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April 2004

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Recreational Fishing and Fishing Policies in the Netherlands and Australia: A Comparative Review

Abstract

This article compares fisheries management, environmental problems and policies of the Netherlands and Australia. From this comparison lessons can be learned for countries that experience economic growth and on increase of leisure activity. In both countries, conflicts between the user groups, e.g. commercial and recreational fishers, are identified and the ways in which policymakers deal with these problems are outlined. Often suggested tools to address these problems are decision-making procedures based on a holistic framework in which economic, sociocultural, political/institutional, ecological aspects are included in the decision framework. Recreational fishing is today often the dominant factor in the resolution of these matters because of the relative economic, social and political power of recreational fishers as a group.

Recreational Fishing and Fishing Policies in the Netherlands and Australia: A Comparative Review

1. Introduction

In the last half-century, fishing as a food resource has waned in its importance relative to other food sources. This is especially true for fishing activities in inland waters of densely populated and highly industrialised countries of the northern temperate world, where multipurpose use patterns have created a very distinct environment for development of inland fisheries (FAO, 1997). Activities such as agriculture, water abstraction, waste disposal and hydropower generation have altered freshwater ecosystems probably more than terrestrial ecosystems. As a result, the majority of freshwater ecosystems in industrialised countries are considered to be impacted (Vitousek, as cited in Arlinghaus et al., 2002). One of the countries where this development can be illustrated is the Netherlands.

The Netherlands is a small country, some 226.7 times smaller than Australia. In 2003 the Netherlands had about 16.2 million inhabitants, making it a densely populated country with 479 inhabitants per km^2 as opposed to Australia with a population of approximately 20 million inhabitants and a population density of 2.4 persons per km^2 (Australian Bureau of Statistics, 2003; CBS, 2003). Despite the difference in population density, the Netherlands can be a good example in sustainable fisheries management. On the other hand, if we consider the way in which the Australian population is distributed over the surface of the country, the Netherlands and Australia are quite similar. Most of the Australian population live in the coastal areas mainly, Victoria and New South Wales (59% of the total population) and 60% of the total population live in the urban areas of the 6 largest cities: Sydney, Melbourne, Brisbane, Perth, Adelaide and Canberra. With a population growth of 1% average per annum in the last decade, it is likely that Australia in the future can encounter similar fisheries problems as in the Netherlands.

Like other West European countries, the Netherlands experienced a period of strong economic growth after the Second World War. The Industrial Revolution at the end of the nineteenth century was the starting point of intensified stress on nature and wildlife in the Netherlands. This stress peaked in the 1950s and 1960s when rebuilding the Dutch economy

after the war and new agricultural policy (Plan Mansholt) was mainly focused on self-sufficiency and quantity of production (Commission of European Communities, 1968).

As a result, nearly the entire Dutch environment was cultivated and polluted. Consequently 500 of the 1,400 plant species in the Netherlands declined greatly in abundance and nearly all diadromous fish became rare in Dutch rivers. Surface water ecosystems, which cover about 18% of the area of the Netherlands, were disturbed by factors such as: water pollution, eutrophication, river engineering works like for instance: spillways, canalisation and hydropower installations (Ministry of Agriculture, Nature and Fisheries, 1998).

In the 1950s, economic growth resulted in an increase in leisure time and a major increase occurred in Dutch outdoor recreation. (Ministry of Transport, Public Works and Water Management, 2002). In the 1960s and 1970s, this further increased, resulting in a shortage of outdoor recreational space. Population growth in the Netherlands in those decades averaged 1.3% per year, and this enhanced the pressure on outdoor recreational space even more.

In the Netherlands, allocation of recreational space in the 1960s was mainly focused on rural areas but in the 1980s recreation was targeted on urban areas. Recent governmental policy goals are to further optimise use of existing recreational areas and make agricultural areas and nature reserves more accessible for recreational activities. Now over 3.9 billion euro is spent annually on water related recreation and tourism in the Netherlands of which 526 million euro is spent on the angling (Ministry of Transport, Public Works and Water Management, 2002; Pleijster, 2003).

In the Netherlands, anglers account for 9-10 % of the total population. After Norway, Finland, Sweden and Iceland, the Netherlands has the fifth highest percentage of anglers in Europe. However, the Netherlands spends the second most on angling (575 euro annually: see Table 1) of all European countries (EAA, 2003; Pleijster, 2003).

Table 1

Expenditure on angling annually in selected countries at beginning of 21st century

Country	Annual expenditure in Euro per angler	Main type of angling
UK	1,000-1,200	Freshwater
The Netherlands	575	Freshwater
US	900	Marine/ freshwater
Germany	400-600	Marine/ freshwater
Austria	426	Freshwater
Denmark	165	Marine/ freshwater
Sweden	162	Marine/ freshwater
Norway	160	Marine/ freshwater
Finland	158	Marine/ freshwater

Sources: based on Toivonen et al., 2000; Lederer; Kovacs and Füresz; Schwärzel-Klingenstein, as cited in Kohl, 2001; Pleijster, 2003.

As commercial production grows and the number of commercial and recreational users of surface water ecosystems increase, conservation of the water resource requires more stringent management intervention (Arlinghaus et al., 2002). With high stress on the environment and the growing demand for recreational space, Dutch and Australian policymakers have a challenging future ahead.

Tisdell (2003a) stated, in countries that experiencing sustained economic growth and rising levels of income, such as China, typically show substantial growth in demand for leisure and recreational activities and demand resources and goods needed to satisfy these demands just as the Netherlands and Australia have experienced in the past. By making a comparison between the Netherlands and Australia in fisheries management, environmental problems and policy, lessons can be learned for countries that experience economic growth and increase of leisure activity.

2. Commercial Fishing in The Netherlands

Dutch commercial fishers currently land approximately 400,000 metric tons of fish and bivalves every year. Half of this consists of Atlantic herring (*Clupea harengus* L., Clupeidae), Atlantic mackerel (*Scomber scombrus* L., Scombridae) and Atlantic horse mackerel (*Trachurus trachurus* L., Carangidae). Sea fisheries supply domestic and foreign markets with European plaice (*Pleuronectes platessa* L., Pleuronectidae), common sole

(*Solea solea* L., Soleidae), Atlantic cod (*Gadus morhua* L., Gadidae), Atlantic mackerel, Atlantic horse mackerel, Atlantic herring and whiting (*Merlangius merlangus* L., Gadidae). Coastal fisheries mainly supply, North Sea shrimp (*Crangon crangon* L., Crangonidae) and Nordish shrimp (*Pandalus borealis* Krøyer, Pandalidae), and bivalves, for instance: common mussel (*Mytilus edulis* L., Mytilidae), oysters (*Ostrea* sp., Ostreidae), common cockle (*Cerastoderma edule* L., Cardioidea) and spisula (*spisula* sp., Mactridae).

The captured fish have total value of approximately 450-500 million euro annually. Common sole and European plaice make up almost half of this value, mussels about 10%. Exports account for approximately 1 billion euro. This is about 0.8% of total Dutch exports. The total commercial fishery provides jobs for 15,000 people, of which 4,000 people are working on the fishing vessels. Dutch commercial fishers mainly fish on the North Sea where they fish with mainly two kinds of fishing vessels: kotters and trawlers. The main difference is, that trawlers are bigger vessels and fish further at sea than kotters. There are about 13 trawlers and 450 kotters in the Netherlands. By European standards, this is a small fleet. However, the Dutch commercial marine fishery has the highest productivity per fishing vessel in Europe. A reason for this could be that the North Sea is a rich fishing ground; 5% of the total fish catch in the world is from the North Sea. Also the Netherlands seem to have an effective system for limiting commercial fishing effort.

However, capture fisheries in the North Sea are mainly responsible for historically low levels of important commercial fish species, despite implementation of general EU regulations restricting fish catches. For example, European plaice, common sole and Atlantic cod stock in the North Sea are below the critical stock size for their survival. Furthermore, the spisula fisheries seems to effect birds for example the common scoter (*Melanitta nigra* L., Anatidae) population. In addition, ray stocks (*Rajiformes* sp., Rajoidea) and the harbour porpoise (*Phocoena phocoena* L., Phocoenidae), the smallest whale like species in the North Sea is also declining due to extensive fishing in the North Sea.

The inland commercial fishery sector of the Netherlands is small and is variable. There are approximately 300-350 companies (full-time and part-time) fishing on 340,000 hectares of inland water of which 200,000 hectares are state-owned. This sector (excluding Lake IJssel fisheries businesses) directly employs approximately 350 persons and generates indirect employment of about 1,000 persons full-time and part-time in trade, processing and sub

contracting, etc. The total annual turnover of the catch is approximately 5 million euro, of which a quarter is mainly for scaled fish: European smelt (*Osmerus eperlanus* L., Osmeridae), perch (*Perca fluviatilis* L., Percidae), pikeperch (*Sander lucioperca* L., Percidae), pike (*Esox Lucius* L., Esocidae), common carp (*Cyprinus carpio* L., Cyprinidae), roach (*Rutilus rutilus* L., Cyprinidae), bream (*Abramis brama* L., Cyprinidae), and three-quarters (about 700 metric tons[1]) consists of eel (*Anguilla anguilla* L. Anguillidae) catches. Riverine fishes like: sturgeon (*Acipenser oxyrinchus oxyrinchus* Mitchill, Acipenseridae), salmon (*Salmo salar* L., Salmonidae), European river lamprey (*Lampetra fluviatilis* L., Petromyzontidae), twaite shad (*Alosa fallax* Lacepède, Clupeidae), sea trout (*Salmo trutta trutta* L., Salmonidae), houting (*Coregonus oxyrinchus* L., Salmonidae) were important in the past, but now nearly all are threatened or even some are extinct (De Nie, 1996). The sector generates another 2 million euro from the ancillary industry (Ministry of Agriculture, Nature and Fisheries, 1998).

In 1996, the average income of a full-time commercial fishers was 25,000 euro (this is a moderate income in the Netherlands). However, there are large regional differences and further analyses of financial results show that most businesses are unprofitable (Ministry of Agriculture, Nature and Fisheries, 1998).

3. Recreational Fishing in The Netherlands and Europe

Recreational fishery in the Netherlands is mostly done in inland water despite 1,200 km of Dutch coastline. About 63% of the recreational anglers concentrate only on freshwater fish, 16.3% only on marine fish and 20.7% on both. Since inland angling is the major type of angling in the Netherlands, we mainly discuss inland recreational fisheries.

According to a Dutch survey (Thij-Rulof, 2001), approximately 1.5 million anglers (of which 8% are foreign visitors) are fishing in the Netherlands, on approximately 182,000 hectares inland water surface. Table 2 shows the participation rates of the different European countries in angling.

Table 2

Estimates of participation rates in recreational fishing

mostly in European countries

European countries	Number of anglers	Total population	Percentage	Trend based on 1998
Austria[2]	410,000	8,100,000	5.1%	Stable
Belgium[2]	300,000	10,000,000	3%	Decreasing
Czech Republic	263,000	10,300,000	2.6%	Increasing
Denmark[2]	451,000	5,300,000	8.5%	Stable
Germany[2]	2,350,000	82,200,000	2.9%	Increasing
Greece[2]	600,000	10,800,000	5.6%	Not known
Finland[2]	1,390,000-2,100,000	5,200,000	26.7-40%	Stable
France[2]	4,000,000	59,200,000	6.8%	Stable
Hungary	325,000	10,200,000	3.2%	Decreasing
Iceland	55,000-94,500	300,000	18.3-31.5%	Not known
Ireland[2]	200,000	3,800,000	5.3%	Stable
Italy[2]	900,000-2,500,000	57,700,000	1.6-4.3%	Decreasing
Latvia	200,000	10,300,000	8.3%	Not known
Luxembourg[2]	20,000	400,000	5%	Not known
Netherlands[2]	1,500.000	16,200,000	9.3%	Decreasing
Norway	1,450,000-2,250,000	4,500,000	32.2-50%	Stable
Poland	600,000	38,600,000	1.6%	Stable
Portugal[2]	600,000	10,000,000	6%	Increasing
Slovakia	89,000	5,400,000	1.6%	Increasing
Spain[2]	710,000	41,800,000	1.7%	Increasing
Sweden[2]	2,020,000-3,115,000	8,900,000	22.7-35%	Stable
Switzerland	350,000	7,200,000	4.9%	Stable
United Kingdom[2]	4,000,000	59,600,000	6.7%	Stable
Other European countries (appr.)	1,100,000	112,200,000	1.4%	Not known
Total (appr.)	**25,000,000**	**578,000,000**	**4.3%**	

Sources: based on Wortley, 1995; Wolos, 1998; Toivenen et al. 2000; EAA, 2003.

In the Netherlands, 62% of recreational fishers are men over 15 years, 7% are women over 15 years of age and 31% children of 15 years or less[3]. In several surveys (Kohl; Lederer; Schwärzel- Klingenstein; Toivonen, as cited in Kohl, 2001) in 8 European countries, it is shown that males still dominate angling, but in some countries the participating number of women are high (see Table 3).

Table 3

Percentage of men and women participating in angling in selected European countries

Country	Male anglers (% of all men)	Female anglers (% of all women)
Denmark	21%	5%
Finland	54%	27%
Iceland	54%	15%
Norway	67%	35%
Sweden	52%	20%
Austria	10%	3%
Switzerland	8%	2%
Hungary	5%	<1%

Sources: based on Toivonen et al., 2000; Lederer; Kovacs and Füresz; Schwärzel- Klingenstein, as cited in Kohl, 2001.

Of the immigrants, living in the Netherlands, 8% participate in angling (Borger, 2003). 23% of the Dutch anglers have had higher education, 47% average level of education and 29% lower education. More than one-third of the anglers have high incomes and less than 5% have a low income. Dutch anglers spend an average of 4 hours for a fishing trip and on average take15 trips per year. The variation in participation is very large; nearly half of the anglers go fishing only 1 to 6 times per year but approximately 10% go fishing once or twice per week (Thij-Rulof, 2001).

To give a broader perspective; 16% of the total water recreational daytrips (including sunbathing, swimming, boat tours, rowing, canoeing, surfing and sailing) are spent on angling in the Netherlands.

Complexities arise in the economic valuation of recreational fishing. It is popularly thought that the economic value of a commodity, such as recreational fishing, can be appropriately measured by the expenditure on it (Tisdell and Wilson, 2003). According to this view the economic value of fishing can be calculated be just looking at the economic impact estimated by looking at the direct and indirect ("ripple effect") effects on the economy, for instance the local economy, retailers, restaurants and hotels and local tackle shops. There are also impacts outside the local economy where most of the expenditures takes place (Tisdell and Wilson, 2003) flow incomes for instance are earned by subcontractors, tackle manufactures and even the households of the employees working in tackle factories. However, not often considered

is that money spent on the total fishing experience could also be spent on something else and these opportunity costs should also be included in the economic valuation (Tisdell and Wilson, 2003). For example, a waterbody popular by recreational fishers, can be used for aquaculture or even in city centres, a waterbody can be replaced by a parking lot. Economic impact analysis does not come to grips with such resource allocation issues.

There are different valuation techniques used to estimate the value of natural resource use, but each of these has its limitations in assessing actual value (Tisdell and Wilson, 2003; Tisdell, 2003b). Economic value can be divided in two kinds of value: use-value and non-use value. Use value represents the value of the actual tangible activities of the angler and a non-use values are values that individuals derive that is not conditional on consumption of, or physical change in a natural resource. Currently there is still debate about present valuation techniques, difficulties in proper practical assessment and often under valuation of non-use values (Tisdell, 2003b).

In many cases pro-recreational policies are based on limited economic rationality. When for instance commercial and recreational fishing are compared, recreational fishing is often given priority because it contributes more to the economy, in terms of: income and employment. This, however, fails to measure the economic use value of the resources involved (see Tisdell and Wilson, 2003). Moreover, if this economic rationality is based on the valuation of the use and non-use economic value of a natural resource, the outcome could be that a recreational fishing activity in certain areas at a certain point could reduce the total economic value of the resource.

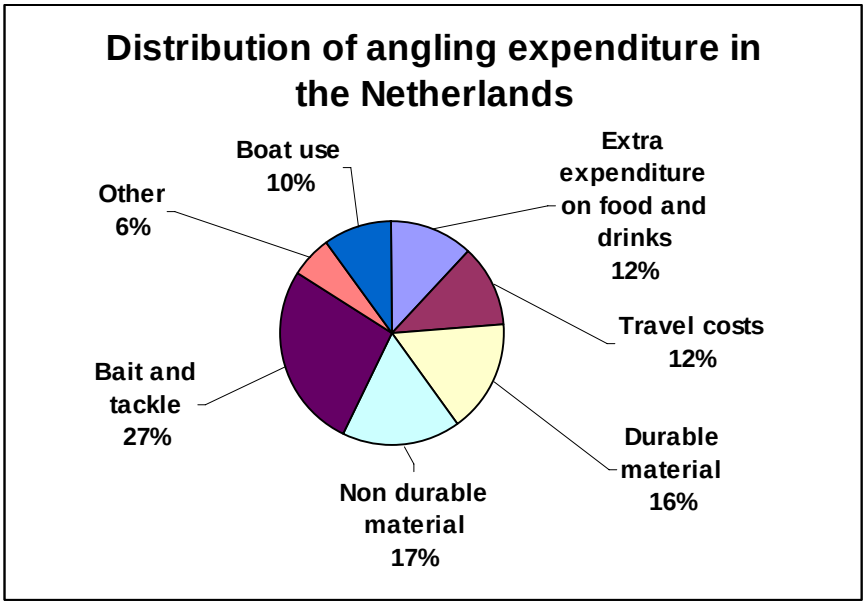
A valuation technique sometimes used for estimating the economic value of recreational fishing is the contingent valuation method (CVM). By sampling populations and determining their willingness to pay (WTP) or willingness to accept compensation (WTA), cost-benefit analyses can be completed. Those can help determine the socially optimal use of ecosystems from a social economic point of view (Toivonen, 2000; Navrud, 2001; Peirson et al., 2001; Arlinghaus et al., 2002).

According to Tisdell (2003b) it is widely accepted that standard environmental valuation techniques have not given enough attention to valuing the attributes of sites. This is so for standard travel cost analysis and contingent valuation methods. However managers of

recreational sites usually are not interested in a single value of a recreational area if there is no loss of quality. Instead managers usually are concerned about the economic impacts of changes in the quality of sites. The hedonic travel costs method and random utility models were developed in an attempt to address this issue (see Tisdell, 2003b). Brown and Mendelson (as cited in Tisdell, 2003b) developed a hedonic travel costs method and used it at fishing areas taking into account the characteristics of scenery, lack of congestion, and fish density. However this method has been subject to considerable criticism (Tisdell, 2003b).

In the Netherlands, some studies have been done of the expenditure of anglers, but very few with CVM and cost-benefit-analyses (Ministry of Agriculture, Nature and Fisheries, 1998; Thij-Rulof, 2001; Pleijster, 2003). The total angling expenditure was approximately 526 million euro in 2003 (Pleijster, 2003). Figure 1 illustrates the distribution of angling expenditure in the Netherlands.

Figure 1
Distribution of angling expenditure
in the Netherlands in 2001



Source: Ministry of Transport, Public Works and Water Management, 2002.

To indicate the further "rippling effect", the turnover of retailers[4] add another 300 million euro. Angling generates approximately 3,500-5,000 FTE, and provides 3,000 FTE of social work. Further environmental and voluntary contribution is estimated to be 5 million euro.

The value of fish taken home and consumed by anglers is between 2.5 and 4 million euro. The total expenditure by Dutch persons going abroad is not known.

In a presentation for the Fishery Committee of the European Parliament on November 12, 2002, the president of the European Fishing Tackle Trade Association (EFTTA) stressed the value of recreational fishing in Europe (EAA, 2003). He stated:

In the European Union, there are 2,900 companies (manufacturers and wholesalers) trading in recreational fishing tackle and generating 60,000 jobs. These companies make an annual turnover of 5 billion euro. The fishing tackle trade serves approximately 25 million anglers in the EU representing 6.5% of the total EU population through 12,900 tackle shops that employ another 39,000 people.

Nowadays recreation has to be easy accessible and part of the daily activities (Borger, 2003). Recreation needs to be integrated with other activities. In several surveys, it has been shown that the main reason why individuals go recreational fishing is to enjoy, to relax and experience nature, rather than to harvest fish or obtain the big trophy (Peirson et al., 2001, Wedekind et al., 2001; Steffens and Winkel, 2002). Therefore, policymakers in the Netherlands are trying to create these total-fishing experiences in combination with other water recreation possibilities inside and directly near urban areas.

The high participation of children in recreational fishing in the Netherlands is seen as perfect way to foster their awareness of the environment. Education and direct contact with nature can enhance their interest in the future sustainability. To develop nature inside or near urban areas educates “city people” (who are normally very distant from nature) about the value of the environment.

4. Commercial Fishing in Australia

Australian fisheries can be divided in three major groups, namely: commercial, recreational and indigenous fisheries. In this article commercial and recreational fisheries will be discussed.

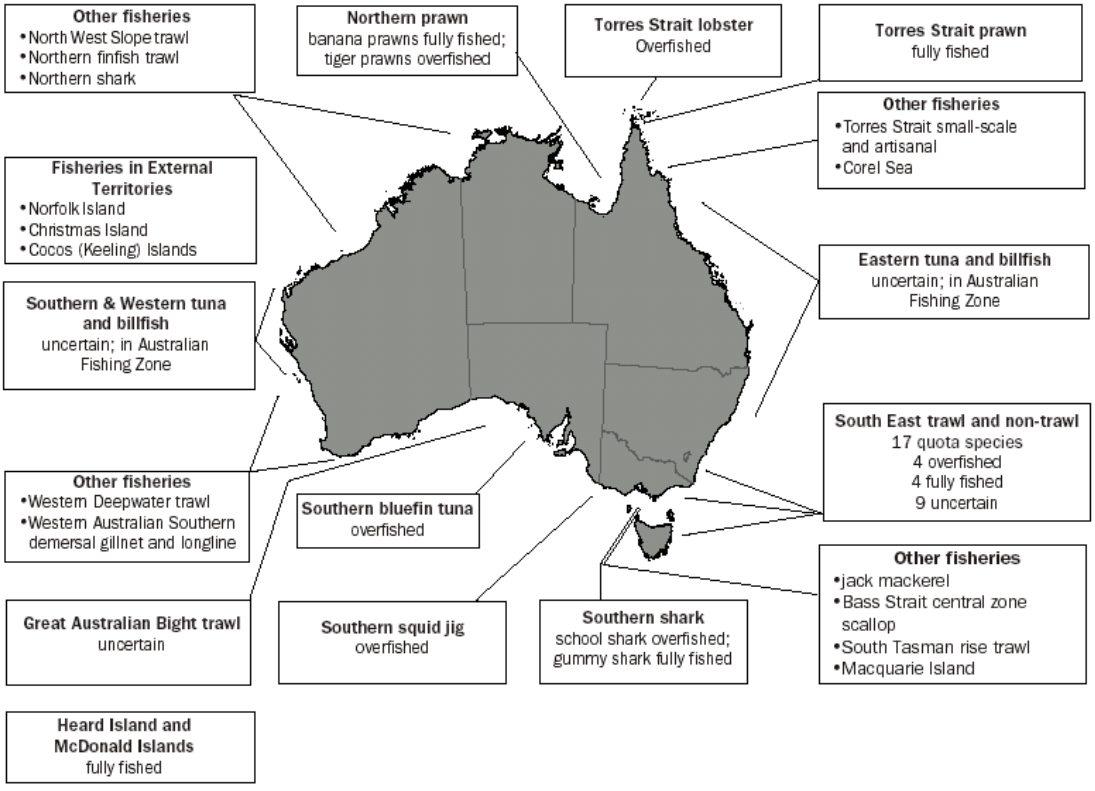
Australia's marine area is one of the largest in the world, extending over about 16 million square kilometres. This is more than double the continent's land area. Australia's ocean

domain includes all ocean temperature zones (based on sea surface temperature), from tropical to polar. Australia's marine environment is very diverse in terms of the different physical features; species and ecosystems, and fisheries management and conservation vary from region to region.

Commercial fisheries in Australia make a significant contribution to the national economy and have traditional place in Australia's culture. However, fisheries production of a number of species has been declining since the late 1980s and most of commercial fisheries are at or near full exploitation and face threats from a number of sources, including fishing and habitat destruction (Kearney, 1995; Kearney et al., 1996). Figure 2, illustrates the status of the Australian captive fisheries.

Figure 2

Location and status of main capture fisheries in Australia



Source: Australian Bureau of Statistics, 2004.

Australia is a dry continent with few inland waterbodies and, hence, nearly all of Australia's commercial fisheries production is from marine areas. Between 2002 and 2003, commercial fisheries caught 249,000 metric tons with a value of 2.3 billion AUD. By 2001, nearly 600

marine species were commercially fished but, 58% of the total value of fisheries were landings from 4 species (Australian Bureau of Statistics, 2003, ABARE, 2003). The main finfish species caught was tuna (*Thunnus* sp., Scombridae) comprising 13% of the total value of the fish catch. Crustaceans were dominated by catches of prawns (*Penaeus* sp., Penaeidae) (15% of the total value) and rock lobster (*Jasus* sp., Palinuridae; *Panulirus* sp., Panuliridae) (20% of the total value) and largest take of molluscs consisted of abalone (*Haliotis* sp., Haliotidae) (9%).

There are about 9,000 commercial fishing boats in Australia, of which about 1,200 currently hold Commonwealth fishing concessions with the balance holding State licences. Direct employment in the sector is around 21,000 persons, approximately 60% are employed in catching and harvesting and 40% in wholesaling and processing (Department of Agriculture, Fisheries & Forestry, 2003).

Reasons for declines in some fisheries include over fishing, use of non-selective fishing gear, loss of habitat, pollution, natural disaster, and Australia's marine jurisdictional complexity which hinders management of a fish stock or population (Australian Government, Fisheries Research and Development Corporation, 2003).

In some fisheries, large numbers of other species (non-targeted species) are also taken. These are termed 'bycatch'. This refers to the species that are taken incidentally in a fishery. Bycatch species are usually of lesser value and of greater quantity than the target species, and are sometimes discarded. Management of bycatch is of particular environmental concern as little is known about the impacts of retained or discarded bycatch on marine ecosystems.

As a response to the significant issues and impacts of bycatch on the marine environment, the Commonwealth developed a National Bycatch Policy in 1999 and a Commonwealth Bycatch Policy in 2000. By the end of 2001, Bycatch Action Plans were developed for 14 of the 21 Commonwealth fisheries (Australian Bureau of Statistics, 2003, as cited in Australian Government, Fisheries Research and Development Corporation, 2003).

In Australia, over forty fishing methods are used, such as: trawling and longline fishing (Kialola et al., as cited in Kearney et al., 1996). Trawling is one of the most widely used commercial fishing methods in Australia. However, demersal trawling makes contact with

the sea floor and therefore it can have substantial adverse impacts on seabed habitats and benthic ecosystems. Repeated trawling may prevent the re-colonisation of benthic species, both sedentary and mobile. (Harris and Ward, as cited in Australian Government, Fisheries Research and Development Corporation, 2003).

Longline fishing involves setting baited hooks along a line up to 100 km in length behind a boat. The line is deployed at various depths and is a particular threat to several non-target species, especially seabirds. The interaction of sea birds that feed in open waters with longline fishing vessels can be fatal and considerable concern has been raised about the effect of longlining on populations of albatross (*Diomedeidae,* sp.) and on some species of petrels (*Procellariidae*, sp.). The Government put in place a threat abatement plan in 1998 with the aim of reducing bycatch to one bird per 20,000 hooks set. This is a reduction of 90% over a five-year period through techniques such as setting baits at night when seabirds are less active (Australian Government, Fisheries Research and Development Corporation, 2003).

5. Recreational Fishing in Australia

An Australian survey between 2000 and 2001 (Henry and Lyle, 2003) estimated that 3.36 million Australians (19.5% of the total population), aged 5 years or older, went recreational fishing at least once per year. An estimated 1.8 million Australian households contained at least one recreational fisher, representing 24.4% of households nationally.

Most of Australia's recreational fishing is undertaken along the coast and estuaries of New South Wales, Queensland and Victoria, reflecting both the fishing areas and the geographic spread of Australia's population. New South Wales had the highest number of recreational fishers (999,000) followed by Queensland (785,000) and Victoria (550,000). The highest participation rates were recorded from Northern Territory (31.6%), Tasmania (29.3%) and Western Australia (28.5%). The regional participation rates were the lowest in urban centres, e.g. Sydney (13.1%) and Melbourne (10.2%), but by virtue of their large populations, urban centres contained largest numbers of fishers, often dominating the fisher populations at the State or Territory levels.

Recreational fishing was more popular with males (2,3 million fishers) than females (1.1 million fishers) and distinct patterns in the age structure of fishers were observed. The 30-44 age group contained the highest number of recreational fishers, although participation rates

were highest among 5-14 age group. In the year 2000, the number of fishing club/association members was estimated to be 143,000 (4.3% nationally).

In Australia, more than 511,000 boats with a capital value of 3.3 billion AUD were used for recreational fishing. During the survey (2001), Australian recreational fishers were estimated to be engaged 20.6 million fisher days of effort. This fishing activity was comprised of 23.2 million separate fishing events or 102.9 million fishing hours of effort. Recreational fishing effort was clearly concentrated on the east coast of Australia, with more than half the national total reported from New South Wales and Queensland alone. An estimated 2.6 million fishing events occurred outside the home State of Australia's recreational fishers.

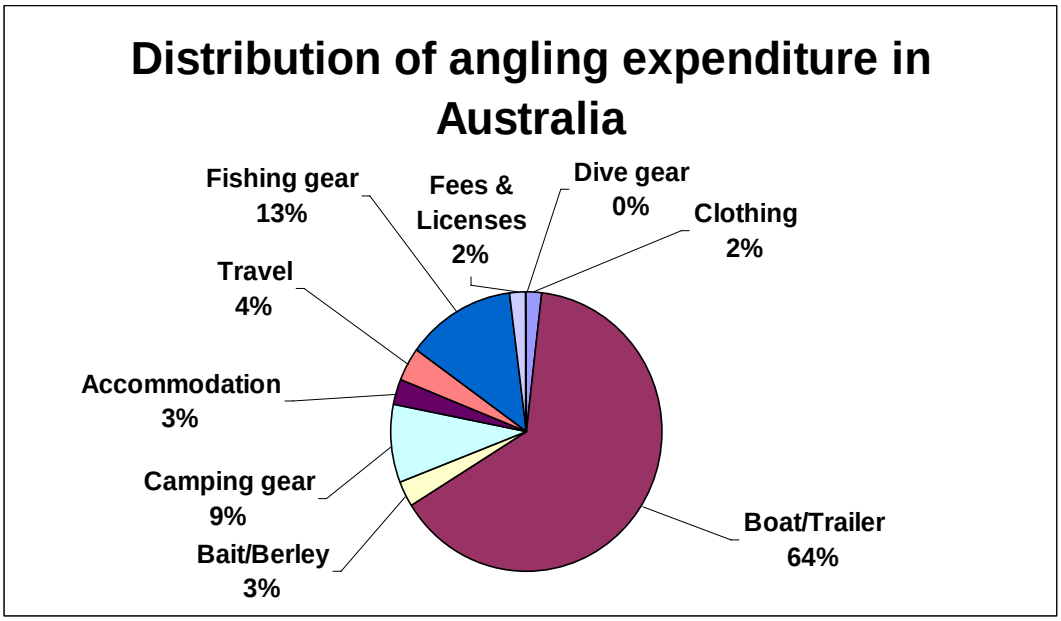
Recreational fishing in coastal waters attracted 41% of the fishing effort. Fishing in estuarine waters (35%), freshwater rivers (11%), freshwater lakes and dams (8%) and offshore waters (4%). Nationally, about 80% of Australia's recreational fishing effort occurred in saltwater (offshore, coastal and estuarine waters). Shore-based fishing attracted a greater level of activity (57%) than fishing from boats (43%). Fishing from privately owned boats accounted for 93%, from charter vessels 3.7% and hire boats 3.3%.

Line fishing accounted for 85% of the total fishing effort. Fishing with pots and traps 7%, harvesting bait with pumps, rakes and spades 4%, fishing with nets 3% and diving with spears or hand collecting 1%.

Recreational fishers spend annually between 1.8 billion and 2.9 billion AUD directly and indirectly on fishing-related items and activities per year (Henry and Lyle, 2003; Australian Government, Fisheries Research and Development Corporation, 2003). Their average expenditure was 552 AUD per fisher between 2001 and 2002. In Figure 3, the distribution in Australian angling expenditure is illustrated. Australian recreational fishers identified "to relax and unwind" (37% of the respondents), "fishing for sport" (18%), "to be with family (15%) and "to be outdoors" (13%) and "fishing for food" (8%) as their primary motives for fishing.

Figure 3

Distribution of angling expenditure in Australia in 2001



Source: based on Henry and Lyle, 2003.

Recreational fishing creates about 90,000 Australian jobs. Two main industries are involved, the Australian fishing tackle and bait industry (with an annual turnover in excess of 170 million AUD), and the recreational boating industry, (with an annual turnover of around 500 million AUD of which 60% is related to fishing in one way or another). It is estimated that international tourists spend over 200 million AUD on fishing in Australia each year (Australian Bureau of Statistics, 2003). For example, of the 3.8 million international tourists visiting in 1996, some 12% (450,000) participated in diving activities, 3% (115,000) participated in fishing activities, and 2% (75,000) in whale-watching. One estimate of annual direct, indirect and capital expenditure on recreational fishing is $2.9 billion (Australian Bureau of Statistics, 2003).

In Australia, the growing pressure on fish stocks from recreational fishing strongly suggests that managing only the effects of commercial fishing may be insufficient to prevent fish stocks from being over-exploited, particularly in freshwater and inshore marine areas adjacent to large population centres or tourist destinations (McPee et al., 2002). In contrast to commercial fishing, recreational fishing has escaped close scrutiny from the community and governments in relation to its impacts on aquatic biodiversity. As seen in many developed and industrialised countries, this might reflect the growing recognition of the social and

economical importance of recreational fishing and the strong political lobby of recreational fishing groups. Furthermore, there is a public and political perception that recreational fishing is more environmentally benign than commercial fishing. The question of whether recreational fishing is ecologically sustainable seems seldom to have been asked or seriously addressed. But it is questionable whether recreational fishing practices in Australia are ecologically sustainable in the long-term (McPee et al., 2002).

The legislative and policy tools for managing recreational fishing are fragmented among the government agencies in Australia. The responsibility for managing fisheries is spread across several agencies. For instance in Queensland, the Department of Primary Industries manages fish and fish habitats, while the Environmental Protection Authority manages marine parks and marine biodiversity (McPee et al., 2002).

Less is known about the recreational harvest than the commercial harvest, because it is difficult to measure catch of recreational fisheries. Hence, ecosystem based-management (EBM) approaches are more developed for commercial fishing than for recreational fishing (McPee et al., 2002). Kearney (1995) estimated that the annual catch by recreational fishers was approximately 50,000 metric tons, which is compared with the commercial catch of 2002 is about 20%. In the national survey of Henry and Lyle (2003) the catch by recreational fishers in 12 month between May 2000 and April 2001 was approximately 136 million fish[5]. In Table 4, the caught and released number of individuals is given. This and the 20% figure above, however, would not indicate the degree of competition between recreational and commercial fishers for some species.

Table 4

Estimated annual harvest and released/discarded catch taken by Australian recreational fishers, aged 5 or older in 2000/2001 by numbers

Species category	Harvest	Released/discarded	Total catch	% released
Finfish	60,421,387	47,284,274	107,705,660	43.9%
Small bait	11,486,181	702,175	12,188,355	5.8%
Crabs & Lobsters	6,121,243	5,376,065	11,497,308	46.8%
Prawns & Yabbies	47,668,561	5,502,983	53,171,544	10.3%
Cephalopods	1,763,952	96,013	1,859,965	5.2%
Other molluscs	7,251,687	704,606	7,956,294	8.9%
Other taxa	1,193,975	55,092	1,249,067	4.4%
Total	**135,906,986**	**59,721,208**	**195,628,193**	**4.4%**

Source: Henry and Lyle, 2003.

In the survey by Henry and Lyle (2003), a small fanatical fishing group was identified. This group consisting of, just 15% of the total recreational fishers was responsible for about half of the overall fishing effort, with the upper 3% (who each fished for more than 25 days) contributing about 20% of the total effort. This analysis suggests the potential of this small proportion of the recreational fisher population to exert a substantial impact in terms of effort on fisheries resources. It is therefore important to carefully consider the preferences and motives of this recreational fishing group when fisheries policies and management are constructed.

McPee et al. (2002) also stated that there is ample evidence to demonstrate that in many coastal areas, particularly those adjacent to large population centres and popular holiday destinations, the recreational harvest in Australia is substantial and exceeds the commercial harvest for some species and/or areas (See further information McPee et al., 2002). Most recreational fishing pressure tends to be concentrated in inshore and estuarine areas that are considered to be important nursery environments for many fish species and this results in a high harvest rate of juvenile fish by anglers (McPee et al., 2002).

The harvesting of a wide range of invertebrates from rocky and sedimentary intertidal areas is also a very common activity in Australia and overseas (McPee et al., 2002). Significant environmental impacts have been identified as a result of these bait-harvesting activities. It is often overlooked in the context of fisheries management, but the harvest of invertebrates for bait constitutes an important component of the ecological footprint of anglers.

Furthermore, angling activities have also impacts on mammals, marine turtles and seabirds. The use of hooks, fishing line, crabpots, fishing vessels can seriously injure these animals. For instance, boat strikes are believed to be the single biggest cause of marine turtle mortality in Queensland (Haines et al., as cited in McPee et al., 2002).

The management of recreational fishing in Australia has generally been hindered by a lack of information, but there is increasing information showing that the impacts from recreational fishing are considerable. However, these impacts have generally not been considered and addressed in fisheries management. McPee et al. (2002) states four reasons. (i) angling lobbyists have generally been successful in shifting attention away from angling impacts and focusing public and political attention on other impacts, particularly commercial fishing, and

to a lesser extent, coastal development and other land-use practices; (ii) the sheer number of participants makes recreational fishing a difficult problem to tackle politically; (iii) there is a tendency for an impact to be looked in isolation (an angler as an individual) rather than assessing the cumulative result.

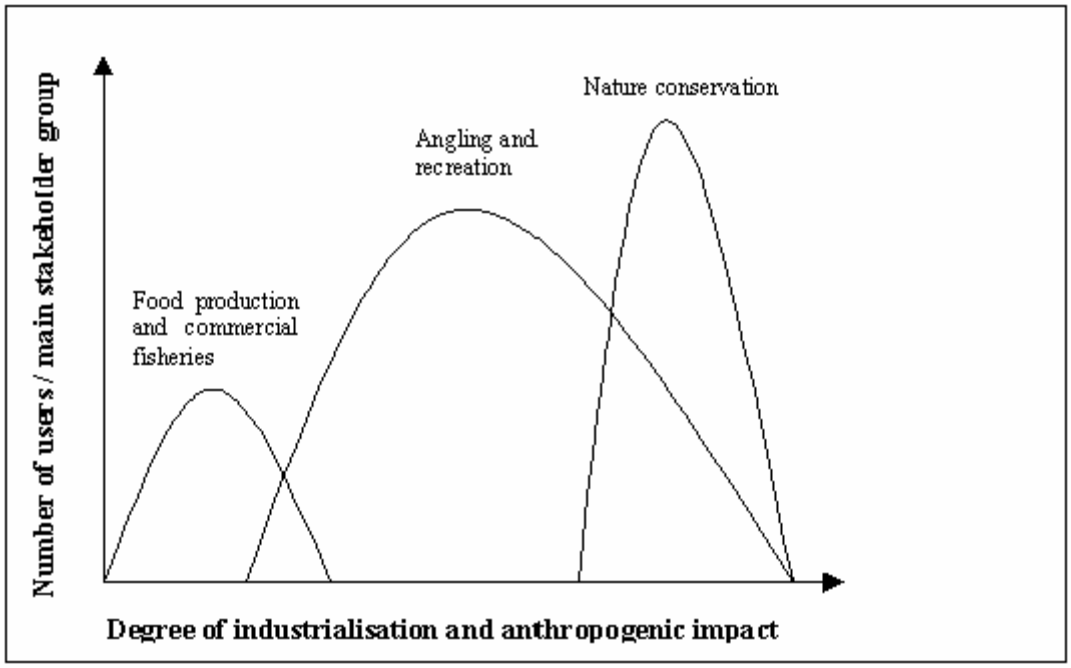
It is generally assumed by Australian recreational anglers that access to fisheries resources is a birthright. Furthermore, collective rights and responsibilities for a share of these resources have yet to be properly defined (Kearney, 2001). However, property right-based management systems are in some parts of Australia emerging issue for fisheries managers and the recreational fishing sector.

6. Historical Development in The Netherlands: The Trade-Off by Policymakers Between Commercial and Recreational Fisheries.

Inland fisheries can be viewed as an evolving organism, with the major stages in the life cycle of an inland fishery comprising an initial emphasis on food production, then a growing interest in recreation, with aesthetic and nature conservation interests emerging last (Smith, as cited in Arlinghaus et al., 2002). The development, illustrated in Figure 4, can be seen in the Netherlands. Evolution takes place along an industrialisation gradient where user numbers in different stakeholder groups alter and stakeholder dominance changes. Figure 4, however, suggests that there is no conflict taking place between commercial fishers and nature conservation and that the activities of commercial fishers will terminate before any nature conservation activity is taking place. It is questionable if this gap is true. In industrialised countries such as the Netherlands and Australia there is still activity of both. Furthermore, Figure 4 suggests that all activities will eventually terminate. This would be the case if the degree of industrialisation and anthropogenic impact is so high that no fishing or conservation activity is possible anymore. It is however doubtful if this will ever happen.

Figure 4

Generalised sociological life cycle of inland fisheries



Source based on: Arlinghaus et al., 2002.

Until the Second World War, the Dutch commercial fisheries sector was a major sector in the Netherlands. At the beginning of the twentieth century: salmon, sturgeon, Allis shad, pike, perch, common carp, tench (*Tinca tinca* L., Cyprinidae) and eel where the most important inland commercial fish species (Ministry of Agriculture, Nature and Fisheries, 1998). Even so, at that time there was already a negative trend. Because of the growing industrialisation and urbanisation (for instance open sewers) at the turn of the century, there was a growing pollution of surface water. The quality of fish, for instance their flavour, declined resulting in a lower market value for inland fish. This probably hastened the change from freshwater to more marine fish consumption in the Netherlands (Ministry of Agriculture, Nature and Fisheries, 1998). A combination of pollution and the river engineering works resulted in freshwater habitats becoming less suitable for fish. Inland wild fish stocks declined resulting in a lower CPUE.

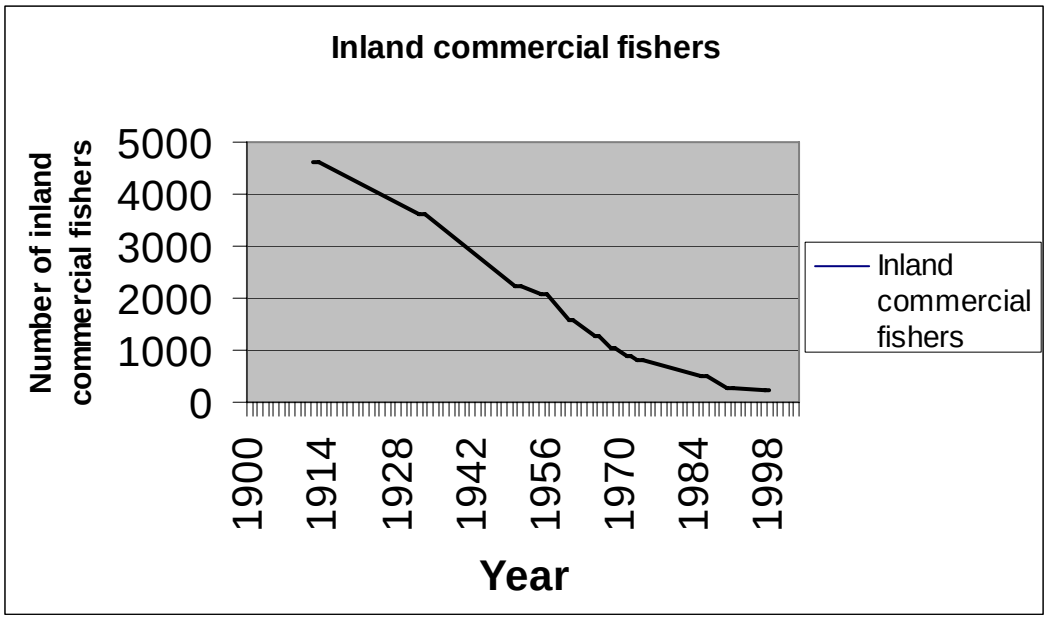
In the years after the Second World War, fishing rights were dispatched unstructured over the Dutch water surface and there were too many commercial fishers. Despite the rising of recreational fisheries, the government decided (1941) to favour the commercial fisheries in granting the fishing rights[6]. In 1946, a commission was set to investigate the possibilities of

improving the issuing of licences and investigate cooperation possibilities between commercial and anglers. The outcome was to give equal rights to both parties, but the fishing right to a particular water surface could only be issued to recreational or to commercial fishers, so full management was given to one party. Consequently most fishing rights for large water surfaces were given to commercial fishers and to small surfaces water fishing rights to recreational fishers.

Between the Second World War and 1972 times were not so good for the inland commercial fishing business. Because of the increasing water pollution, high fish mortalities and declining demand for freshwater fish many commercial fishing businesses disappeared. Figure 5 illustrates, the decline in commercial fishing businesses. In 2003, there are about 350 commercial fishing businesses the inland waters of the Netherlands.

Figure 5

Estimated number of commercial fishers in the Netherlands from 1912 to 1998



Source: based on Ministry of Agriculture, Nature and Fisheries, 1998.

Only eel fisheries seamed to be profitable. Gradually more commercial fishers ceased fishing for scaled freshwater fish and concentrated only on the eel fisheries.

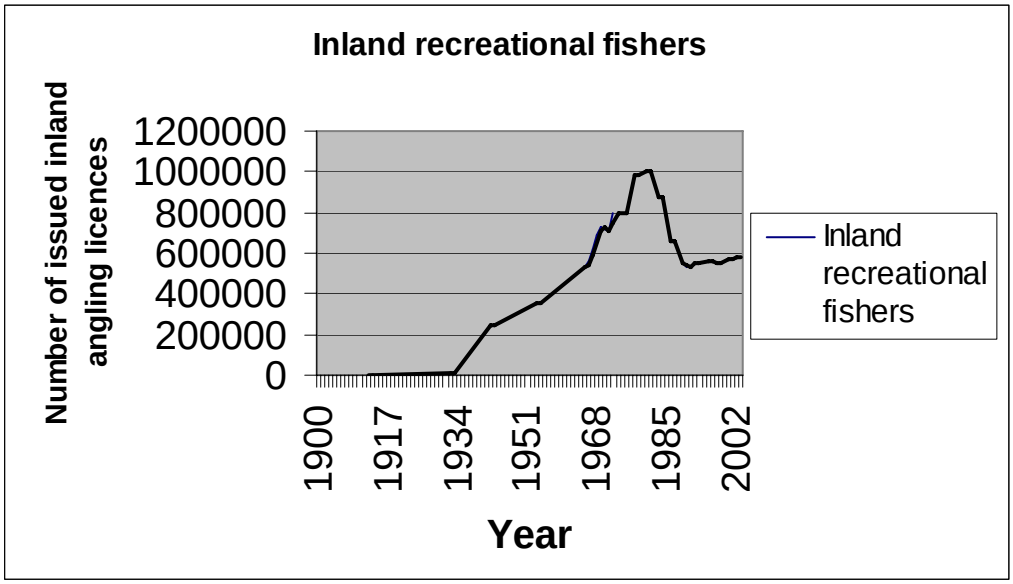
Recreational fisheries or angling increased gradually in importance from the beginning of the

twentieth century. Figure 6 shows this increasing trend. It is the reverse to the declining number of commercial fishers.

Figure 6

Estimated number of issued inland angling licences

in the Netherlands from 1912 to 2002



Source: based on Raat and Brevé, 2003.

Following the Second World War, interest in sports angling in the Netherlands accelerated sharply. It shows also a decline approximately in 1980. The reason for this could be the price increase in the licences at that time (Raat and Brevé, 2003). Since the 1990s, the number of issued licences has been about 600,000 per year, and once again a slight upward trend is apparent.

In 1963, a major conflict arose between commercial and recreational fishers. Dutch anglers claimed that commercial fishers were eradicating wild fish stocks. The recreational fishers won. This was the starting point of Dutch government policy in favour of recreational fisheries and a policy aiming at extending the water surface area available for recreational fishing. The slogan of policymakers at that time was: “priority for sport, subject to the provisions of the profession”.

In 1972, consequently Dutch government policy divided renewals of inland fishing rights into eel fishing rights reserved for commercial fishers and scaled fish fishing rights reserved for

anglers. This policy, also involved buying out arrangements to financially stimulate commercial fishers to hand-in scaled fish fishing rights. This favoured recreational fishing. A second goal was to reorganise and minimise marginal inland fishing businesses and enlarge fishing grounds for the remaining commercial fishing businesses.

Social relationships between Dutch commercial and recreational fishers have been strained for a long time. The division of the fishing rights further increased the poor relationships between the two parties. At the time of the division of the fishing rights and the waning of domestic consumer demand for freshwater fish, commercial specialisation in the eel fishery had good economic prospects. However, after this division, the eel wild stock of the Netherlands declined steady mainly because of the closing of many glass eel (juvenile eel) migration routes by river engineering works and the spreading of an eel disease (swimbladder nematode: *Anguillicola crassus* Kuwahara, Niimi and Itagaki, Anguillicolidae) (Ministry of Agriculture, Nature and Fisheries, 1998). This infected much of the wild eel stock. In addition, eel culture was increasing in the Netherlands. This resulted in a decline in eel prices. Furthermore, high demand for glass eels from fisheries at the Spanish, Portuguese and French coast (as a result of the growing demand by eel farmers) resulted in a decline inland wild eel stocks. Eel is now considered to be a potentially endangered species in the Netherlands (Ministry of Agriculture, Nature and Fisheries, 1998).

The growing attention of Dutch policymakers to freshwater ecosystems and emphasis on the rights of recreational fishers led to greater emphasis on the qualitative rather than quantitative aspects of fisheries management (Ministry of Agriculture, Nature and Fisheries, 1998) and the fact that most recreational fishers were not taking their caught fish home[7] (Thij-Rulof, 2001) resulted in an increase of some economically interesting pescivorous fish species for the commercial fishers. In addition, depending on the target fish species of commercial fishers, “cultural eutrophication” (eutrophication induced by human activity) was beneficial because some eutrophication increases the productivity of the fishing water (Bninska and Leopold, as cited in Arlinghaus et al., 2002). The economically valuable pikeperch for example, even reaches its abundance in polytrophic or hypertrophic waters (Barthelmes, as cited in Arlinghaus et al., 2002; Ministry of Agriculture, Nature and Fisheries, 1998). Because governmental policy prevented commercial fishers from switching over to catching more lucrative scaled fish species, many inland fishing businesses could not survive. As a result, commercial fishers felt deceived by the government and injured by the well-organised,

stronger and growing group of recreational anglers with its good political lobby.

Nowadays, the social relationship between commercial and recreational fishers is less polarised, but still strained. There are strong regional differences especially grounded on historical and emotional motives. The absence of trust, a big threat to the personal relation between "sport and profession", is still a major obstacle. According to Sipponen and Gréboval (2001), many of the sources of conflicts between commercial and anglers lie in the difficulties of communication between users, the lack of a mechanisms for dialogue, or in a failure to understand common objectives. The failure of dialogue between fishermen's groups frequently arises through a lack of willingness on the part of the stronger group to discuss resource allocation with the minority group.

However, even with a mechanism of dialogue it is very difficult to come to a social or ecologically perfect solution. Using the Kaldor-Hicks criterion, markets can rarely lead to a social optimum when a decision about resource use is reached purely by majority voting. It is very difficult to find the optimal solution for different interest groups, even when governments are involved in the decision process (Tisdell, 1991). Imperfect information of individuals, majority voting, priorities, satisfactions, benefits and alteration of views of conservationist, politicians, commercial or recreational fishers indicate a dynamic process over time and the best decisions made at this moment are often inadequate for the future. As Tisdell (1991) pointed out, governments often tend to be myopic in their decisions because their desire to be re-elected may put a premium on short-term benefits to the detriment of long-term interests. According to Pearse (as cited in Balon, 2000) and Kearney (2001), this is also the case with recreational fishing, where politicians, even if not anglers themselves, support recreational fishing in order to woo millions of voters, who travel to motels and camps, buy fancy fishing and camping equipment, vehicles, gasoline, boats, fishing licences and much more.

This long-term process of "imperfect" social decision-making suppressing commercial fishing, in favour of recreational fishing in developed countries may not continue unabated. The influence of conservationist and animal rights and welfare movements is growing (Thailing, 2002). With the increasing stress on the environment from continuing human activity and the growing recognition by humans of animals as individuals (for instance: can fish sense pain?) (Balon, 2000), policy favouring of recreational fishing could end because of

the growing opposition from environmental and animal welfare groups. Such a pattern would be consistent with that outlined in Figure 4.

Since about early 1980s, there has become a growing shift from a management targeting recreation to ecologically based management The holistic integration of the fisheries, recreation and ecosystem management has increasingly become the focus of aquatic management. There is a growing belief that only healthy ecosystems (aquatic) are able to produce high social and economic benefits. Participation, social involvement and shared responsibility of all stakeholders in such decision-making, along with co-management, are the key elements in this shift (Sipponen and Gréboval, 2001; Arlinghaus et al., 2002).

7. The Holistic Approach of Dutch Policymakers Towards Fisheries, Recreation and Nature Conservation

Traditional inland fisheries management is usually carried out at three levels: the fishery, the fish and the aquatic ecosystem (Cowx; Welcomme, as cited in Arlinghaus et al., 2002; Cowx, 2002). By far the most dominant traditional inland fisheries management measures in Europe are regulations (targeting fishery) and stocking practices (targeting fish stocks) (Van Densen et al., 1990; Müller and Bia, Cowx, as cited in Arlinghaus et al., 2002). To a lesser extent, inland fisheries managers use habitat management techniques (Welcomme, 2001; Cowx and Welcomme, as cited in Arlinghaus et al., 2002).

Nature conservation programs and improvement of water quality and the targeting fish populations have rarely been successful and, in the past, have proven to be a short-term solutions (e.g. Ministry of Agriculture, Nature and Fisheries, 1998; Raat, 2001; Cowx and Collares-Pereira; Souchon and Keith; as cited in Arlinghaus et al., 2002; Raat, 2003). Reasons may include fish species diversity being more dependent on rehabilitation of habitat structure and maintenance of lateral and longitudinal connectivity (Collares-Pereira et al.; Lucas and Marmulla; Wolter, as cited in Arlinghaus et al., 2002). Furthermore, a single species cannot be managed effectively without understanding its interconnectedness with other species and ecosystem processes. Therefore, commodity production of a single resource is shifting to the management of whole systems for a variety of purposes (Vogt et al., as cited in Krueger and Decker, 1999).

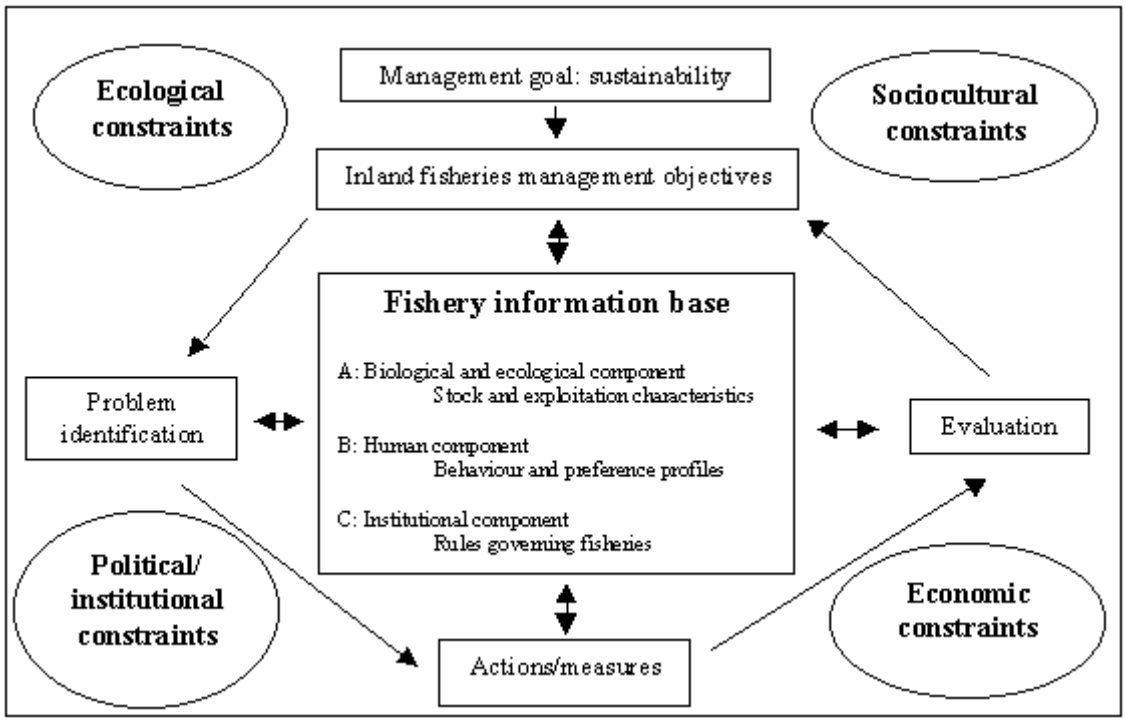
The principal impacts on inland fisheries do not originate from the fishery itself but mainly

from the outside the fishery (e.g. FAO, 1997; Ministry of Agriculture, Nature and Fisheries, 1998; Arlinghaus et al., 2002). As mentioned before, this is certainly the case for the Netherlands (Ministry of Agriculture, Nature and Fisheries, 1998). Nevertheless, as the users of water ecosystems increase and exploitation is expanding, conservation of the resource requires more stringent management (Sipponen and Gréboval, 2001).

Therefore, because of the threats to inland fisheries originating mainly from outside the sector, and the complexity of ecosystem management for multi-purpose goals, inland fisheries management has to be considered an integrated part of a holistic management/framework of aquatic ecosystems or watersheds (Scheffer et al., 2001; Caddy; Garcia et al.; Pitcher, as cited in Arlinghaus et al., 2002). This type management is divided in four domains that need to be integrated (economic, sociocultural, political/institutional, ecological) (Krueger and Decker, 1999). This is illustrated by Figure 7. According to the FAO (1995) an inland fishery can only be sustainable when it conserves water, genetic resources, is environmentally non degrading, technologically appropriate, economically viable and socially acceptable.

Figure 7

Holistic framework for decision making in inland fisheries management



Source: based on Krueger and Decker, 1999; Arlinghaus et al. 2002.

Because of the inability to manage fisheries in isolation, ecosystem-based management

(EBM) has been developed. It is based on the view that: (i) interrelationships between ecosystem are important; (ii) different human values in the process of natural resource must be taken in consideration and (iii) the biodiversity crisis needs to be recognised (Arlinghaus et al., 2002).

As mentioned before, strong participation of different stakeholders is a key element in this type of social decision-making as well as the need for stakeholders to co-operate for multi-purpose and sustainable management. This holistic sustainable objective, is implemented in the Netherlands via a bottom-up approach. This recognises that the fisheries community does not have the sole rights to use the fishing grounds. They may even have the right or duty to manage the fishing ground for a wider community benefit.

Unfortunately, a bottom-up approach to fisheries management in Europe may result in it being targeted to the mostly unsuccessful stocking (Van Densen et al., 1990; Müller and Bia; Cowx, cited in Arlinghaus et al., 2002). Because of the widespread bottom-up approach, stocking programs are done without proper research and proper evaluation of the alternatives and effects. In some European countries, the stocking of fish is mostly the first and only alternative of fisheries managers and is often undertaken by habit (Klein, as cited in Arlinghaus et al., 2002). The choice of stocking regime is often based on best guess and anecdotal information, determined by external constraints (money, sizes, numbers and fingerlings available) (Welcomme, 2001; McPee et al., 2002), or driven by “insider relationships” with stocking material traders. The stocked species are often not determined from an ecological view but are those species that are most valuable or attractive to sell or to catch, and thus demanded by anglers (Sigler and Sigler, 1990; Arlinghaus et al., 2002). A risk could be that, intensive stocking may result in a rapid angler response, raised angler expectations and finally higher exploitation level which may outpace the fisheries managers best stocking efforts This is called the “paradox of enhancement” by Johnson and Staggs (as cited in Arlinghaus et al., 2002).

Besides the fishing licences issued to angler associations in the Netherlands, every commercial and recreational fisher has to have a fishing deed/licence to fish in inland water. The money collected from the selling of fishing deeds/licences, is invested in fisheries management related projects. With this deed/licence the angler has to comply with several fishing regulations such as: codes of conduct, closed fishing seasons (periods forbidden to

fish for different species), bag and size limits, number of fishing rods, use of bait and other gear like keep nets (OVB, 2003). However, some of these regulations (catch-and-release, use of live bait) are opposed by animal right activists. These pressure groups have succeeded in banning fishing using live fish as bait in some countries, for example in the Netherlands and Germany (Wedekind et al., 2001; OVB, 2004).

To improve the EBM approach (see Figure 7) and to reduce problems from careless fish stocking as a result of the bottom approach, “Fish Management Commissions (FMC)” were established by the Dutch government. Via these FMCs (approximately forty FMCs), fish stock management can be improved to more closely achieve the EBM objectives. Hence, fish stock management is determined/designed by groups of different stakeholders (recreational anglers, commercial fishers, nature conservationists) and different preferences are mediated by the power of the FMCs.

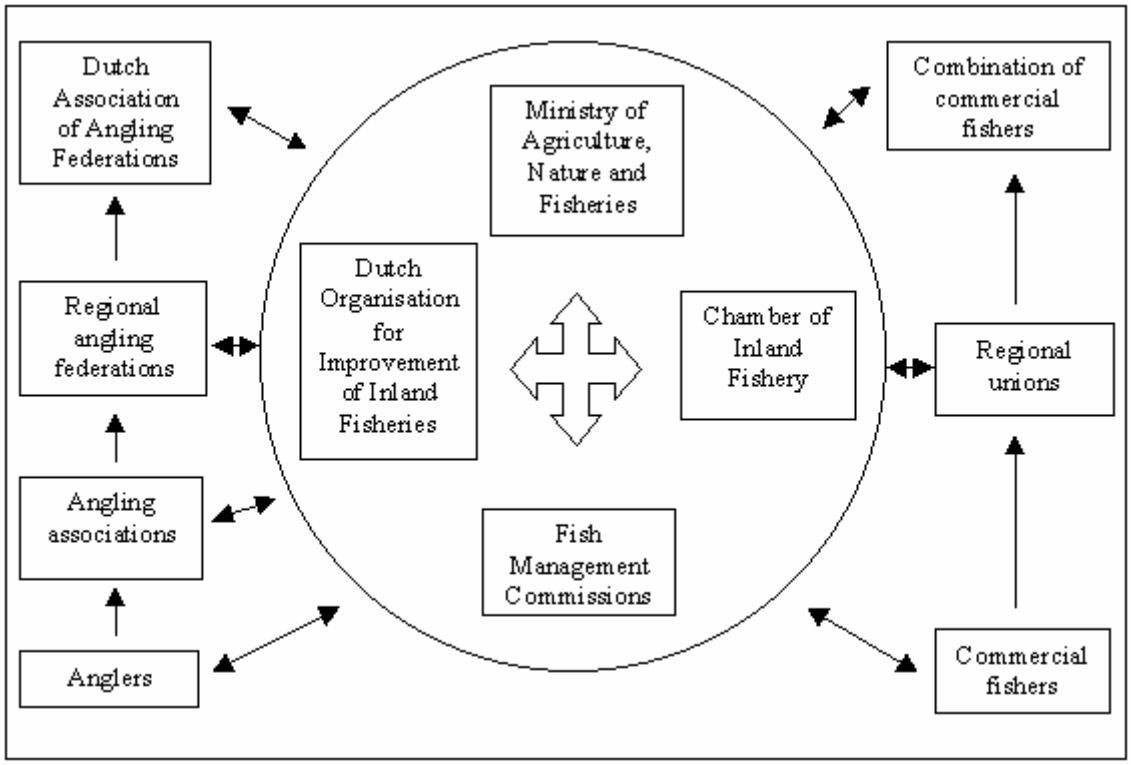
The Dutch Organisation for Improvement of Inland Fisheries (in Dutch OVB) is a semi-governmental organisation. It gathers and disseminates information on fish stocks, water and fisheries. In addition, it gives subsidies for good management and it stimulates the founding of more FMCs. The OVB also the issues of the fishing tax/licences for commercial and recreational fishers and collects the fees.

However the Netherlands, the Chamber of Inland Fishery allocates the inland fishing rights. A inland fishing right is based on having the right to fish on a certain property and to catch certain fish species. However, in the majority of the state-owned inland waterbodies, 96,434 hectares (87%) fishers have to share the fish resources, so fishing for certain fish species is also allocated. In total, 117,373 hectares (94.3%) is allocated for recreational fishery and most of the fishing rights are owned by recreational fishing associations. In total, 110,846 hectares (89%) is allocated for commercial fishery to catch mostly eels.

In the Netherlands, 400,000 anglers belong to approximately 1,000 angling associations. The rest, 200,000 anglers are not member of an association and they can only fish in non-association water bodies. Angling associations are affiliated with 12 regional federations all associated with the Dutch Association of Angling Federations (in Dutch NVVS). In Figure 8, the structure of associations, federations and institutions in illustrated. Half of the commercial fishers are organised in unions.

Figure 8

Organisational structure of Dutch fisheries management



In the Netherlands, marine commercial fishing is regulated differently to inland commercial fishing. Marine commercial fishing right are determined by EU regulations and every year each member state determines how much of each fish per species can be caught (Total Allowable Catch = TAC). According to the TAC, every member state determines the quota that each fisher may catch. In 1993, the increasing interference of the government, gave marine “kotter” fishermen the incentive to organise themselves in 8 groups of 15 to 100 commercial fishers called “Biesheuvelgroepen”, in which currently 97% of all the kotter fishers are organised. With the organisation of the groups, commercial fishers could create more flexibility and better security of income for themselves and regulate governmental restrictions within the group. As a result, the quota division among fishers is regulated by these groups themselves and this is achieved be the individual transferability of quota (ITQ) among the group. The board of the group functions as a mediator.

Trawlers can fish in seas outside the EU. The EU stimulates fishing outside EU seas to decrease fishing pressure on its wild fish stocks. For instance, the EU makes contracts with third countries (countries outside the EU) for trawling companies.

In Europe, there is an overcapacity in fishing effort in relation to the TAC. To decrease the overcapacity, EU uses a buying out policy. The Netherlands employs a supplementary approach to decrease fishing effort named “zeedagenregeling”. This input-controlling policy restricts the amount of fishing time (effort) spend at sea. This marine commercial fishing effort is monitored and regulated by themselves using black boxes (computers registering the amount of time spend at sea). If the effort quota is exceeded, the fishermen in question get fined.

8. Australian Fisheries Policies Particularly in Relation to Recreational Fishing

Most of Australia’s fisheries have been exploited for many years. The Australian Fisheries Management Authority (AFMA) employs a strict management structure in partnership with stakeholders, including the fishing industry and interested community organisations to manage its commercial fisheries. However, in practice the outcome is seldom satisfying for the different stakeholders (Kearney, 2001). Australia uses input and output controls, or a mixture of both and its management tools and are somewhat similar to these of the Netherlands. Input controls, which are still mostly used in Australia, often regulate the level of catch from a fishery through limits on engine capacity, boat size, net size, fishing effort (for example, limiting time and places where fishing can occur), or a combination of these controls. Output controls are applied through two basic quota systems: total allowable catch (TAC) and individual transferable quotas (ITQ).

According to Kearney (2001) there are however some environmental disadvantages in using quota systems. For instance, ITQ approaches may result in high grading and discarding of fish to improve the economic returns to individual operators. This erodes the attempts to rebuild the affected stocks. In addition, for some species, for instance prawns output controls are not well suited because of the great unpredictability of catches (Kearney et al., 1996). From a management perspective, ITQ’s provide the greatest resource protection with the least impact on efficiency of harvesting system. But taking into account the drawbacks of ITQ use into consideration, new concepts such as ecosystem-based fisheries management should be considered so that the ITQ approach is seen in a new light (Department of Agriculture, Fisheries & Forestry, 2003). This broader EBM approach involves managing the broader impacts of fishing on the marine ecosystem, such as bycatch and protected species.

Australian recreational fisheries are, like the commercial fisheries are mostly controlled by input and output restrictions. For a long time it was believed that management of recreational fishing was unnecessary and open-access to a fishery was a birth right. But in the past decade or so, results of surveys of recreational anglers began to demonstrate the enormity of marine recreational landings (Kearney et al., 1996). However, harvest estimates of popular coastal finfish are unreliable because catches by recreational fishers are extremely variable, there is illegal harvesting and often catch declarations are not required. These facts make it difficult to obtain adequate catch information (Kearney et al., 1996).

Because of the long period of lack of definition and clarification of the status of recreational fishing, many issues such as possible benefits, disadvantages, fishing rights, value, and resource access are not well canvassed in Australia. As mentioned before, the management of commercial and recreational fisheries in Australia is complicated by the varying roles of states, and Australian states use a wide variety of approaches to fisheries management. Common, however, is the increasing priority given to the management of recreational fisheries and the interface with commercial and recreational harvesting and environmental degradation. Most states have now accepted the need to control total recreational catch in at least some fisheries by the use of bag and size limits and closed seasons (Kearney, 2001). Furthermore, an increasing number of Australian states are now currently following the "user-pays user-benefits" recreational management approach by introducing fishing licences, and collecting fees from these.

In Western Australia, recreational fishers over 16 years of age need a fishing licence for net fishing and freshwater fishing in general. For marine recreational fisheries, recreational fishers need a licence for some aquatic species, namely abalone, rock lobster and marron (*Cherax tenuimanus* Smith, Cherax). In Northern Territory and South Australia, recreational fishers are required to have a fishing licence. In Queensland, only a permit is needed at present for 29 freshwater dams. For the freshwater rivers and tidal waters in marine areas no permit is required. In Victoria all recreational fishers between the age of 18 and 70 years need a licence. The revenue from fishing licence fees is spent to improve angling opportunities and fish habitats in Victoria. In Tasmania, no licence is required for rod and line fishing in the sea but there is an inland fisheries licence required for freshwater fishing.

In New South Wales (NSW), all anglers have to buy a fishing licence. This began in March 2001. All money raised from recreational fishing licences is placed into the Recreational Fishing Trust (freshwater or saltwater trust) and spent on improving recreational fishing in New South Wales. In the year 2002/2003, 2.7 million AUD was spent on recreational fishing improvements and in the year 2003/2004 double this amount (5.4 million AUD) will be available (New South Wales Fisheries Department, 2004).

In comparison with the trade-off developments between inland commercial and recreational fisheries in the Netherlands, 2 million AUD is spent each year (years 2002/2003 and 2003/2004), in NSW in buying out commercial fishers to create commercially free recreational fishing areas. In total, almost 20 million AUD has been allocated to buy out commercial fishers. This is funded by a loan and the Recreational Fishing Trust is repaying the loan on an annual basis (New South Wales Fisheries Department, 2004). Over 550 commercial fishers voluntarily registered for the buying out arrangements and currently 251 commercial fishing businesses have been bought out. As a result of the buying out, commercial fishers approximately thirty areas in New South Wales are free from commercial fishing. This amounts to 27% of the total estuarine acreage in New South Wales (New South Wales Fisheries Department, 2004).

Lake Macquarie provides an example of a buying out strategy seemingly based on economic rationality. Lake Macquarie is a large estuarine lake of some 110 km^2 located between Sydney and Newcastle and has recently been declared totally free of commercial fishing as a result of buying out 36 commercial fishers. These fishers annually caught 300 metric tons of fish with a value of approximately 1 million AUD at first point of sale (New South Wales Fisheries Department, 2004). Nevertheless, recreational fishing was considered to contribute more to the economy. About 200.000 people engage in recreational fishing on Lake Macquarie each year and the expenditure associated with the activity of anglers in Lake Macquarie is estimated in the range of 12 million to 24 million AUD per year (New South Wales Fisheries Department, 2004). Thus the economic impact of recreational fishing significantly exceeded the economic impact of commercial fishing in Lake Macquarie.

Despite the seemingly rational economic basis of the choice in favour of recreational fishers in Lake Macquarie, economic impact analysis is inadequate as a method for deciding on the

best use of resources to satisfy human wants, that is for solving basic economic resource allocation problems (see Tisdell and Wilson, 2003). A more appropriate method from an economic resource allocation point of view would have been to compare the willingness to pay of recreational fishers to exclude commercial fishers from Lake Macquarie with the willingness to pay of commercial fishers for access to it.

Using this approach, it is possible that a Kaldor-Hicks social optimum would result in a corner-point solution involving the complete exclusion of commercial fishers from Lake Macquarie. In other words, an interior solution may not occur for which commercial fishing is allowed up to a level where the marginal willingness to pay of commercial fishers for access to Lake Macquarie equals the marginal willingness of recreational fishers to exclude. That is not, however, proven by the use of comparative economic impact analysis by the New South Wales Fisheries Department. While economic impact analysis might have popular political appeal, it is flawed as an economic technique for socially optimal resource allocation.

While there is a case for greater use of economic techniques in determining the optimal use and allocation of resources used for fishing, care needs to be exercised in seeing that the economic techniques employed are appropriate for the social choices to be made.

9. Discussion

Both in Australia and the Netherlands, growing social conflict has occurred between commercial and recreational fishers as economic development has proceeded. This might be expected given the type of generalised life-cycle of use of aquatic resources suggested by Arlinghaus et al. (2002). In both countries, recreational fishers in areas of conflicting interests have managed to displace or restrict the activities of commercial fishers. This partly reflects the changing relative political and economic power of the two groups.

Arlinghaus et al. (2002) predict that the relative political power of nature conservationists will grow with further economic development. This group has already had some policy impacts on the use of aquatic resources and on fishing. Comparatively speaking, however, they appear to have had a greater impact on the activities of commercial fishers than on recreational fishers. This may be because commercial fishing is perceived as environmentally more damaging that recreational fishing. However, as mentioned in this

paper, several scientists have shown that recreational fishing can cause considerable ecological damage.

It could, be difficult for environmentalists to make much headway in the near future in curbing the activities of recreational fishers. Both in the Netherlands and some Australian states, recreational fishers must pay licence fees. In return, anglers demand benefits. This actually strengthens their political lobby. Furthermore, the public bodies collecting and using the income from these licence fees can be expected to become their political champions. A symbiotic social relationship emerges.

It is likely to be difficult for nature conservation groups to counteract such a social development. To a large extent their interest is in non-use values and those cannot be marketed by means of a fee for access. By contrast, fishers to some extent are interested in use-values. So conservationists do not 'pay the piper', in this case the public regulator, but recreational fishers do. So it is likely that the adage 'he who pays the piper, calls the tune' will apply. One might expect decisions of the regulator of recreational fishing to favour anglers. No obvious change in this situation seems to be on the horizon.

It seems clear that there is a tendency, given the 'user-pays, user-benefits' doctrine, for public regulators to use a limited form of economic rationalism to give priority to recreational fishing in trade-offs between such fishing and other demands. The economic techniques used are sometimes inappropriate to the task at hand, others fail to take account of total economic value, and non-economic values that may be present in the community. Consequently, the Ecology Based Management approach may be compromised.

Concluding Comments

In conclusion, some differences between recreational fishing activities in Australia and the Netherlands can be highlighted. Whereas 9.3% or less of the Dutch engage in recreational fishing, 19.5% of Australians do so. While fishing clubs do exist in Australia, Australia does not have recreational fishing associations of the type present in the Netherlands with rights to manage particular water bodies. Dutch angling takes place mostly in inland waters whereas in Australia angling principally occurs in estuarine and coastal waters. The two most densely populated Australian states (NSW and Victoria), like the Netherlands, have introduced licences and fees for recreational fishing but most of the other states (South Australia and the

Northern Territory excepted) have only limited licencing systems at present. Overall Australian recreational fishers seem to be less regulated in their access to fishing than their Dutch counterparts. Nevertheless, as demonstrated similar policy issues have arisen for both countries.

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Notes:

1. 2.800 metric tons is produced by eel culture (Min LNV, 1998).

2. EU countries (2004 entering countries not included). The total average percentage recreational fishing participation of the EU countries is approximately 6.5% (EAA, 2003).

3. The number of angling children has in the Netherlands increased between 1994 and 2000, with 43%.

4. 200 angling stores, 2.000 pet stores and more than 7.000 supermarkets, garden centres, department stores, exhibitions, internet, mail order houses, wholesalers, etc.

5. The weight of some of the fish categories can be calculated by length-weight ratio's (see further information Henry and Lyle, 2003).

6. When having a right to fish in the Netherlands means that the owner (a person or a organisation) of the fishing right has the right to put and take fish in the waterbody in question (Ministry of Agriculture, Nature and Fisheries, 1998). Fishing rights are property rights leased to two kinds of users, individual commercial fishers and recreational associations.

7. Catch-and-release policies are fundamental to the recreational fisheries policies of the USA and other temperate countries such as the Netherlands and the UK (Welcomme, 2001; Policansky, 2002).

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