group are followed, it is likely that no licenses will be granted to salmon farms operating within a 20km distance of freshwater fisheries. In this scenario, it is unlikely that Killary Salmon and Gaelic Seafoods will be able to expand their operations.

The level of co-operation between aquaculture user groups, fishermen and aquatourism operators is much higher in the Killary than in Ballynakill Harbour (see factor b). One reason for this lies in the physical characteristics of the resource. The Killary is a very narrow fjord. For the mussel co-operative it was crucial, therefore, to make agreements with the fishermen about which areas were to be designated for mussel structures in order to keep the fairway and the lobster fishing grounds accessible to fishing vessels. In addition, the various user groups are essentially neighbours, which facilitates communication. In contrast, Ballynakill Harbour consists of many bays and inlets and competition for space between the oyster co-operative and the fishermen is not an issue. Furthermore, due to its shallowness, this bay is not an important fishing ground for species such as lobsters; except for shrimp fishing, the fishing activities mainly take place outside the bay. The division of Ballynakill Harbour into several inlets and bays has resulted in a situation where each of the different users has their own territory, where they can work in isolation from the other users.

A second factor for different levels of co-operative links lies in the technical characteristics of the shellfish production. Intensive mussel production requires the use of rafts and longlines, which take up considerable space in the water. The activities of the co-operative in Ballynakill Harbour do not place such high demands on large areas of the bay. Fishing boats can still fish the areas where the native oyster beds are located (provided they do not damage the seabed), and the production of *gigas* takes place on sites in the inter-tidal zone, where fishing activities cannot take place.

Finally, some socio-economic factors may have contributed to the differences in co-operation levels. At the inception of the mussel co-op, Killary fishermen were very concerned that their whole fishing area would be filled with mussel structures. For its members, the co-op was an important mechanism to keep the benefits of mussel farming in the area. Agreements with the fishermen were necessary to avoid conflicts that might have been crucial to the development of the co-operative in its early stages. Nowadays, four members earn a full-time living from the co-op, which must not be put at risk due to the emergence of conflicts between themselves and other users. In the Ballynakill area, an important reason behind the establishment of the co-operative was the expansion of the salmon farm. The majority of the members are full-time or part-time fishermen themselves and co-operation links did not have to be developed. As discussed previously, the need for co-operation between the co-op and the fishermen in this area was not as crucial due to the physical and technical characteristics of the resource.

A final observation from the comparison of the two cases is that the mussel farmers in Killary Harbour are much more focused on long term concerns than the co-operative and individual producers in Ballynakill Harbour (see factor c). The latter users are still in a development stage and their first concern is the survival of their business. The co-operative, in particular, will have to solve some internal problems before it can become a commercial producer. In Killary Harbour, the co-operative is crucial to the members' income. Trial and error during the past fifteen years have solved the co-operative's teething problems. They are now in a position

where they have to safeguard their success and focus on factors that, in the long term, can become a major problem to the marketing of their product, such as water pollution and lack of marine planning. This development is also reflected by the example of Ballynakill Oyster Fisheries Company, an established producer, whose concerns are also related to long term impact on resource management.

In addition to the above factors, conflicts and co-operation in resource management in the two study areas are also encouraged by factors that are taking place beyond the local level. First, the overproduction of farmed salmon has led to a drop in the market price for both farmed and wild salmon (Fingleton & MacCann, 1996), which is another incentive for the commercial fishermen and recreational fisheries to 'condemn'¹ the activities of salmon farms, ultimately leading to conflicts between these user groups. A second factor that has contributed to conflict situations, is the fact that the government perceives salmon farming to be a major national and regional socio-economic development mechanism. As such it has, for a long time, closed its eyes to the potential externalities related to the activity while, at the same time, stimulating new business.

Third, the presence of FORUM, the community development initiated by the EU, has certainly left its mark on resource management in the two areas. In the case of the Killary, the project provided the mussel co-operative with back-up in their attempts to exclude outsiders from the mussel resource. Bad experiences with tourism development in the 1970s formed the incentive for the co-operative to develop this policy, and, consequently, to avoid conflicts between local and potential 'outsider farms'; as is illustrated by the rather cool relationship between the co-op and the individual mussel producer. However, it is questionable whether the co-op would have achieved its goal without the strong bargaining position FORUM provided them with. Even now, the mussel farmers and FORUM perceive that DoM is not convinced about the need for such a policy.

In the case of Ballynakill Harbour, FORUM's presence has contributed tremendously to the development of the area in a multiple-use resource, primarily through its partnership with the Irish Sea Fisheries Board (BIM) and the consequent appointment of a locally based Aquaculture Development Officer (ADO). The co-operation between the individual shellfish producers is a major achievement that will benefit resource management in terms of training, production problems resolution, monitoring and marketing. However, the presence of FORUM and the ADO has also had a negative influence on collective action. In the case of the shellfish co-operative, the support by the external agents is very convenient for the group of people who want to keep the co-op going in order to maintain property rights to the bay, without complying to the co-op's rules (see Steins, 1995).

At present, the user groups in Killary Harbour seem to work together in relative harmony. The most visible threat to multiple marine resource management is the conflict between Delphi and Killary Salmon. Whether or not this conflict will end or increase, will depend on the outcome of the law suit, scientific research and the willingness of the two groups to resolve the conflict. Overdevelopment of the area and the resource itself is another threat to *the status quo*. The user groups are aware that the condition of the resource as a whole has an impact on the management of their individual operations. The establishment of a FORUM in which the different users can discuss resource management and have a stronger position in negotiation process with external 'developers' (e.g. DoM) is a desirable development to protect the fjord.

However, the development of such a platform is hindered by the Delphi Fishery, whose owners (at this moment) will not co-operate with the salmon farm.

Despite the multiple-use status of Ballynakill Harbour, inter-user resource management patterns have been developed so far between the shellfish producers only. It is very likely that multiple-use resource management will develop once the present users have secured their continuation. At present, the results of assistance from the development agents FORUM and BIM, and from the PESCA Programme still have to prove viable. The most established new users have only just passed from an experimental to a more production-orientated phase which will inevitably result in new problems to be overcome. Their status as one of the users in a multiple-use resource will become visible once they are established producers who have to focus on long term aspects of resource management.

In the next section the significance of this examination of co-operation and conflict for the study of multiple-use resources in general is discussed.

5.3 Collective action in multiple-use resource management

This examination in the previous section showed that in Killary Harbour, six factors were crucial to multiple-use resource management patterns that have developed over time:

1. the interdependence between the technical characteristics of the activities involved and the narrowness of the fjord, which resulted in potential competition for space;
2. the increasing awareness of the externalities caused by finfish farming that stimulated the development of an anti-fish farm lobby in the area, which encouraged Killary Salmon farm to develop friendly relations with other users and strict environmental policies;
3. local people's perception that resource management should be kept as local-as possible;
4. the position of the user groups as producers in the wider economic market;
5. the back up provided by FORUM in negotiations with government bodies regarding resource development;
6. the government's policy to stimulate aquaculture, and especially finfish farming, as a mechanism for socio-economic development, despite strong local objections.

In the Ballynakill area, the multiple user groups seem to work in isolation of each other. Three factors have contributed to this lack of collective resource management patterns:

1. the interdependence between the technical characteristics of the activities involved and the physical characteristics, which did not lead to competition for space between shellfish producers and fishermen;
2. TBT pollution experiences with the salmon farm in the mid 1980s, salmon disease problems created a strong anti-fish farm lobby;
3. the take-over of the salmon farm by foreign [*non-local*] owners;
4. the priority of the recently established users to make their enterprise viable and thus to focus on short term internal objectives.;

5. the role of FORUM, BIM and the ADO which had both positive and negative effects on co-operation;
6. the government's policy to stimulate aquaculture, and especially finfish farming, as a mechanism for socio-economic development, despite strong local objections.

The above lists suggest that the establishment of co-operative links between different user groups is affected by a number of factors, which are summarised in figure 5a. Some of these factors are related to the internal context of the resource system (A-D), while others are found in the wider socio-economic, institutional and political context in which the resource system is embedded (E-G).

Figure 5A: *Factors influencing inter-user co-operation*

- | |
|---|
| <p>A. relationship between the technology of the activity and the physical characteristics of the resource system
e.g.: the need to use mussel structures in a narrow bay that is also used for fishing requires co-operation between the user groups involved</p> <p>B. the extent to which the user groups perceive each other's activities as a threat to their own specific use
e.g.: many wild salmon fishermen perceive the salmon farm as a threat to their existence and take a leading part in the anti-fish farm lobby</p> <p>C. past experiences with other users
e.g.: negative experiences with tourism development encouraged the Killary mussel farmers to co-operate in the development of a local resource management strategy</p> <p>D. the rate of participation in external policies affecting local resource use
e.g.: lack of local participation in the designation of finfish farming areas encouraged the Bailynakill fishermen to co-operate in order to create property rights to parts of the bay</p> <p>E. the extent to which producers have secured their position in the market
e.g.: once the economic viability of the activity is secured, users will have more time to develop relationships with other users</p> <p>F. the role of external agents involved in resource management
e.g.: external agents can encourage inter-user relations by facilitating user fora</p> <p>G. external factors
e.g.: the discovery of the negative effects of TBT on aquatic life stimulated the already present conflict between traditional users and the salmon farms</p> |
|---|

This list of factors influencing co-operation and conflict between different user groups operating in the same resource system is by no means complete, but reflects the findings of one research project. More empirical research in other multiple-use settings is required to identify factors influencing inter-user group co-operation.

The above factors can serve as a heuristic tool, that will help researchers and practitioners to organise information about the networks that have been established between user groups that use the same resource system for their individual activity. It must be noted, however, that, in order to fully appreciate the dynamics of collective resource management in a multiple-use resource, the physical, technical, institutional and socio-economic characteristics of each different user groups must be analysed. Guidelines for such an 'internal' study are suggested by Edwards & Steins (1996), Oakerson (1992), Ostrom (1994), and Wade (1988).

5.4 Discussion

This study indicates that the evolution of a resource into a multiple-use resource places new demands on resource management and the users. The activity of one user group will have an impact on the activities of other user groups that operate in the same resource system, and will therefore affect the management of the resource as a whole. In this light, the issue of co-operation is an important factor in the management of the resource as a whole.

In North West Connemara, the development of aquaculture and aquatourism due to favourable ecological characteristics and extensive support by the government and development organisations has an important on-going impact on the management of Killary and Ballynakill Harbour. The differences and similarities in marine resource management between the two case studies can be explained in terms of physical and technical characteristics, socio-economic factors, resource governance rules, historical background, the position of a user in the wider economic system, the role of external agencies and other external factors, such as the increasing awareness of externalities caused by finfish farming due to scientific research (cf. Oakerson, 1992; Petersen, 1987; van Ginkel, 1995).

The evolution of management strategies and inter-user relationships must be seen as an outcome of interactions between the internal and external characteristics of resource management in a dynamic environment. This paper identifies a number of factors that will help researchers and practitioners to organise information about the presence or lack of collective management strategies between multiple users of a resource system (Figure 5a, p.59). It must be stressed that these factors are a heuristic tool on the basis of which research questions for examining potential reasons behind inter-user co-operation and conflict can be developed, and not a blue print. If figure 5a is used as a blue-print, the researcher will use a *priori* distinctions between factors that lead to co-operation/conflict, which will hinder rather than facilitate the research (Steins, 1996b).

The development of activities depending on the local resource base will continue to have a significant influence on the socio-economic structure of North West Connemara. Support structures provided by the government and development bodies, and infrastructural developments that make the area more accessible to tourists and open up new markets, are the most visible results of these socio-economic changes. Pollution problems and ecological changes due to overdevelopment are negative changes that will have a bearing on the management of the area's marine resource base. The potential increase in demand for finfish and shellfish for the tourist market (cf. Barret, 1991), and the increase of employment opportunities, will be positive results of these developments.

In future, monitoring the marine resources and the outcomes of resource management will be a vital process in the protection of the resource base. In this light, the establishment of user group fora is essential. These platforms, however, will only work if users are in a position to co-operate and are willing to do so, and if the both the government and development agencies accept them as partners in the marine planning process. At present, such a co-management approach is hindered by the government's top-down approach in relation to marine planning, inter-user conflicts and the relatively new status of the two research areas as a multiple-use resource.

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NOTES

1. The classification categories and criteria for shellfish harvesting areas are:

Class	Sample results	Treatment before consumption
Grade A	< 230 E.coli/100g flesh or < 300 faecal coliforms	May go for direct human consumption if end product standard met
Grade B	< 4,600 E.coli/100g flesh (in 90% of samples) or < 6,000 faecal coliforms/100g flesh (in 90% of samples)	Must be depurated, heat treated or relayed to meet category A
Grade C	< 60,000 faecal coliforms/100g flesh	Must be relayed for long period (two months) to meet category A or B., or be treated.
Grade D	> 60,000 faecal coliforms/ 100g flesh	Harvesting prohibited

Source: BIM, 1995b

2. In October 1995, the v-knotching legislation was brought into action. It is illegal to land, sell or be in possession of lobsters that have a v-piece cut out of their tail. Fishermen that are registered with the Irish Lobster Association will get a premium if they take the lobster for notching to their local group. V-knotched lobsters are usually females which are crucial for the survival of the stocks. The programme was adopted following the successful conservation strategies of lobster fishermen in Maine, USA (BIM, 1996).
3. According to Delphi Fishery News, it was recently discovered that Killary Salmon produced far more fish than they were licensed to do in 1995, and look set to overproduce in 1996 and 1997. Delphi Fishery has, therefore, applied for an injunction to prevent this happening. A High Court Hearing is scheduled on 2 December 1996 (DF, 1996b).
4. The idea of restricting the farmed area to 4ha per individual and allowing only locals (*'living within a 30 miles' radius*) is an issue of contention between the co-operative and the DoM: *'the DoM wants to issue licenses for big areas and to non-locals, but we want to keep it as local as possible'*. Recently, the DoM agreed on this policy, but no formal arrangements have been made which gives the policy a status of 'recommendation' only.
5. In 1986, scientific research found that Ballynakill Harbour had the highest concentration of TBT recorded in the country. The use of TBT on all marine structures was banned through a Bye-law to implement a new EU Directive on pesticides in April 1987 (Ruddy & Varley, 1991).
6. At the time of the license application, the appointment of the local was perceived by the locals as a strategy to buy local goodwill (interview data; cf. Ruddy & Varley, 1991).