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The Outcomes of Private Ownership of Fishing Rights and of Changes in Administrative Practices

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This book is dedicated to Kirsti, Aura, Ansa and Touko.

ABSTRACT

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Diss.

This thesis summarises the results of six studies describing the organisation and functioning of the fisheries system of Finnish inland waters. During the past 15 years, the efficiency of inland fisheries has been improved due to changes in fisheries legislation, in particular the establishment of regional management units, which have provided for the participation of many relevant interest groups in the decision-making process, thereby improving the practice of co-management. The outcomes of the fisheries system were found to depend more on political-administrative institutions than on biological productivity. The system shows greater stability at the lower hierarchical levels. Access to fishing grounds is of vital importance in both professional and recreational fishing. The long-run private market equilibrium supply for recreational fishing with active types of gear accounted for 50% of the Finnish lake surface area. Due to an input-oriented management policy the resource rents which should have accrued to statutory fishery associations from fishing licence sales dissipated, contradicting the predicted outcome of private ownership. The price mechanisms provided the owners with insufficient information as to what direction to take to improve the management and supply of fishing grounds. Locality turned out to be a dominant feature of recreational fishing. As regards professional fishing, state-ownership of fishing grounds was a recruitment channel into the occupation, and was also found to facilitate effective operations contrary to that of private ownership. The social environment and the patters of behaviour of professional fishermen have remained largely unchanged in spite of the rapid technological development in the industry. Private ownership has led to a suboptimal allocation of fisheries resources, particularly in the professional branch of the industry. Within fisheries regions, an appropriate scale for management has been found which will enable managerial responsibilities to be increasingly vested in them in the future.

Key words: Fisheries organisations; fisheries system; inland fisheries; legislation; management regimes.

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CONTENTS

LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following papers, which will be referred to in the text by their Roman numerals (I-VI):

I Sipponen, M. 1995. Effects of undercompensation and small remunerations on the regional economy of fishing in the Province of Central Finland. - Finnish Fisheries Research 15: 23-38.

II Sipponen, M. & Latikka, A.-L. 1995. The market for recreational fishing opportunities in Finnish inland waters in 1974-1991. - Finnish Fisheries Research 15: 1-21.

III Sipponen, M. & Muotka, M. 1996. Factors effecting the demand for recreational fishing opportunities in Finnish lakes during the 1980s. - Fisheries Research 26: 309-323.

IV Sipponen, M. 1995. Fisheries regions - a tool for more effective fisheries management? - Aqua Fennica 25: 77-91.

V Sipponen, M. 1998. The impact of ownership of fishing rights on professional fishing in Finnish lakes. - Fisheries Research 34: 123-136.

VI Sipponen, M., Niittykangas, H. & Salo, H. The adaptation of professional fishing to diminished vendace stocks: the case of Finnish inland waters. - North American Journal of Fisheries Management (in press).

Author´s contribution

The author of this thesis is the sole author of original publications I, IV and V. The study of the adaptation process of professional fishermen was written jointly (VI). The role of the co-author was purely of a technical nature in publication II. The contribution of the co-author in publication III mainly involved running the models.

1 INTRODUCTION

Watercourses suitable for fishing are one of our national treasures. Of all the countries of Europe, the proportion of watercourses of the total land area is highest in Finland, viz. 9.3 % (31 613 km^2). Various interests related to industrial and leisure activities have a stake in inland waters, fisheries in particular among them. As the Finnish fishing population is large by international standards, an appropriate form of stewardship of fishing grounds is essential, if the utilisation of fishery resources is to be developed. The goal of fishery management is stated in the first section of the Fisheries Act (286/82) to the effect that the maximum sustainable productivity should be obtained from waters areas when engaged in fishing. This goal integrates fisheries management into the wider concept of the sustainable use of renewable natural resources. The concept of productivity, traditionally interpreted biologically, is presently considered also to encompass social dimensions, including economic efficiency and value judgements.

The assignment of property rights has been widely proposed as a means to ensure the effective utilisation of the common property nature fishery resources (Gordon 1954, Scott 1955, Hardin 1968, see also Copes 1972, 1986, Ciriacy-Wantrup & Bishop 1975, McGoodwin 1990, p. 91, Kesteven 1996). However, Symes (1998) points out that in the case of fisheries property rights are often used to refer to use (or usufruct: the right to use and derive profit from a piece of property belonging to another, provided that the property itself remains undiminished and injured in any way) rather than real property rights. True property rights within fisheries are rare, while use rights are defined as access rights or harvest rights. He also observed that relatively little has been written on the nature of use rights and their integration within systems of management, in particular within the European context. Thus the Finnish institutional environment, where waters are privately owned and where fishing rights include both the real property right and use right, would not only provide a favourable basis for fisheries management, but also opportunities for testing empirically the validity of the presumption of privatisation.

World-wide the analysis of inland fisheries has been overshadowed by marine fisheries. However, along with greater understanding of the social and economical importance of recreational fishing, inland fisheries have come to be regarded as deserving higher priority (Norling 1968, Gaudet 1977, Grover 1982, O´Grady 1995, FAO 1997). Fishing in Finnish inland waters means above all recreational fishing in terms of the number of fishermen and the value of catches.

At the end of the 1980s professor O.V. Lindqvist from the University of Kuopio posed the question of whether the Fisheries Act (1982) is, in fact, self-contradictory. This is an interesting problem for a fisheries administrator and is related to the level of exploitation of fish resources. The author´s perception, based mostly on a career as a governmental fisheries manager at the intermediate level, emphasises the understanding that inland fisheries are multidimensional system, which thus requires holistic analysis. The long tradition of a management policy which places a high priority on conservation, has given way to biologically-oriented goal setting. Consequently, the concept of sustainable development would intuitively appear suitable to a system of inland fisheries, as the latter use small scale technology and have had relatively small impacts on fish stocks. In this context, daily management solutions challenge the ability of fisheries´ science to produce a relevant understanding of the processes going on and their consequences for the system.

The goal of this study was to evaluate, whether the functioning of the fisheries system has been improved as a result of the revised fisheries legislation of 1982 and consequent administrative changes. This has been done by ascertaining the main features affecting the outcomes and workings of the fisheries system in relation to Finnish inland waters. A special point of reference was introduced by Copes (1972), who found that "management of a fishery by a regime of private ownership is generally non-optimal from social standpoint and is not inherently superior to unlimited entry". This finding ran at the time counter to the emphasis in the literature. It was presented in a context where the joint ownership of private fishing rights was not considered. Scott (1955) emphasised that the mere existence of the institution of private ownership is not sufficient to ensure efficient management, but property must be allocated on a scale sufficient to ensure that the owner has complete control of the asset. Criticising the ideology that private property is always efficient, Bromley (1991) notes that private property regimes are never cited as the cause of resource degradation, but "inappropriateness" of the time horizon of the owner, or prices. Therefore, the hypothesis to be dealt with in this synthesis was modified as follows:

The joint possession of private fishery resources, when the entire fisheries system is taken into consideration, has led to underutilisation and suboptimal allocation of these resources.

In Finnish inland fisheries, consideration of management has earlier focused more on fishing grounds generally and on them as an object of possession rather than on single fish stocks and the process of fishing. In order to acquire knowledge of the state of inland fisheries and the function of fisheries institutions, I have studied the fishing licence market for jointly owned

private fishing grounds, particularly in their recreational and professional uses, and the function of the new management units, fishery regions. My research has followed the evolution of these new institutions.

While the number of studies addressing biological concerns, even in the case of Finnish inland fisheries, is abundant, studies focusing primarily on fisheries and related activities are less in evidence. Nevertheless, inland fisheries as an object of study has been considered from various points of view, but many of the studies on fishing have focused locally either on a specific problem or on a certain type of fishing. Ethnological fishing research in Finland has concentrated on the changes in fishing as a livelihood. Pennanen (1986, p. 216) observed that in traditional winter seine fishing, carried out by part-time professional fishermen, ecological and social factors dominated economic and technical ones - an item also discussed in this synthesis. In his study Lappalainen (1998) examined various groups of fishermen and the changes in the types of fishing, providing a perspective into changes in the fishing culture as well as to the relationships between some of the institutions concerned. Lappalainen characterised generalisations for the properties of Finnish inland fisheries on the basis of his empirical observations from Lake Höytiäinen. These ethnological studies have provided a broad picture of fisheries. As a system, the properties of inland fisheries have been examined also e.g. by Sipponen (1987,1990), while Lindqvist et al. (1988) proposed what they termed "intended underfishing" as a feature of the system. As a livelihood, the fishery branch was surveyed as far back as in the 1970s (Kehitysaluerahasto 1976). The Finnish Game and Fisheries Research Institute has produced time series data about the profitability of professional fishing in 1973-1988 (see Salmi & Salmi 1995). The recreational aspect has entered into the picture, particularly since the beginning of the 1990s, although statistics produced by the Finnish Game and Fisheries Research Institute describing recreational fisheries countrywide in terms of types of fishing, catches and fishing effort have been available since the 1980s (e.g. SVT 1993:11, SVT 1995:12). As statistics, however, they did not provide much explanation of the observed development. Professional fishing as a type of entrepreneurship has been investigated in more detail, for example by Niittykangas et al. (1993) and Salmi et al. (1996). The settings of the fisheries institutions have been described by Honkanen (1985) and Vihervuori (1992, 1998) and, in particular, their development in the 20th century by Tiitinen (1995). Conflicts between different types of fishing and the decision-making attached to them have received attention by Salmi et al. (1994), Pitkänen (1996, 1997), Salmi (1997) and Salmi & Auvinen (1997, 1998). However, a socio-economical approach, especially in relation to recreational fishing, is a relative newcomer to the Finnish fisheries research. The capacity of fishing grounds to generate economic wealth and recreation has largely remained uninvestigated. Many of the studies undertaken in the course of the present research enter into these areas, filling a gap in knowledge, both in terms of ideas and statistics.

The Finnish inland fisheries has been worth studying for the following reasons:

1. Fishing grounds are a nationally important resource base. The requirements of modern society create the need for a fisheries system, through the workings of which a resource base is transformed into a resource for man in order to produce material and non-material utilities;
2. The inland fisheries is a relatively neglected field of fisheries science, particularly recreational fisheries, which deserve a higher priority;
3. Finnish institutions for the ownership and management of fishing grounds are unique. They therefore constitute a good basis for studying the predicted outcomes of normative economic principles;
4. It is important to try to understand inland fisheries as a system.

This synthesis presented here summarises six (I-VI) separate articles, each of which describes or analyses either some interlinked features of the subsystems or the inland fisheries system as a whole. The biological subsystem encompasses the concern of sustainable productivity (I,VI). The socio-economic subsystem is involved with the goals of access management policy, related aspects of rent accumulation and the concerns of the fishing licence market (II,III,V,VI). The political-administrative subsystem, in turn, deals with legislation as an instrument for strengthening stewardship, removing market deficiencies and improving equity and entrepreneurship (II,IV,V).

At the outset in article (I), by means of economic impact analysis and using a regional input-output model constructed for the Province of Central Finland, the effects of a demand stimulus on the different branches of the fishery are assessed. The results indicate the proportional significance of professional fishing, recreational fishing and fish farming to a regional economy. However, the main purpose was to determine the losses incurred by the fishery industry due to diminished remunerations in permit procedures. They turned out to be proportionally smaller in monetary terms than in biological units, i.e. fingerlings. Further attempts to apply the method to the whole country were not taken. A permit procedure interlinks the biological and political-administrative subsystems. The goal of maintaining the sustainable productivity of fishing grounds is discussed with reference to the appropriateness of the concepts used in interest comparison according to the Water Act. In essence, it is impossible to replace biological productivity with money, even though legislation allows it.

The fishing licence market as a mechanism providing opportunities for recreational fishing is examined from the supply side in article (II), where the aggregated supply curve is graphically estimated for all the lakes and river units offered in the market. Hence the question is of a complete census. The long-run market equilibrium supply appears to account for 50% of the Finnish lake surface area. The market for river fishing has better adjusted to demand than that for lake fishing. The dissipation of resource rents that should accrue to

owners from the fishing licence market was a finding contradicting the predicted outcomes of private ownership of fishing grounds.

The demand side of recreational fishing carried out in lakes is examined in article (III), where single-equation demand models are specified and estimated for the whole inland lake fishery system. The price system was found to provide scanty if any information for the bodies responsible for fisheries management as to what direction to take to improve the supply. The locality of recreational fishing was one of the reasons affecting the performance of the licence market.

In respect to institutions, legislation as a means of improving fisheries management is studied as regards the fisheries regions (IV), which constitute a participatory system for relevant interest groups. The goals of the players within fisheries regions allows for the grouping of regions according to their willingness to take advantage of the new opportunities provided by legislation. It was suggested that the Finnish inland fishery system is user-oriented on the policy and strategy levels, but owner-oriented on the operational level, whereas as a whole its nature is user-oriented.

The impacts of property rights on professional fishing are examined in article (V). State-ownership was found to facilitate the starting up of professional fishing enterprises, providing access to fishing grounds, use of the most effective fishing technology and consequently the highest turnover. Private ownership encouraged less effective operations, resulting in under-utilisation of vendace resources. The most prominent distinctive feature of public and private access management was the attitude towards entrepreneurship, which was hampered in privately owned waters.

The adaptation of professional fishermen to a changing operational environment (VI) is analysed in various production areas of fishing. It was shown that full-time professional fishermen differ from part-time professional fishermen in their adaptation to diminished fish stocks: they increase their fishing effort, they try to extend their fishing grounds and they switch to new species. Part-time fishing did not seem to serve as a preparatory stage for full-time professional fishing, but full-time and part-time fishers constitute two distinct strategic groups whose members have diverging aims. The results lend support to the view that technological development in the industry has been rapid, but that the social environment and patterns of behaviour of professional fishermen have remained largely unchanged.

Some of the ideas which emerged in these separate studies are further developed here. In particular, they are explained in relation to the goals of the different access management policies of the fishing grounds. The goals behind access management and the market behaviour of owners of fishing rights as well as that of fishermen, can be condensed into three related paradigms presented by Charles (1992) conservation, rationalisation and social/community paradigms. Because of the rapid development of the practices of co-management during the study, it has received more attention in the present report, whereas my original intention, which was to analyse the importance of the Water Act and its implications for the functioning of the fisheries system lost some of its current interest during the length of time taken

to complete the study. However, the subject has been studied e.g. by Lehtinen (1993).

The multi-discipline approach adopted is not free from difficulties. The multiplicity of issues have combined to demolish (Finland´s) inland fisheries as a coherent entity - emphasising the need to understand it as a system. The methods employed during the study have been described in detail in the individual articles. As such they illustrate the nature of fisheries science as an applied field of science.

Throughout the study, the Åland Islands are excluded and northern part of Finland included, unless otherwise mentioned.

2 RECENT DEVELOPMENTS IN INLAND FISHERIES AND THE STATE OF THE ART

2.1 Worldwide developments

Worldwide the concept of fisheries has often been interpreted to mean marine commercial fisheries, where the economic interests have been paramount. The birth of modern fisheries science and the modern practice of fisheries management is related to marine fisheries (McGoodwin 1990, p. 67, 198). While over-exploitation of fish resources and over-expansion of the fishing fleet (Parfit 1995, Safina 1995, Crean & Symes 1996) as a result of failure in management and governability (Symes 1996, Dubbink & Vliet 1996) is a phenomen common to many of world´s marine fisheries, it is more difficult to define any such common single factor originating from human interventions for inland fisheries in the Western world. One reason for this might be that inland fisheries, unlike international sea fisheries, usually come under the political control of a single government and, consequently, would be expected to give less controversy or governmental intervention (Gaudet 1977). By definition inland fisheries are fisheries which are exploited in fresh water or estuaries and the target species are those which spend all or part of their life cycle therein (EIFAC 1994, p. 17). Inland fisheries are not a scale model of marine fisheries because of substantial differencies in the biological and socio-economic resource base and cultural circumstances.

Barber & Taylor (1990) divide the evolution of the goals in marine fishery management in the Western world into three periods representing stages of increasing complexity in fisheries management issues. During the first period in the pre-1900s, a laissez-faire attitude dominated and depletion of a resource was not admitted. The next period from the early 1900s to the late 1960s found maximum sustainable yield (MSY) as the management goal. As a consequence, maximizing harvested biomass was an explicit goal, whereas social and

economic concerns were implicitly recognised under management for MSY. The next guiding concept was optimum yield (OY) (see Barber & Taylor 1990) or the optimal social yield (OSY) (McGoodwin 1990, p. 158), which recognised that cultural, social, political, economic, and biological goals must be addressed. However, as a broad concept it has so far had little operational significance. Therefore Larkin (1988) asked whether it was time to write an epitaph for OSY, contrary to McGoodwin (1990, p. 160), who recommended that policy analysts, scientists and fisheries managers should develop a more formalised and comprehensive conception of OSY. Stephenson & Lane (1995) suggested that future fisheries management should focus on integrated fisheries, rather than solely on fish populations, in a way that should provide a framework for a new fisheries management science. According to Caddy (1995), generalising on the most fundamental deficiency described by the former authors, the organisation of science into disciplines that communicate poorly among themselves and to society does not lead to the necessary synergy or state of precaution in situations of uncertainty. Smith (1986) has pointed out that there has been an evolution in fisheries management in which an element of emotionalism has been brought into the fishery. This emotion involves the aesthetic uses of fishery resources. Lee (1993) extends the point by noticing that with the rise of environmental concerns in industrialised societies and international organisations, sensible management includes the welfare of nonhuman species, or as Hughes & Noss (1992) argue, a set of rights of ecosystems extended to habitats and organisms.

Throughout the history of fisheries management, goals have been rarely stated explicitly or have been stated in generalised terms of "best" or "wise" use, "provide the maximum benefit to society", with no supporting statements of objectives (Barber & Taylor 1990). Nowadays the significance of mutual understanding between the different actors as a prerequisite of good resource management is recognised (Smith 1980, Harville 1985, Pringle 1985, Loftus 1987, Barber & Taylor 1990, Raat 1990, McGoodwin 1990, p. 158, Dyer & McGoodwin 1994). The first section of the Finnish Fisheries Act is an example of these broadly phrased goals, for which the OSY would seem to be an operational expression.

Overall, the approaches taken to fishery management have been heavily influenced by the legacies of the policies and regimes that were formulated in response to the crisis in large-scale industrial fisheries in the North Atlantic and North Sea around the turn of the century. As a result, many of these approaches are inappropriate for the management of small-scale fisheries (McGoodwin 1990, p. 68), not to speak of freshwater fisheries, which in terms of resource base and scale differ considerably from marine fisheries. However, some concepts developed with respect to marine fisheries may also help to conceptualise the problems inherent in inland waters.

In (marine) fisheries, there is a need to emphasise the sustainability of the fishery system as a whole (Charles 1997). Charles (1992) has presented three principal classes of fishery policy objectives and respective world views, or alternatively, paradigms for them: conservation, rationalisation, and social/community paradigm. In this study these paradigms have been

extended to inland fisheries in order to illustrate the basis for decision-making, also embracing the recreational use of fisheries resources.

The *conservation paradigm* is based on the premise that the primary duty of fishery management is to take care of the fish. Fishermen are viewed as components of a predatory fleet in which all fishermen act in their own self-interest. This approach has emphasised biologically-based management, which often, in order to save fish stocks, has tended to restrict total fishing effort. The philopsophy behind the "old" Fisheries Act of 1951 fits well under this heading.

The *rationalisation paradigm* emphasises wealth generation in fisheries through the pursuit of economic efficiency. It is assumed that society should seek to maximise fishery rents, that is, economic benefits over and above payments to fishermen and vessels. Fisheries that fail to seek economic efficiency and to maximise rents must be rationalised. Rationalisation involves, for instance, instituting private property rights in respect of fishing, e.g. individual transferable quotas. However, Gordon (1953) pointed out that society may prefer to have an economically inefficient fishery, if this choise is desirable.

The rationalisation paradigm has its roots in Hardin´s (1968) "the tragedy of the commons" model. Berkes & Farvar (1989, p. 9) criticise the prominent position it has had among resource managers in the Western world in spite of its shortfalls. According to Berkes et al. (1989) the model confuses common property resources with open access, i.e. the absence of property rights, thus equating the common property resources with overexploitation. It also makes the assumption that resource-users are individualistic and unable to cooperate in the interests of greater community, and overlooks the role of institutions that provide for exclusion and regulation of use. They think that cultural and historical factors underlying such institutions are key to success of communal management. Berkes & Farvar (1989, p. 8) argued that the Hardin model leads to the erroneous conclusion that resources should be either privatised or controlled by central government authority to ensure sustainable use and maintenance or capture of all or some of the rent that the fishery could yield. Placing emphasis on privatisation has been considered to be misleading in that it tends to direct analysis away from the consideration of many reasonable and economical non-property rights policy alternatives (Wilson 1982).

The market mechanism is often seen as an instrument for allowing optimal allocation of resources and achieving economic efficiency (e.g. Cauvin 1978, 1980), the goal of the rationalisation paradigm. The market-based perspective conceptualises man as an economic actor, and society mainly as a market. It suggests that markets are the superior way to achieve public goals, because in the market the private and the public interests are reconciled. When the price mechanism or the market system fails to bring about a social optimum, a market failure is said to occur. The reason behind it is that individuals are induced to behave in ways that do not contribute to the social optimum: the incentive structure being such that private and public interests diverge (Dubbink & Vliet 1996).

The applicability of market allocation has been doubted as regards both commercial (Wilson 1982, Charles 1994) and recreational fisheries (Bedi 1987).

The market has been considered as a suitable and efficient institution to the attainment of short-term economic goals, but only partly appropriate for the achievement of long-term economic goals, and not for political, social, normative and other non-economic goals (see Dubbink & Vliet 1996).

The *social/community paradigm* focuses on community welfare, distributional equity and other social and cultural fishery benefits. Even in marked-based Western societies cooperation for the communal interest frequently occurs; for example, in contemporary commercial fisheries in the United States, Great Britain and Canada - countries in which the supremacy of the individual interest is held without question (Berkes 1985). So far this paradigm has mainly been considered in relation to coastal fisheries.

As an alternative to pursuing management procedures which have to a great extent been based on the rationalisation paradigm, the concept of *co-management* has been introduced. The co-management perspective, or paradigm, starts from the assumption that man is able and willing to take some public responsibility. Man is seen as something more than an economic actor (Dubbink & Vliet 1996). Co-management has many definitions, but an essential element is that management is based on shared responsibility and shared decision-making between government, fishermen and other players in the fishery system (Jentoft 1989, Charles 1992, Dubbink & Vliet 1996, OECD 1997). Formally defined, co-management (also called folk management and co-operative management) is any localised behaviour originating outside state control that facilitates the sustainable utilisation of renewable natural resources (Dyer & McGoodwin 1994). Fishermen´s organisations taking an active part in developing, implementing and enforcing fisheries regulations have, by various authors, been termed co-management (Jentoft 1989). The oldest and most successful co-management regimes are found in Japan, where cooperative organisations have long played an important role in fisheries regulation (McGoodwin 1990, p. 192). In most Western nations with cooperative co-management regimes, the arrangement is confined entirely to coastal and inshore fishing (McGoodwin 1990, p. 192). In some cases co-management takes the form of territorial regulations, in other cases quota allocation is the tool. Some co-management organisations are multi-purpose, combining fisheries management with fish marketing and other functions (Jentoft 1989, OECD 1997). This regime shares many features with the Finnish fisheries regions.

2.2 Valuation of inland fisheries

Individual preferences are the fundamental source of values (Randall 1987a). Values related to natural resources can be divided into use values and non-use values. On-site recreational use or commercial use of fishery resources are examples of use values, and existence value of the archetype of non-use values.

Welfare economics provides methods for valuations of economic value (e.g. Navrud 1992), although their applicability has been questioned (Cauvin 1980, Rahikainen 1993) and criticised (Vatn & Bromley 1994). The latter argue that efforts to derive hypothetical values for the complex and interrelated attributes of the environment results in a non-trivial loss of information. Often the valuing of fishery resources has been needed in attempts to avoid fishery habitats being converted or irreversibly lost because of competing usages of water areas. A number of estimates have been presented, even for freshwater fisheries, mainly in North America (EIFAC 1977, p.1, Cauvin 1978, American Fisheries Society 1987), where estimations of value have been required because of competition in allocating public resources. In Europe, value assessments with respect to fisheries have been relatively few, but have been used, for example, in order to evaluate damage caused to freshwater fish stocks by acidification (Navrud 1989) and the value of recreational fishing in a regulated lake, such as lake Inari (Tervo & Mäenpää 1996).

The theoretical economic analysis of open-access and optimally utilised fisheries has, for the most part, been developed in the context of commercial fisheries (Anderson 1993). The theoretical analysis of recreational fisheries has received comparatively short shrift. The main conclusions of the few existing studies (e.g. McConnell & Sutinen 1979, Bishop & Samples 1980, Anderson 1980, 1983, McConnell & Strand 1981) are the same as those on commercial fishing: open access in a recreational fishery does not maximise potential rents because individuals do not consider the costs they impose on other participants (Anderson 1993).

The competing usage and joint management of commercial and recreational fishing is a contemporary management problem in many fisheries. It has been subject to academic attention mainly since the late 1970s, principally in North America, where efforts are being made to develop management strategies towards recreational fisheries when these interact with commercial ones (e.g. Anderson 1981) and in Australia, where marine recreational catches are being restricted (ABARE 1992). In Europe, this interaction has been largely ignored, both theoretically and empirically (Cunningham et al. 1985, p. 288), but is now also recognised as a source of conflict (Weissglas et al. 1996, FAO 1997).

Access management institutions and the effect they have on the benefits being optimised have also attracted less attention in inland than in marine fisheries. In the works of Turvey (1964), Copes (1970,1972) and Copes & Knetsch (1981) the affects of various fisheries access management policies on types of benefits generated were analysed. Copes & Knetsch (1981) introduced also recreational fishing into the framework, an opportunity also discussed by Tuomi (1977).

Concomitant with the increasing understanding of the social and economical importance of recreational fishing, inland fisheries have been and are regarded as deserving a higher priority (Norling 1968, Grover 1982, O´Grady 1995). For some reason, socio-economic or human dimensions research seem to have met with limited interest in European recreational fisheries management, as compared to the role of human dimensions research in the United States or Canada (Aas & Ditton 1998).

In the European context the concept of recreational fisheries involves both subsistence fishing (non-commercial) and sport fishing. Subsistence fishing is for personal consumption, food for others, or for sale to supplement income. Sport fishing means recreational or pleasure fishing where the capture of fish is secondary to the activity itself (Wortley 1995, Cowx 1998). The broad European concept would be more appropriate even in Finland, where the importance of distinguishing the traditional subsistence fishing from recreational fishing is still stressed in many quarters, obviously rather in order to emphasise possession than affect managerial decisions.

The importance of recreational fisheries in Europe varies widely between regions. In the western European countries, fisheries are exploited for pleasure and sport and few fish are consumed. In spite of a slight reduction in interest the economic importance of recreational fisheries can not be overemphasised (Cowx 1995). In northern Europe, fisheries are exploited partly on a subsistence basis, but sport fishing is becoming more popular. In eastern Europe, recreational fishing is much more than a leisure activity (Bninska 1995). The intensity of recreational fishing is probably more akin to that of subsistence fishing. In southern Europe recreational fishing is generally less well developed and in a state of decline, although in some countries it is a well developed activity (Stephanou 1995, Wortley 1995, Cowx 1998). The European development coincides with Smith´s (1986) prediction of the life cycle of fisheries, where the pattern of use develops from food production to nonfood uses: recreational and aesthetic ones.

In Europe, restricted access is reported to be the principal cause of conflict between commercial and recreational fishing. Conflict between recreational fishing and animal welfare interests have been reported in several countries although not in eastern Europe (Wortley 1995). A common need has arisen to increase recreational fishermen´s knowledge of the ecological implications of their activities, e.g. the stocking and introduction of new species, which can have influences on the aquatic environment and other resource users (Wortley 1995, Cowx 1998). In many countries concern has been expressed at the possible demise of recreational fishing through conflicts with other user groups and the imposition of tight regulations to promote conservation (Cowx 1995). The education of recreational fishermen, as well as the domestic use of the catch, are considered important issues within the EIFAC (European Inland Fisheries Advisory Commission) member countries.

Commercial fisheries in inland waters of Europe are diverse in character, and information is sparse. Commercial fishing is restricted to specific water bodies in most of western Europe. In eastern Europe it also involves the management of the whole aquatic ecosystem rather than just fishing. State-

ownership, prevalent in eastern Europe, is being replaced by privatisation. Even though in some counties (e.g. Finland) fishery legislation confers some advantages on professional fishing, in some others nature conservation policies tend to operate to the exclusion of commercial fishing. Leisure activities, by damaging the aquatic ecosystem and preventing the use of conventional fishing methods and gear, impair fisheries in some countries (von Lukowicz 1995).

In his quite comprehensive description of European inland fisheries, Dill (1990, 1993, p. 276) summarised the present situation in respect to the inland fisheries of Europe "that the commercial fisheries are declining as recreational and aquacultural fisheries grow, that new technologies are replacing the old, that the role of private fishing is declining, that environmental considerations are more important than ever before, and that there is a growing realisation that many of the factors influencing fisheries are quite external to the fishing itself. These phenoma, and the other changes that have been mentioned, are not, however, unique to Europe. This is the way of the world today". However, Dill fails to fully recognise the particular esteem with which Finnish people regard fisheries.

Structural changes have during the last few decades been taking place within the Finnish fishery industry. The relative importance of recreational fishing and fish farming has increased, and that of professional fishing decreased. Simultaneously connections between fishery occupations and agriculture have loosened. The pursuit of full-time professional fishing in inland waters is a relatively recent phenomenon, dating from the 1960s and the 1970s (Lappalainen 1997). Many professional fishermen have sources of income other than fishing (VI).

In terms of the number of fishermen, their catch and its market value, the main concern of Finnish inland fisheries is recreational fishing. The multiplier impact of recreational fishing on the economy is manyfold compared with the producer-priced value of the catch: recreational fishermen spend on their hobby 1 400 - 1 600 million FIM annually (SVT 1994:3, p. 58, SVT 1998:3).

2.3 Economic rent

The concept of an economic rent arose in the early nineteenth century from the realisation that rent for land was not set by the owners of the land but rather by the potential profitability which users could reap from using the land (Barlowe 1958, ref. Campbell & Haynes 1990). Land as a factor of production consists of natural resources of all kinds, including fishing grounds. According to an economic classification, the total income of a factor of production is made up of its economic rent and transfer earnings. Economic rent is an income received by the owner of a factor over and above the amount required to induce that owner to offer the factor for use, above the income termed transfer earnings. The difficulty related to fishing grounds is that their yield for man is based on fugitive and migratory fish stocks, which have to be captured.

A resource rent (RR) measures the surplus revenue that could be appropriated by the owner of a fishery resource who is exploiting the resource to his best pecuniary advantage. This rent relates to the richness of the resource (Copes & Knetsch 1981). Resource rent is just one form of economic rent and true resource rents are a long-term phenomena (Campbell & Haynes 1990). The capacity to raise licence fees, either recreational or commercial, would be one measure of an increase in resource rent (Copes 1972). However, owners of waters have not systematically done this in Finland.

2.4 Management objectives under different management regimes

For policy prescription purposes the rent concepts of the rationalisation paradigm are illustrative. In this context the social maximisation in achieving economic efficiency in fisheries management should, besides the profit to the fishing industry, include at least consumer rent and the rents accruing to all factors of production (Copes 1970, Clark & Munro 1975, Anderson 1980).

In the studies by Turvey (1964), Copes (1970,1972) and Copes & Knetsch (1981) the affects of various fisheries access policies on the types of benefits generated by a fishery were analysed. In their framework Copes & Knetsch (1981) used static analysis, thus omitting dynamic considerations of discount rates and price changes. Such a framework does not produce numerical value estimations. In respect to professional fishing, the comparison of management regimes is structured on the assumption that under public management control total net social benefit is attempted to be maximised as a combination of its component parts; consumer rent (CR), producer rent (PR) and resource rent (RR) (Copes & Knetsch 1981). By definition, catch size, level of fishing effort and consumer prices of fish are optimised. A worker satisfaction bonus (WSB)(Anderson 1980, Smith 1981) might also be included in PR (Cunningham et al. 1985, p. 264, 289). Consequently, the private owner is assumed to maximise his or her RR and the producers´ monopoly the sum of PR and RR.

In respect of recreational fishing, for each level of demand a constant level of resource availability over time is assumed. That is, each level of demand is considered in the long term, matched by a corresponding sustainable catch level. Similarly, the analysis also applies to recreational fishing where fish stocks are annually restocked to the same level (Copes & Knetsch 1981).

In a recreational fishery, the producer rent (PR) is discarded as the definition of consumption and production is fuzzy. Therefore in this case the total net social benefit to be maximised under public access management consists of the sum of the consumer rent (CR) and the resource rent (RR). The private owner is assumed to maximise his or her RR. However, it is not possible to determine a priori the catch size, effort level and access fees pursued by the private owner relative to public authority management because, unlike the private owner, the public authority will take into account the social costs implicit in crowding and stock reduction.

As regards the management goals of the Finnish inland fisheries system, the most important players are recreational and professional fishermen together with water owners operating in statutory fishery associations and/or fisheries regions. Therefore the possible rents accruing to the fish processing and marketing industry or fish farming are not considered here. The relevant types of access bodies are either private or public. Private owners are represented by statutory fishery associations, public by fishery regions and the state, often represented by the National Board of Forestry (NBF). In the chapter on the socio-economic subsystem I will consider whether the hypothesis of underutilisation and suboptimal allocation of fishing rights as a result of private access management policy can be validated.

3 THE FISHERIES SYSTEM

3.1 Fisheries science and the fishery

In the end of the nineteenth century the scarcity of certain marine species began to be noted, particularly in the North Atlantic and North Sea fisheries, due to overfishing. This observation led to the birth of modern fisheries science and the modern practice of fisheries management (McGoodwin 1990, p. 67). In a broad sense, fisheries science is the study of the structure, dynamics, and interactions of habitat, aquatic biota, and man, and the achievement of specified human goals and objectives through use of the aquatic resource (Lackey 1978). The importance of environmental issues within fisheries science is increasing (Royce 1996).

According to Anderson (1980, 1986, p. 19) there is no generally accepted definition of a fishery, but usually it can be thought of as a stock or stocks of fish and the enterprises that have the potential for exploiting them. Kesteven (1996) also grounds his definition of a fishery on fish stocks, the contextual system of which is an ecosystem. Lackey (1978) and Larkin (1980) define a fishery, either recreational or commercial, as a system composed of a habitat, aquatic animal and plant populations, and man. McGoodwin (1990, p. 65) states that a fishery can be either a geographical location where fishing takes place, it may refer to the method by which fish are caught, it may refer to a particular species, or these definitional attributes may be combined. Charles (1997) recognises that the long-term well-being of a fishery requires the simultaneous achievement of multiple sustainability criteria, of which a set of four have been suggested: ecological, socioeconomic, community and institutional sustainability (Charles 1994).

The basic variables in any fisheries system are fish stocks and man, or in other words the resource in its environment and the surrounding society. Regarding inland fisheries, each single watercourse or larger lake could provide a basis for defining a fishery. However, such an atomistic approach would

obscure the assessment of the contribution of the different components for the whole fishery system. Also the question would arise: To what extent are the features found in specific circumstances appropriate elsewhere? The inland fisheries as a whole can be understood as a system consisting of many fisheries, each interacting with its surroundings. This holistic approach, with its generalisations and abstractions, is used here.

Although the identification of the component parts of the fishery system vary according to the scope of the investigation, some common elements related to biology, socio-economics, culture, politics and administration have been identified (e.g. Lackey 1978, Larkin 1980, Pennanen 1986, Sipponen 1987,1990, Lindqvist et al. 1988, Charles 1992, 1994, 1997, OECD 1997, Lappalainen 1998, Cowx 1998). These elements are here considered to constitute biological, socio-economical and political-administrative subsystems of an inland waters fishery system. All the subsystems are interlinked with each other and can be affected by human interventions. Depending on the subsystem in question, its component parts will be natural conditions, functional units, action or normative rules. The figure (Fig. 1) illustrating these rather well established interactions seems on the surface somewhat trivial; the challenge for the players in the system, however, is to adopt a systematic the way of thinking of fisheries as a system either in accomplishing their daily routines or setting long-term goals.

The fisheries system covering Finnish inland waters can be defined as a system consisting of institutions, actions and regulations, which forms a whole, and which provides the settings for the exploitation of fish stocks. It is an open system interacting with its environment. The outcomes of the Finnish inland fisheries system are determined less by the use of biological resources than by socio-economical and political-administrative interactions, as many human activities are bound by institutional forms that owe more to tradition and precedent than science or economic efficiency (Lee 1993). The outcomes are also dependent on whether the system is in or out of its long-run equilibrium. The joint utilisation of fish stocks by recreational and professional fishing challenges the system´s ability to provide satisfactory allocations for different players. Whether a sub-optimal allocation of fishery resources prevails, needs to be considered from various individual and societal points of view. Before Finland joined the EU, the Finnish inland fishery system faced relatively few external changes because of international interests or the world fish market. The performance, and permanence, of the system has greatly depended on national decision-making.

In spite of the abundance of watercourses, Finland has not yet achieved an unambigious fisheries policy for inland waters. However, in the Finnish society the fact of state fisheries administration, in addition to other hierarchies established for fisheries management, indicates the social significance of fisheries and the development potential it is thought to have.

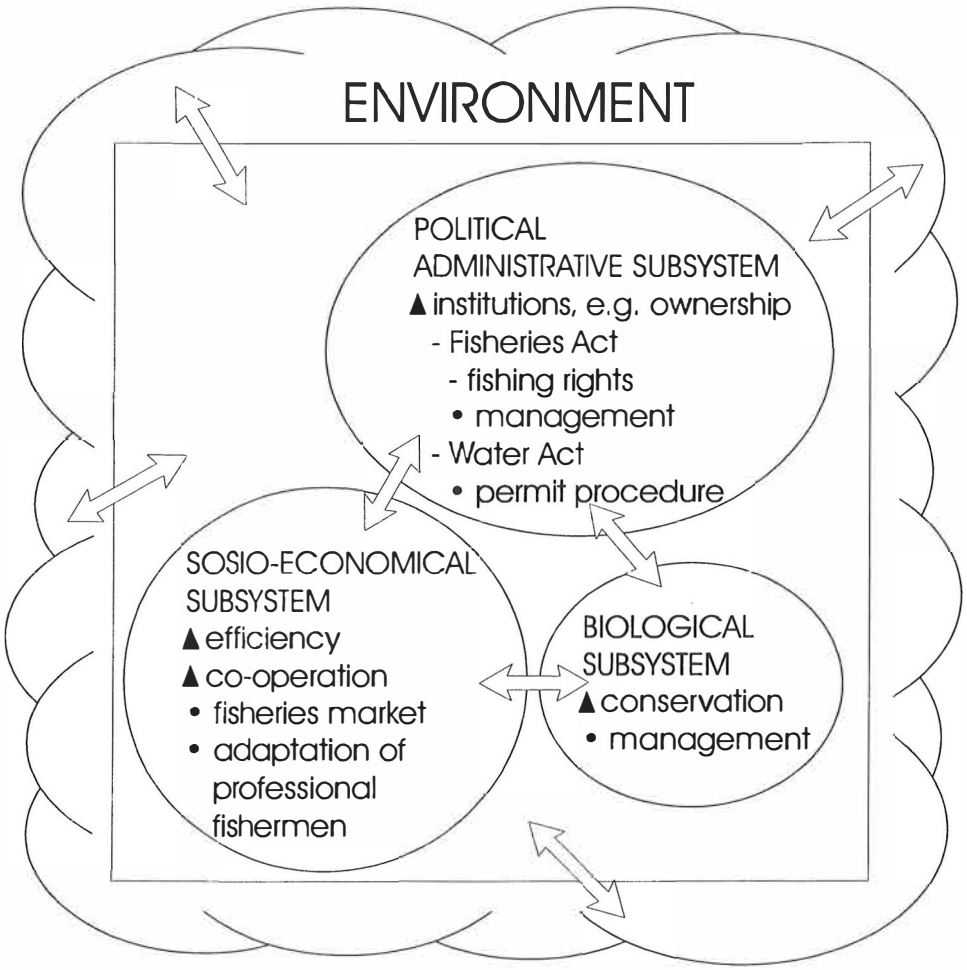

FIGURE 1 Subsystems of the fisheries system of Finnish inland waters; the main goals inherent in the subsystems (▲) and the most important mechanisms transferring interactions (•).

3.2 Biological subsystem

The main factors of the biological subsystem are surface of the earth, watercourses and fish stocks, all of which can be regarded as natural resources. As far back as the 1950s, dividing such natural resources, which could be considered as intermediate products, into renewable and non-renewable resources, was established by Ciriary-Wantrup (1952, p. 27-47). He termed renewable resources flow resources and non-renewable resources stock resources. A natural resource is a flow resource if it provides a continuous stream. A natural resource is a stock resource, if its total amount does not increase to any considerable extent over time. From an economic point of view

a natural resource becomes a resource for man once a meaningful way of exploiting it has been developed. What natural resources at any time are resources, depends on social decision-making, on the stage of technical development and on social institutions. Thus a resource is a relative concept, which changes over the course of time.

Each of the previous characteristics defining resources have faced change with respect to fisheries. In social decision-making, fishery interests, values and aspects of protection have nowadays higher priority than earlier among ordinary citizens as well as legal institutions. Technical development in professional fisheries, has in turn, been rapid, even more so than social flexibility among many players in the fisheries system (VI). Some social institutions related to fisheries have been and still are sources of rigidity. Statutory fishery associations, in particular, in their basic functioning are rather conservative, a feature which, depending on the issue in question, may be considered either advantageous or disadvantageous. They lend their support to social concerns rather than economic efficiency. Administrative authorities and the courts, on the other hand, have pursued a policy emphasising an active hold on the resource. Sustainable development as an integrated goal in the interests of the society has been deemed also to include fisheries.

Sustainable development has different meanings for different people. Rubenstein (1993) uses it in its broadest sense to mean that the abundance and the genotypic diversity of individual species comprising an ecosystem, as well as the species composition of the overall ecosystem itself, are not significantly reduced by human interventions. Lee (1993) describes sustainability as a goal, not a fixed end-point to be reached but a signpost guiding constructive change.

According to Charles (1997), ecological sustainability implies a) maintaining the resource base and related species at levels that do not foreclose future options, and b) maintaining or enhancing ecosystem capacity, quality and resilience. Ludwig et al. (1993) claim that sustainable exploitation can not be achieved without first overexploiting the resource. They propose that man will never attain scientific consensus concerning the systems that are being exploited; there is no agreement about the causes of failures to exploit resources sustainably. Morever, scientific certainty and consensus in itself would not prevent the overexploitation and destruction of resources, as many practices continue in spite of abundant scientific evidence of their destructiveness. In their answer to previous authors Rosenberg et al. (1993) state that the experience of fishery management suggests that the problems of achieving sustainable resource use are challenging but not insurmountable. They find that sustainable development is achievable if scientific advice based on biological, social, and economic considerations is an integral part of the development of policies for renewable resource use. Obviously, the objectives for fisheries management will increasingly be set within the wider goals of environmental management, for both marine and freshwater fisheries.

The catch statistics from Finnish inland waters do not suggest, on a general level, that fish stocks have been overfished. Regarding single species stocks, the picture changes. According to Lehtonen (1994), the natural stocks of salmon and brown trout, lake char and some whitefish stocks reproducing in

rivers have been subject to scientifically documented overfishing. The biological limits for catches of many target species in recreational fishing have not been reached, although many stocks are effectively utilised. In lakes fishing does not affect reproduction and variations in stocks originate mostly from environmental causes (Lehtonen 1994).

From an economic point of view, conservation may be equated with investment in a resource which will produce a flow of benefits over time (Cauvin 1978). The conservation paradigm would have been more closely applicable to the Fisheries Act of 1951 than to the Act (1982) currently in force. While the stipulations of the Fisheries Act (109§) as regards endangering or damaging fish stocks or fishing waters have been rarely used, the stipulations of the Water Act can be used to protect fishing grounds, habitats and watercourses. Few fish species are protected under the Nature Conservation Act. Larkin (1992), in turn, remarks on the significance of freshwater fish as the barometers of environmental stress.

The Finnish inland fisheries system is subject to exogenous environmental impacts originating both from domestic and foreign sources. Although the surface area of the most deteriorated lakes has decreased, watercourses are subject to slight eutrofication, and overall the quality of Finnish surface waters has worsened (see Wahlström et al. 1996, p. 149). Acidification of lakes seems to be on the decline (see Wahlström et al. 1996, p. 136), but the effects of climate change have to be experienced (Beamish 1995, Lappalainen & Lehtonen 1997, Elo et al. 1998). On the basis of a nation-wide survey, recreational fishing in inland waters has mostly been hampered by the effects of agriculture, forest and swamp draining and the regulation or construction of lakes and rivers (see Wahlström et al. 1996, p. 189), some of the consequences of which become endogenous as they are dealt with in the political-administrative subsystem.

An increase in the dependence of European recreational fisheries on aquaculture has been predicted, as many target species are cultivated (Lindquist 1995, Wortley 1995). A fundamental advantage of Finnish inland fisheries on the basis of sustainability criteria is that the majority of the catch consists of species which reproduce naturally. Although concerns about the genetic integrity of indigenous fish stocks due to unwise and illegal stocking are prevalent, Finnish inland waters have so far been protected from abundant introductions of exotic species, the effects of which are difficult to predict (Larkin 1992). Signal crayfish has been stocked, particularly in waters where crayfish plague is considered to systematically hinder the growth of indigeneous crayfish stocks. Whether the short-run gains will coincide with the principle of sustainable fisheries in the long-term, remains to be seen (see Steward 1991).

Stocking of fingerlings has been the most common management procedure carried out by the owners of waters during the past few decades. The compensatory fish stocking obligations settled by courts also essentially contribute to the biological input structure of the fisheries system of inland waters. During the years 1989-1997 the average annual value of compensatory fish stocking obligations was 39 million FIM, or 47 % of the average annual value of fish stockings (83 million FIM) according to the fish stocking register

maintained by the fisheries authorities. Two thirds of fish stockings (68 %, 57 million FIM) were directed towards inland waters, of which compensatory fish stockings accounted for 19 million FIM (33 %)(Fig. 2). Fish stocking obligations should be integrated with other fisheries management procedures, as e.g. the stocking of brown trout may affect vendace stocks (Valkeajärvi et al. 1997).

The basis of the biological subsystem is still by and large healthy, and the prevailing management strategy has guaranteed the continuation of many fisheries. The adaptive management (Walters 1996) is designed for situations where information is inadequate and results come from experience. Of three principal management strategies within this context - active, trial and error, passive - the centre of gravity of the strategies pursued in inland fisheries seems to be shifting from passive to trial and error.

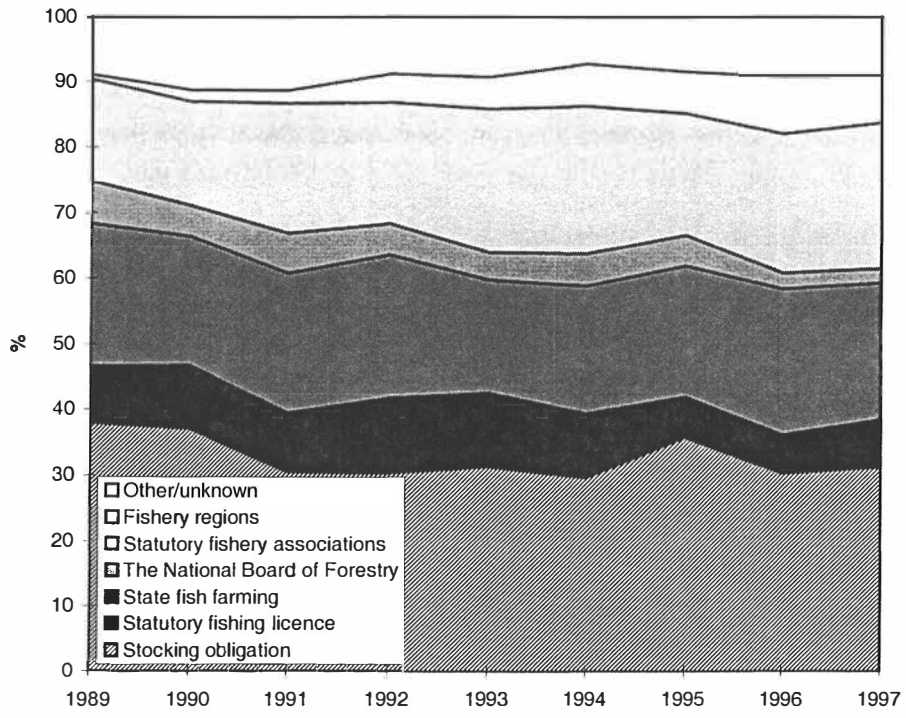

FIGURE 2 Fish stocking in Finnish inland waters according to the source of financing.

3.3 Political-administrative subsystem

The political-administrative subsystem consists of the legislative and administrative institutions and decision-making relating to the use of fishery resources. Institutions may be defined as social decision systems that lay down rules for adjusting and accomodating, over time, conflicting demands from different interest groups in a society (Ciriacy-Wantrup & Bishop 1975). Such institutions include laws, constitutions, traditions, and moral and ethical structures. In itself the market also is an institution. Institutions direct, control, restrain, or at least influence almost every activity and interpersonal relationship in a modern society. According this broad definition, in respects to fisheries institutions include the processes and organisations that develop and implement the rules affecting the use of fishery resources (OECD 1997). In particular, legislation and property rights are essential institutions in the case of Finnish (inland) fisheries. Legislation has provided also a mechanism by to reduce market imperfections, especially concerning recreational fishing.

As regards fishing and the state of fishing grounds, two acts are of particular significance, viz. the Fisheries Act and the Water Act. Stipulations concerning the institutional structure of the fisheries system, rules defining the ownership of fishing rights and the regulations concerning fishing are prescribed in the Fisheries Act. The protection of the biological resource base and of fishery values are basically included in the Water Act. Safeguarding the biological production capacity of fishing grounds is one of the most important prerequisites ensuring the productivity and amenities fisheries can provide. According to Vihervuori (1998, p. 72-78) the new EU-based amendments to the Water Act were mostly of a formal nature, as the interpretation of the general ban often leads to the same result. Also the basic case-to-case nature of decision-making has been preserved.

Altogether institutions play an essential role in Finnish (inland) fisheries, which in turn encompass a complex of private and public interests. Finnish legislation provides for institutions partly or entirely unknown in the rest of Europe, such as fisheries region management units, joint ownership of private waters (Vihervuori 1996a, 1996b) and the provision of water courts as permit-delivering bodies instead of administrative authorities, an aspect which is partly linked to the private ownership of waters (Vihervuori 1992, p. 58,60). Public rights of access and the related common rights of citizens are traditional features of the Nordic legal system (Vihervuori 1992, p. 26).

Finally, according to Charles (1997), institutional sustainability focuses on maintaining financial, administrative and organisational capability over the long term as a prerequisite for ecological, socio-economic and community sustainability (Charles 1994). This implies that there is no decay over time in the quality of institutional arrangements, a point related in particular to the manageability and enforceability of resource regulations. The legal and administrative instruments of the Finnish inland fisheries system support institutional sustainability.

3.3.1 Property rights

Property is a system of authority established by government. It is a set of rights to the control of assets (Dasgupta 1982, p. 38). In an economy that is otherwise conducive to efficiency, nonattenuated property rights are assumed to ensure efficient allocations in a well-functioning market. Their main characteristics are universality, exclusivity, transferability and enforceability. With respect to fishing rights, the definition is idealistic. According to Bromley (1991) the term property refers not to an object or a natural resource but rather to the benefit stream that arises from that object or resource.

Resource regimes can be classified in many ways. A particular resource, and fish are a good example, may be held under more than one regime. Berkes & Farvar (1989) and Berkes et al. (1989) describe idealized types of property-rights (use rights according to Symes (1998)) regimes:

- Open access (or the absence of well-defined property rights)(res nullius): access is free and open to all.
- State property (res publica): the state holds the rights to the resource in trust, on behalf of its citizens.
- Communal property (res communes): held by an identifiable community of users with rights to exclude others from using the resource.
- Private property: an individual or corporation has the right to exclude others from using the resource and to regulate its use.

Fish as migratory and fugitive resources share two key characteristics of common property resources: the exclusion of potential users is problematic, and subtractability, which means that each user is capable of subtracting from the welfare of others (Berkes et al. 1989). However, a fish can not casually be labelled as a common property resource, but depending upon where it is found, how it is caught and by whom, it can be res nullius, res publica, res communes, or private property (Buck 1989). In Finland fish at liberty in waters are regarded as no one´s property (res nullius), but, when caught, becomes their captor´s property. By definition, a fishing right means a legally protected right to fish in a specified water area, the right to become the proprietor of fish caught and the right to regulate on fishing in this water area (Honkanen 1985, p. 1). However, these rights have been restricted in many ways.

In Finnish inland waters the institutional structure of possession should lend itself to the recognition of stewardship among owners, which, in turn, should promote efficient allocations.

3.3.2 Fishery legislation

The Royal Fisheries Statute of 1766 may be regarded as the first piece of fisheries legislation (Dahlström 1984) in Finland. According to the wealth seeking policy of mercantilism, one of its goals was to enable a fishery to develop into an independent source of livelihood. Since 1789 fishing rights have been connected with land ownership (see Honkanen 1985, p. 24-25). More recent revisions have taken place in 1902, 1951 and 1982. Since 1983 Finland has had three different fisheries acts: the Åland Islands has its own fisheries regulation, the Fisheries Act of 1951 was in force in the northern part of Finland until the end of 1997, whereas the rest of the country observed the Fisheries Act of 1982 with its subsequent amendments, especially those of 1993, which came in force in the beginning of 1994. Customary law has retarded the revision of fisheries law which, according to Honkanen (1985 p. 43), has often manifested the ideological tendencies of past generations.

The main provisions of the the Fisheries Act of 1982 deal with fishing rights, fishing arrangements and the management of fish stocks. The present goal of the Act can be seen as related to the broad concept of the optimum sustainable yield, OSY, which opens the floor to many interpretations according to different circumstances. A favoured position is given to professional fishing, and sanctions following the under-utilisation of fish stocks have been laid down according to the provisions of the law governing the Finnish constitution.

The regulation of fisheries management is based on the fact that water areas in Finland are privately owned. The ownership and the boundaries of waters are often very complicated. This has contributed to the complexity of the Fisheries Act (1982), especially concerning the administration of the fisheries in private waters. This field of legislation crosses the borderline between public law and private law (Vihervuori 1992, p. 132).

The institutional settings for fisheries management encompasses the relevant authorities, fisheries regions, statutory fishery associations and advisory organisations. Their structure and function is not described in detail here. It is worth noticing that neither the fish processing or trade sectors, nor consumers or environmentalists have been granted representation in the decision-making bodies at "field" level.

The fishery system is regulated by both economic and non-economic rules (Wilson 1982). In statutory fishery associations, non-economic rules seem to be more prevalent than in the fisheries regions, where the multiplicity of players has facilitated a rather good start in the learning process, including increased cost-benefit awareness and willingness to monitor the results of the decisions made (IV).

3.3.2.1 Statutory fishery associations

The statutory fishery associations are based on the system of property formation. In the general parcelling out of land, carried out mainly during the 1750s and the 1850s, water areas normally remained in joint possession and

use of the farms in a village. Subsequent parcelling out of land has increased the number of private owners, i.e. shareholders. Due to societal development and changes in land use, many shareholders have detached from natural local communities.

The need for co-operation in Finnish fisheries management is of surprisingly long-standing origin. As long ago as in the mid 19th century regulations aiming at establishing fishing associations were put into effect. The bodies and goals of the then proposed organisations resembled to a great degree those of the present-day fisheries regions (Tiitinen 1995). The Fisheries Act of 1902 provided for the establishment of statutory fishery associations on a voluntary basis and the Act of 1951 made them compulsory. This process was further enhanced by the Fisheries Act of 1982, as unorganised statutory fishery associations were ordered to organise their activities according to the new law and the rules of all statutory fishery associations had to be revised and approved by the local regional fisheries authority.

It is primarily the responsibility of the owners of fishing rights to arrange fishing and fishery management in such a way that the objectives of the first section of the Fisheries Act (1 §) are properly fulfilled. The statutory fishery association is one instrument for the implementation of these objectives. Although mandatory as a body, the functioning of statutory fishery associations can appropriately be characterised as self-regulation, functioning without direct state control. Self-regulation may produce the efficiency benefits of sole ownership, although at the cost of the lost capability on the part of the administration to directly control the fishery in the interests of society (Charles 1996). One of the main duties of a statutory fishery association is safeguarding its interests in connection with the permit procedures prescribed by the Water Act, a task which can also be vested in fisheries regions.

Statutory fishery associations are made up of all the property owners in a village who have a share in the common water areas of that village. As interest in common waters has often been a minor point in the context of purchasing real property, many owners obviously are not conscious of the fact that they may also be shareholders in the village´s common waters and consequently in the statutory fishery association. Among property owners, i.e. shareholders, there are also companies, public corporations, decedents´ estates and natural persons inhabiting outside the locality concerned, the motives of which may differ from those of local shareholders.

A statutory fishery association represents all owners collectively in matters of fishery rights. However, it has duties linked to public fisheries management, such as the stocking of fish, and even regulatory powers towards its shareholders (Vihervuori 1992, p. 132). 70 % of the waters of the statutory fishery associations comprised lakes, 27 % sea and three per cent of rivers (Kilpinen 1995). At present there are estimated to be some 11 384 statutory fishery associations altogether (Anon. 1998). The objective of the various pieces of legislation in force is to prevent the breaking up of fishing grounds, and actions have been taken to combine them into more coherent units. The value of the voluntary work (174 000 hours) done in statutory fishery associations has been estimated to be worth 7,0 million FIM (Kilpinen 1995) at 1997 prices.

On the basis of the provisions of earlier legislation an interest in common waters could not in practice be used as an object of exchange and conveyed to others apart from assigning real estates (see Vihervuori 1986). Since 1988 due to alteration in partitioning legislation an interest in common areas, or a part of it, which has been assigned from an estate, can be parcelled out into an independent piece of real estate even though it does not include any land (termed "ghost estate"). Such an estate can be sold wholly or partly. Present legislation concerning the formation of property adheres to the same principle. These alterations might increase transactions of real estates and also increase in principle e.g. access to fishing grounds.

The great number of shareholders within a statutory fishery association makes this kind of joint ownership of waters resemble the common property resource regime as defined by Bromley (1991), where the individual members of the management group (the "co-owners") have both rights and duties with respect to the use rates and maintenance of the waters owned. The essential difference is, however, that statutory fishery associations are based on real property rights, whereas common property in the sense mentioned above is based on the use rights of fishery resources. In Finnish lakes, the prevalent type of use of fishing grounds is their joint utilisation on the basis of property and use rights.

Auctions of fishing rights, carried out for example in the river Kemijoki (O. Tuunainen, personal information) and in Lake Pyhäjärvi (SVT 1995:12, p. 105), are perhaps the most obvious forms of the operation of market forces regarding the economic utilisation of fishing grounds. Auctions are more common in coastal than in inland waters. A statutory fishery association was not allowed to enter into contracts during 1952-1982 (51§), which partly undermined the prerequisites for economic operations.

Local rules play an important role in the decision-making of statutory fishery associations, which have failed to take adequately into account changes in the ownership structure - in particular the increasing number of urban non-residents (II, Lappalainen 1995). Among owners the lack of perception of societal development and need for improved access to recreational fishing in rather well specified areas in the country led, finally, to a private member´s bill resulting in increased supply in the form of the state lure fishing licence. The concern over these state-supplied fishing licences stems from the question of who has the final say on the use of private property in the case of fishing grounds; the state intervention in the supply market has diminished the role of private owners and altered the distribution of benefits. Such concern contradicts the notion that statutory fishery associations - including shareholders with large holdings - voluntarily accept the dissipation of resource rents from the fishing licence market. However, in inland waters the recent experiences of the lure fishing licence has tended to settle the matter.

Among the range of management measures employed in statutory fishery associations, input controls (e.g. closed seasons and preservation areas) have been preferred to output controls (catch limits), which have been rarely used in lakes. As statutory fishery association waters are not easily separable from those of their neighbours, integrated measures are needed. The shareholders of

statutory fishery associations can easily face problems in formulating an ecosystem view and management objectives for the reasons mentioned by Lackey (1978): incomplete problem awareness and incomplete knowledge of the intricacies of the problem. Tast (1996) identified the problems of statutory fishery associations as the following: they are too small, they are scattered, the legality of decisions is uncertain, the shareholders are ageing, the urban shareholders need to be motivated to participate, ways of getting new customers need to be found. His remedies included measures related to the typical functions of the fisheries regions.

3.3.2.2 Fisheries regions

A fisheries region can be defined as an organisation allowing for the co-operation of all persons and groups interested and involved in fisheries management. From the fisheries point of view it should form a coherent management unit, within which the human and physical resources could be properly combined and fisheries management implemented by integrated measures. Contrary to statutory fishery associations, fisheries regions are not units for possession, but are instrumental, serving co-operation.

The failure of voluntary organisation for three decades to reorganise into larger management units (IV, Sipponen 1998) indicates that the owners of fishing rights did not recognise as strong a need for co-operation as fishery administrators and many fishermen. Co-operation, which on the regional level after its birth pangs is now seen as inevitable, did not originate in the needs of statutory fishery associations. Without legislation fisheries regions would probably not have been established.

The fisheries region is essentially a Finnish institution. To some extent comparable organisations exist in Sweden, but they cover smaller areas (Andreasson et al. 1990) and do not have public duties (Vihervuori 1996b). In western Europe many alternatives exist for the institutionalisation of co-operation (Jentoft & McCay 1995).

Fisheries regions were not built up without conflicts. It turned out to be exceptionally difficult to approve the regulations governing fisheries regions in some parts of the country. These regulations as such should of course be mainly a formality. However, the Federation of Finnish Fisheries Associations (FFFA), which is a water owners' organisation, tried include a stipulation according to which the council of the fisheries region would lack a quorum if the representatives of the water owners did not have a majority among the representatives present. This demand was rejected by the fisheries authorities. The Supreme Administrative Court in 1988 upheld the fisheries authorities´ decision in this matter (D:5711/5/86, A:20.6.1988, T:2656). If the FFFA´s demand had been met, the representatives of the water owners could have withdrawn from the fisheries region councils and thus could have prevented the fisheries region organisation as a whole from functioning. It was not until at the turn of 1990s that the various disputes ceased in inland waters. Confrontation continues to exist, however, in inshore waters (Sipponen 1999).

The fisheries region has many features of a public authority. Since the beginning of 1994 it has been empowered to draw up fishing regulations, a task which earlier was among the responsibilities of the fisheries authorities. Simultaneously the decision-makers became officially responsible for the legality of their actions where these concerned their public duties. The decision-making body of the fisheries regions also changed. The former council was replaced by a meeting, the composition of which differs to some degree from that of the earlier council. In each region the authority lies with the meeting. Appeals against region´s decisions can be made to an appeal body. Each region was also given a warden to manage its daily activities.

Although the fisheries management units preceding the fisheries regions had managed to function in certain locations, they were still local in nature and consisted entirely of owners of fishing rights. Through the establishment of the fisheries regions and Fishery Districts an interacting network was formed for fisheries. It is no exaggeration to say that the reform of the Fisheries Act in 1982 combined hitherto more or less isolated players and finally created a comprehensive fisheries system for inland waters.

3.3.2.3 Co-management

Pinkerton (1989, 1994b) has identified the key elements predicting the success of various management arrangements. Her classification includes items predicting the preconditions for favourable co-management, propositions predicting the best mechanisms and conditions supporting co-management, propositions predicting the best scale, propositions predicting which groups are most pre-adapted to developing co-management, and tentative propositions. In another article she has reclassified these items (Pinkerton 1994a) into logistical arrangements, cost-sharing arrangements and power-sharing arrangements. This later classification is more illustrative as regards the Finnish fisheries system, and the issues related to it are discussed here.

The theory of co-management is supported by the outcomes of the fisheries regions. Many of the prerequisites of successful co-management (Pinkerton 1994b, pp. 332-334) are inherent in the fisheries regions organisation, even though examples of co-management usually feature marine and community-based fisheries, which differ in scale. Consequently, unlike some foreign management regimes for marine co-operation, the fisheries regions in Finnish inland waters do not practise fish trading.

Although the formation of the regions is mandatory, regions are quite free to choose their own ways of carrying out their public duties and other activities. The most important respects in which fisheries regions share Pinkerton´s favourable co-management preconditions are summarised (Table 1) and discussed below. Scale and representation (Jentoft & McCay 1995) are the most coincident items.

TABLE 1 Criteria of successful co-management (Pinkerton 1994a) applied to Finnish inland fisheries regions.

A. Logistical arrangements	**Relevance regarding fishery regions**	**Benefit achieved**	**Obstacle removed**
1. Clear boundaries	Defined on the basis of the Fisheries Act	Stewardship	Mosaic-like ownership structure in possession of fishing grounds
2. Clear criteria for membership or participation in local area management	Defined in the Fisheries Act	Participation	Ignorance
3. Management units of a scale appropriate to human resources and ecology of any particular area	The starting point in the process of formation of fisheries regions	Increased efficiency in management	Unwillingness to co-operate
4. Clear interception agreements	Not usually resolved	Life-cycle view	
5. Local all-stakeholder co-management boards	Representation is defined in the Fisheries Act	Learning process	
6. A co-ordinating role for a province-wide management board	Regional Fisheries Authority	Support to fisheries regions	
B. Cost-sharing arrangements			
1. Cost recovery related to local management activities	The Fisheries Act provides possibilities	Allows accumulation of resource rent	
2. A local volunteer force	Used on statutory fishery association level	Decreases management costs	
C. Power-sharing arrangements			
1. A degree of local control	Control is based on fishery legislation	Decreases enforcement costs	
2. Clear legal definition of local powers	The Fishery Act defines	Increased responsibility	

Logistical arrangements. The clear boundaries of the fisheries regions (1) come from the Fisheries Act, which sets up the basic structure of the institutions of management. The boundaries of the statutory fishery associations can be traced directly to legislation, but those of the regions allow for the players´ own discretion. As the membership (of the meeting) (2) originates in the Fisheries Act, new institutional arrangements regarding fishing have not emerged. All the relevant parties with managerial responsibilities are represented, and there is no question as to which groups have or do not have their say.

Scale (3) has, for a number of reasons, turned out to be one of the most important single factors supporting co-management. The geographical size of the regions has been successful, as claims for changes have not arisen on the part of the regions. Interrelated with geographical size are the possibilities of taking action on the basis of an ecosystem-approach, which is facilitated by the fact that the boundaries follow watersheds. The need for this larger perspective has arisen from practical situations where fisheries management is increasingly faced with multiobjective decision-making and a closer relationship to environmental issues. The composition of the decision-making bodies of fisheries regions support participation and effective communication, which have turned out to be important features of the most advanced regions. Within regions, the personality and attitudes of key persons have had notable significance in developing communication. In Finland, there is little evidence of the existence of a cohesive social system (kinship, ethnicity, homogeneous gear type) which the regions could have taken advantage of in their development. Instead, social systems, particularly at the statutory fishery association level, have been sources of rigidity tending to maintain the status quo. However, because of their larger authority, regions obviously are better placed than statutory fishery associations to assuage conflicts.

Concern over the depletion of local fish stocks is usually not of importance in inland waters (Lehtonen 1994), a feature which facilitates management. The most important commercial freshwater species, vendace, withstand intensive fishing (V,VI). Some management plans, which have been developed recently for brown trout fisheries, include some elements of interception agreements (4). It has been the prerogative of fisheries regions to allocate fishing rights and issue regulations in inland public water areas - in state-owned waters in the middle of the largest lakes.

The composition of the meeting of the fishery region involves representatives from different interest groups, which support participation. The lack of representation (5) of the fishing industry and trade, consumers and environmentalists in the decision-making bodies has not so far raised problems, because fisheries regions do not usually participate in larger commercial operations, but will challenge regions in the future.

The Regional Fisheries Authority (6) has a quite strong contributory role, as one of its goals is to ensure the operational possibilities and supervise the activities of the fisheries regions. Based mainly on informal consultations, one of the main challenges of the authority is to increase the involvement of private owners in the activities of the regions. The contributory role of the regional authority could be further strengthened if it was empowered to direct the

regions by results. The present situation, where this is the responsibility of the ministry, is a an obvious exception to the principle of subsidiarity. Although not in fact put into practice, it remains a principal flaw in the Fisheries Act.

Cost-sharing arrangements. These illustrate the mandatory and voluntary features of the Finnish fisheries system. Financial contributions to the economy of the fisheries regions come from many sources. State support to regional organisations facilitates their management functions. State financial aid to the regions has increased steadily during the 1990s, and the amendments to the Fisheries Act of 1994 quaranteed the regions a steady income flow. But despite its importance, state financial support can not alone ensure successful operation, as the experience from coastal regions has shown (Sipponen 1998,1999). The fisheries regions also benefit indirectly from the activities of the Regional Fisheries Authority and of the Regional Environment Centre, in looking after protection of water habitats and fish stocks, as well as of monitoring obligations carried out under the auspices of these authorities.

Many owners of waters, particularly inland, also share in the management costs, owing to traditional management policy. The statutory fishery associations are used to matching fish stocking costs with revenues from fishing licences. Many owners in inland waters have also allowed fishery regions to use their shares of owner remunerations, a solution which displays internal co-operation. Even though the coordination and implementation of fish stocking, which is the largest single cost item in the regions´ budgets, has been given to the fisheries regions, statutory fishery associations are keen to keep their remaining assets in their own hands. The amount of voluntary work done in the statutory fishery associations (Kilpinen 1995) is noteworthy. However, as the tasks of the region become more complex, the substitution of expert services for volunteer work can be foreseen.

Ability to generate income has varied between fisheries regions. The Fisheries Act provides the basis for long-term contracts. Regions have used this opportunity in the case of licences for recreational fishing, but less for regional-wide licences for professional fishing. Various development projects have been organised on the basis of initiatives on the part of the regions. The use of experts in the preparation of management plans is nowadays seen as more necessary than during the first phase, as the need for a watershed or ecosystem approach is recognised among the actors. However, preparing plans is by and large a bottom-up process in the course of which experts convert the non-scientifically expressed objectives into managerial language.

Power-sharing arrangements. These are settled by the Fisheries Act. The amendments to the Fisheries Act have changed the administrative powers of the various bodies in the continuum statutory fishery association- fisheries region - Regional Fisheries Authority - Ministry of Agriculture and Forestry. With respect to the issue of fishing regulations, some of the powers earlier held by the ministry have been delegated to the regional fisheries authorities, whose powers, in turn, have been partly delegated to the fisheries regions.

The Finnish government has also set up an appeal body, which is one of Pinkerton´s tentative propositions (1989) for successful co-management. This body has dealt with questions concerning the allocation of fishing licences.

Pinkerton´s (1989) observation that the motivations and attitudes of key individuals can make or break co-management is in acccordance with Finnish experiences. In the cases cited by Pinkerton where co-management has achieved its goals, new relationships have been created between individual fishermen, fishermen´s groups and government. In the Finnish fisheries regions, the owners of waters have to be added to this list.

However, there are certain issues indicating the existence of some kind of tension between fisheries regions and the Regional Fishery Authority. During the hearing of appeals some fisheries regions have demanded a stronger role for themselves: in their statements to the Water Court they have sought the right to share the powers of the fishery authority in approving compensatory fish stocking plans or monitoring programs. If these demands had been accepted, the regions would have enlarged their sphere of action and entered the preserves of government.

3.3.3 Water legislation

The fate of fish resources when faced with human interventions is often primarily dependent on the regime of the Water Act. The Fisheries Act plays a minor role in this respect. Consequently, environmental authorities are essential players in questions concerning the protection of water resources. In many cases private and public interests in fish resources are among the main factors affecting the granting of permits by the Water Court (Vihervuori 1992, p. 134). One has to agree with Vihervuori (1992, p. 135) that the fishery interests, traditionally recognised as such, have a value beyond mere economic considerations and in a way represent ecological and environmental values in general.

Vihervuori (1992,1998) has presented a pithy description of water legislation. The Water Act is based on three principal prohibitions: prohibitions on closing off, altering a body of water and polluting a body of water. The prohibitions are not absolute, but they may be described as provisions for determining the eventual necessity of a permit case by case, and the entire permit system is based on these prohibitions (Vihervuori 1992, p. 58). What constitutes the public fishery interest, depends on the prevailing circumstances in each single case.

The permit procedure is initiated by an application. If the impacts are far-reaching, the Court may also set a special inspection procedure in motion. The Water Court has to examine all possible impacts on public and private interests and rights and decide whether to grant the permit. Normally granting on permit depends on a weighing of interests, which is structured in a different way in the cases of water pollution as compared with water management and construction projects. In cases of water pollution, the detrimental effects of all kinds must be relatively small as compared with the benefits, in order for the permit to be issued. In water management and construction projects, the benefits from the project have to be significant compared to the various damages, inconveniences and losses of benefits caused by it. Also, non-

monetary and non-material interests are taken into account. If a permit under the Water Act is granted with the result that fish resources are affected, the fish management obligations are settled by the Water Court.

The court may include various conditions in a permit, and these may often be regarded as the very core of the decision. The regular condition categories are emission specifications, effluent treatment obligations, fishery management obligations and obligations to monitor discharges and their impacts. The prescribing of conditions can not be kept strictly apart from the question of whether a permit is to be granted or not. Firstly, the acceptable level of pollution is regulated by conditions. Secondly, otherwise lacking preconditions may in some cases be created by laying down e.g. fishery management obligations (Vihervuori 1992, p. 62).

Appeals against the permit decisions of the Water Court are made to the Superior Water Court and thereafter, provided the right to appeal is granted, to the Supreme Administrative Court. The two appellate courts have the right to independent discretion regarding all aspects of the permit decision (Vihervuori 1992, p. 72).

The judicial concept of the yield of fishing is far more one-dimensional than the biological concept of production and productivity. The basic question is whether the value of the life-support system is adequately recognised: does the interest weighting differentiate enough between reversible and irreversible consequences.

The Water Act does not define the term "yield of fishing" (Anttila 1989). However, legal praxis equates the capitalised value (r=0.05, t=20 years) of the catch with the yield of fishing in respect of remunerations. It is worth noting that, according to Anttila (1989), the reasons for the decisions by even the Superior Water Court concerning the assessment of remunerations and the yield of fishing remained obscure during the 1980s.

The value of a capital asset such as fishing grounds is equal to the present value of the net future revenues that it is expected to yield. A general conclusion is that higher discount rates tend to transfer resource utilisation toward the present, as the future is given less weight in balancing the relative value of present and future resource use.

The capital value of fishing grounds, based on the yield of fishing, according to Anttila (1989), varies at 1997 prices between 3 461 to 4 327 FIM/ha, and hence for all the inland lakes between 11 604 to 14 505 million FIM. These figures correspond to annual net yields of fishing between 173 to 216 FIM/ha (r=0.05, t=20 years). The maintenance, management, enforcement and marketing costs of lake fishing sites have been of a smaller order of magnitude compared with capitalised yield figures. This capital value may be interpreted as an indication of the generation of RR in part by the engagement of owners themselves in fishing (see Cunningham et al. 1985, p. 284).

The capital value presented above is estimated on the assumption that fishing costs amount to 40% of the gross value of the catch. Although this presumption may be valid in respect to professional or subsistence fishing, it is inappropriate as regards recreational fishing, where fishing costs often exceed the value of the catch. According to the data on recreational fishing (SVT

1998:3), fishing costs were 4,5 times greater than the value of the catch in inland waters. Thus the oversimplified assertion that recreational fishing is at least worth what recreational fishermen individually and citizens collectively are willing to pay is justified. Assessment of the capital value of fishing grounds on the basis of yield has operational value in the permit procedure, but does not reveal the economic value of recreational fishing, which in certain cases should be assessed in order to improve the weighting of interests.

Besides the considerations of yield described above, fishing and fishing opportunities, representing public interests in large, have an undisputed effect on permit decisions. Sometimes values related to tourism, culture, recreation and environment are intermingled with the permit discretion without any of these being or having been to be converted into monetary values. A good example of this kind of approach is the decision concerning the hydropower plant in Huopanankoski in 1978 (Supreme Administrative Court 1978 A II 123).

3.4 Socio-economical subsystem

The fisheries industry contains numerous activities within the production, processing and consuming sectors. Production and the productivity of fishing grounds may be looked at from the point of view of society, enterprise, private water owner or consumer. The fisheries system of Finnish inland waters is characterised by a multitude of players who do not have strong economic interests. Even though the functioning of the socio-economical subsystem is directed rather by social than economic forces, both the social/community and the rationalisation paradigm can be used to explain the outcomes of the subsystem.

Fishermen are essential players in the subsystem. By the process of fishing they utilise the flow resource generated by fish stocks. The objective of professional fishing is to earn one's living, and the final product is fish as an item for consumption. For recreational fishing, the final product is the use of fish stocks combined with leisure time to provide satisfaction (e.g. McConnell & Strand 1981), to experience recreational amenities and to provide sources of food.

The relative value of fish in commercial or recreational use depends on substitutability. The economic value of consuming fish depends on the price of food substitutes, and that of the opportunity to fish recreationally depends on the available recreational substitutes. The value of using fish stocks for recreational purposes is likely to increase relative to their value in commercial use (McConnell & Strand 1981, Smith 1986, Dill 1993).

In a market economy, the market mechanism creates prices, and transactions between the players in the market should result in the proper allocation of scarce resources among human wants. It is considered that the objective of each decision-making unit is to obtain the maximum output from given inputs. However, the economic value of a product or service is

determined by people´s willingness to pay, not market prices. A willingness to pay figure is an expression of real economic value, whether products or services are directly priced to the consumer, as is the case with commercial fishery products, or whether they are provided free or at nominal prices, as is often the case in many western countries with recreational fishing opportunities. Some fishing opportunities are not priced and paid for by the direct beneficaries of the service. This non-market nature of the service, where money is not actually exchanged, does not make the economic value less real (Copes & Knetsch 1981). Furthermore, even though there are difficulties in measuring people´s willingness to pay for non-material goods (Vant & Bromley 1994), they are conceptually part of the problem of maximisation of the value of production. Interrelated with this point is that placing emphasis on willingness to pay in the definition of efficiency means that the existing distribution of income among members of society must be accepted as the proper one.

Allocational Pareto-efficiency is said to occur when no resources are wasted - when no one can be made better off without someone else being made worse off. A unique Pareto-efficient solution may be identified only by prior specification of the distribution of income, wealth, and legal rights, which include property rights. Each different specification of nonattenuated property rights gives rise to different Pareto-efficient solution, which involves different resource allocation, commodity distribution and price ratios (Randall 1987b, p. 159).

An efficient fishery policy, in turn, is one that gives the "best" possible results measured in terms of overall well-being or net social benefits within the means available, or that which achieves the desired goals with the least negative effects (Charles 1992). According to Charles (1992) there has been a tendency to oversimplify the efficiency goal by equating social well-being with rent maximisation, i.e. the broader concept of efficiency with the narrower concept of economic efficiency. However, in order to be meaningful, the concept of well-being should be defined for the relevant players.

The social/community paradigm may be linked to sustainability on both the macro and micro levels. According to Charles (1997), socioeconomic sustainability focuses on the macro level, on maintaining or enchancing overall socioeconomic welfare, aggregated across the fishery system, and is based on a blend of relevant economic and social indicators, such as resource rent (or sustainable net benefits), distributional equity, and viability within local and global economies.

Community sustainability, in turn, focuses on the micro level, on the desirability of sustaining communities as valuable human systems in their own right, as more than just collections of individuals. This involves maintaining or enhancing the community´s economic and sociocultural well-being, its overall cohesiveness, and the long-term health of the relevant human systems (Charles 1997).

3.4.1 Market behaviour in the fishing licence market

Being dominantly privately owned, the fishing licence market could create a mechanism for allowing the allocation of fishing rights between professional and recreational fishing. From an economic point of view, the owners of fishing rights should receive some kind of return to induce them to put their waters on the market. Imperfections (V, VI) in the professional fishing licence market indicate that it continues to await development. Cauvin (1980) supports the pricing of recreational fishery resources, because this would provide a price control on the demand for fisheries resources and thus make a recreational fisherman aware of the costs of providing recreational benefits. By pricing the provision of recreational fishing at their economic cost, the recreational fisherman, in expressing his evaluation of the benefits he receives on the basis of his willingness to pay, will send out signals if he feels that the provision of recreational benefits should be expanded or contracted. However, recreational markets also are faced with market imperfections (II).

According to Cole & Ward (1994), in recreational fishing a fishing opportunity is a range of physical resources that complements the fishing experience provided by nature and the owner of the fishing rights. It is an example of the economic concept of supply. On the other side benefits for recreational fishermen fall under the economic concept of demand.

3.4.2 Demand for fishing licences

The number of obligatory state fishing licences and voluntary ice-fishing licences (fishing cards) purchased indicates the demand for recreational fishing. The state licence was related to households until 1982, and since 1983 it has been personal, which explains the increase of the number of licences sold (Fig. 3a). Along with the hefty price increase introduced in 1994 the demand for state fishing licences decreased by 18 % within two years, even though this new licence also included ice-fishing. The decrease can obviously be partly explained by technical difficulties in the terms of payment for these licences, and unwillingness to pay a tax of this kind.

The relatively stable return from state-supplied licences for ice-fishing indicates that this licence has satisfied an actual need (Fig. 3b). Returns have been distributed without reductions to the owners of fishing rights. Because only few fishermen were formerly in the habit of buying an owner´s licence for ice-fishing alone, any reduction in owners´ revenues due to state intervention in the market has been compensated for yields from ice-fishing licences (II: table 10, Shemeikka 1986).

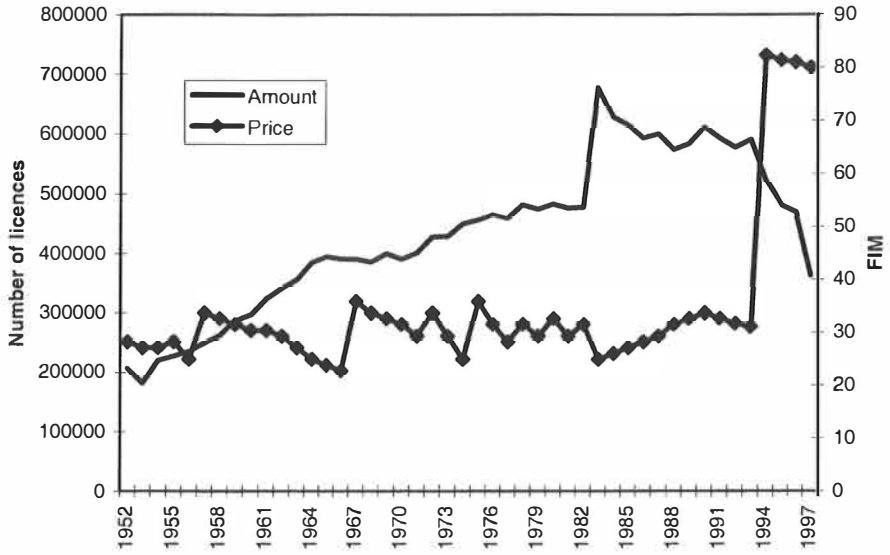

FIGURE 3a Number of state fishing licences purchased in 1952-1997. Prices (FIM) at 1997 values. Northernmost part of Finland excluded.

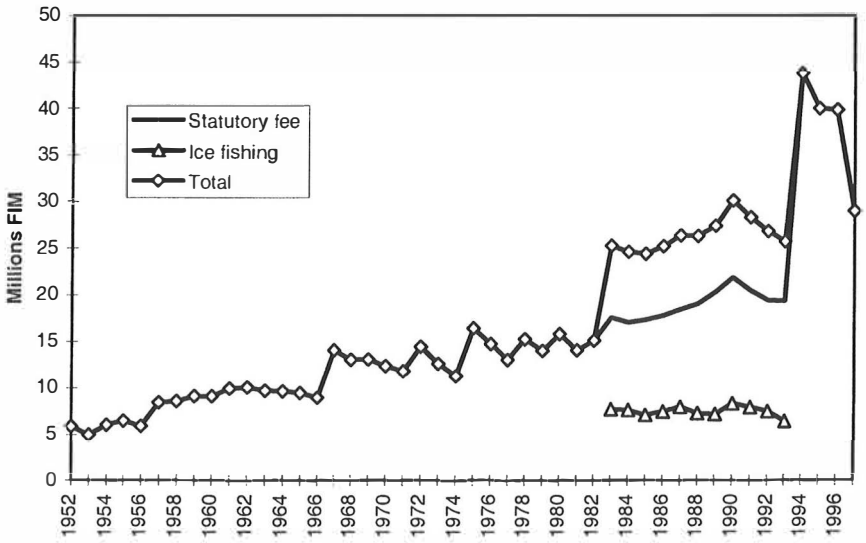

FIGURE 3b Returns (millions FIM) from state fishing licences in 1952-1997 at 1997 values. Returns from lure licences excluded.

In Finland, the first scientific estimation of the total revenue accruing to the owners of fishing rights, in particular to statutory fishery associations, from fishing licences was presented in article II. Licence sales for lake fishing sites totalled FIM 35 million in 1986 (at 1997 prices), at which time joint-licences had not yet been introduced effectively. Licences for river fishing totalled FIM 5 million, which is a product of the average annual return per site (FIM 33 500) and the number of the most popular sites (146) (Fig. 4a, Appendix 1). Recently, considerably higher estimates for licence sales have been published (SVT 1998:3), but the statistical basis for these figures is different.

Locality is a dominant feature as regards the demand for recreational fishing in lakes. This means that the owners of fishing rights could practise monopoly pricing, as recreational fishermen would have to pay the fees requested. The positive signs of the prices (strictly of price indices) of fishing licences (III) indicate the indifference of both recreational fishermen and owners with respect to prices and the quality of fishing. This observation was surprising and contrary to predictions. The results suggest that fishermen were charged such low fees for their fishing during the period studied that pricing did not affect their behaviour to any considerable degree. Consequently the fishermen´s response to pricing did not provide any signals to the owners of waters as to what kinds of fishing they should provide.

3.4.3 Supply market

The extant markets for lake and river fishing differ. Lake fisheries may be considered "mature" in the sense that most of the important fishing grounds have been marketed either publicly or locally, whereas river fisheries are "developing" in the sense that physically new fishing grounds can still be brought onto the market. The former are characterised by inelasticity in terms of the area supplied, the latter, again, shares the dynamic elements of market adjustments. Lakes are also more or less extensively managed homogeneous sites, while rivers are intensively managed and to some degree differentiated sites. The market consists of private and public supply, statutory fishery associations mainly representing the former and fisheries regions and the state the latter. Below, I will first illustrate the development of supply on the basis of fishing sites or types of fishing licences. Secondly, the development of supply is considered from the point of view of the management regime.

The supply of *lake fishing sites* in terms of area supplied by statutory fishery associations has been inelastic. In aggregate during 1963-1971, such sites occupied between 36 to 41 % of the total lake surface area, stabilising around at 50 % during 1974-1994 (Fig. 4a). The figures for the years 1986 and 1988 are unrepresentative (II). The long period examined indicates that the graphically derived area-based supply curve is a long-run supply curve. The supply indicated by the number of lakes doubled from the 1960s to the 1990s (Fig. 4b), but cumulatively coverage has increased in less proportion. Pricing has exhibited a low level of correspondence with the qualitative aspects of the lake sites and has given little guidance to potential consumers (II, III).

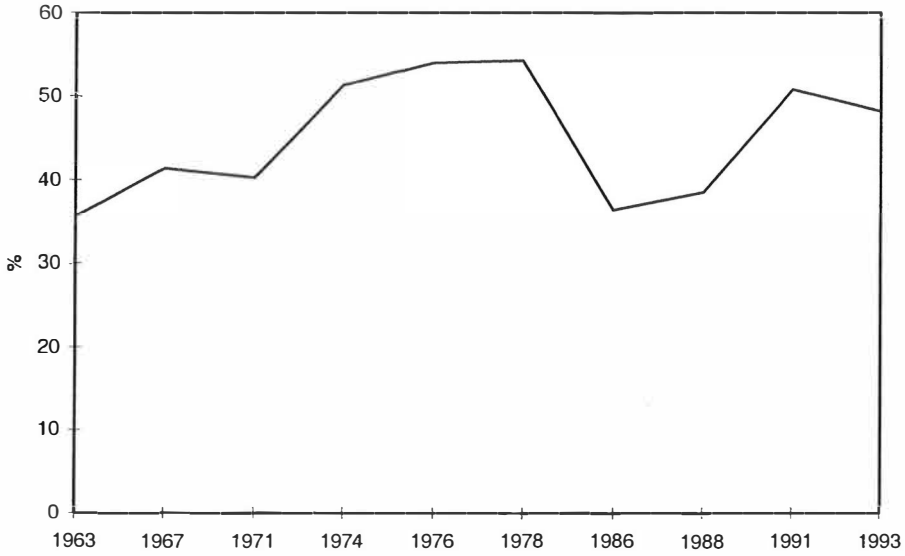

FIGURE 4a Supply of fishing sites of the Finnish lake surface area (%).

In addition there exists a local market for sites that have not been not targeted at the larger public, and which have thus been excluded from the figures describing the supply situation. The market for recreational lake fishing opportunities is still violated by the asymmetry of information, on the sides of both owners and fishermen.

The supply of *river fishing sites,* as indicated by their number, showed a four-fold increase from the 1960s to the 1990s (Fig. 4b). Although these figures do not take all the characteristics of river fishing into account, they express the trend. Pricing as a means of obtaining market signals has worked adequately. The average daily price of river sites has increased steadily (Fig. 5, Appendix 1).

The supply of *joint-licences for recreational fishing* doubled from 1988 to 1993 in terms of area. Both the fishery regions and other management units increased their supply (Fig. 6a, Appendix 2), which accounted for half of the Finnish lake surface area. Concomitantly with the rise in the numbers of suppliers, the average area covered by joint-licences has decreased.

The fishery regions have slightly raised the annual prices of joint-licences for recreational fishing during the 1990s, but other management institutions have done so considerably more (Fig. 6b, Appendixes 3 and 4). In particular the National Board of Forestry has pursued a high pricing policy, which has raised the average price. The particular pricing policy pursued is a good indicator of the social values inherent in the fisheries regions: Half of them have practised low pricing for the young, e.g. granting half price licences.

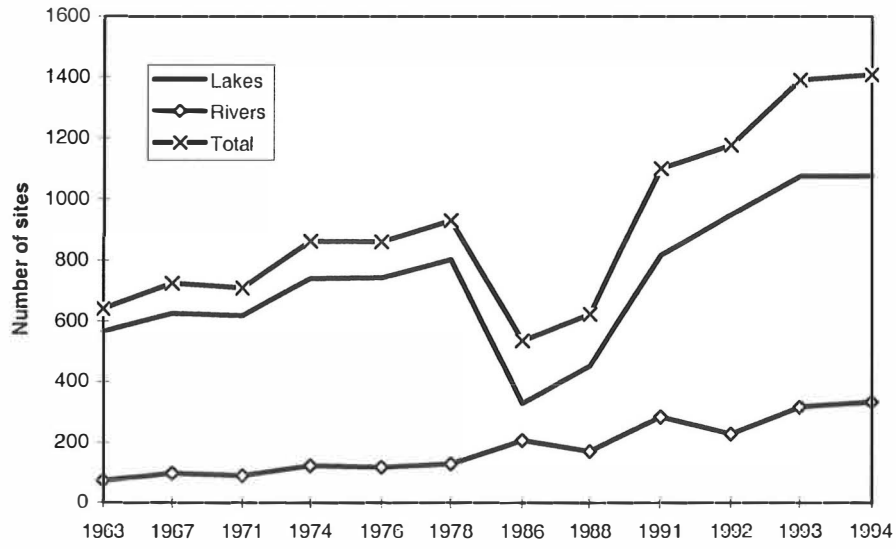

FIGURE 4b Supply of fishing sites in Finnish inland waters in 1963-1994. Note the irregularity of the time scale.

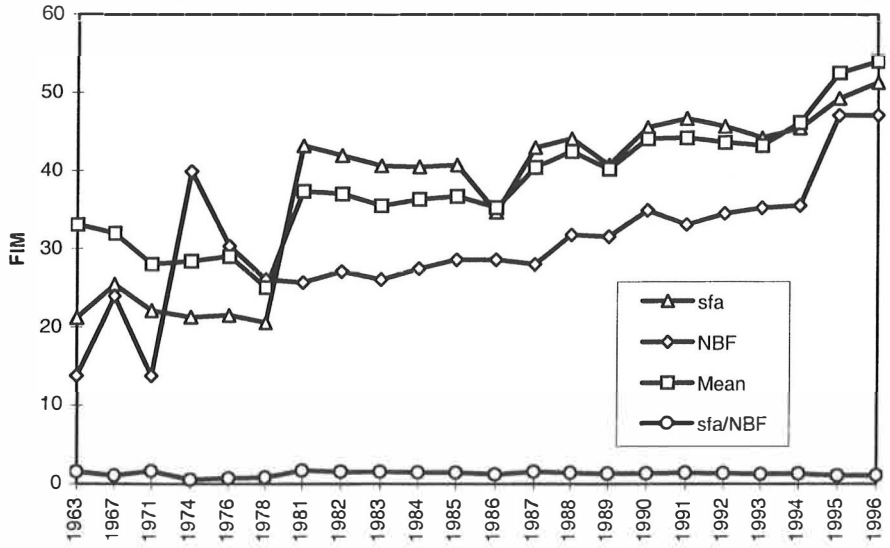

FIGURE 5 Average prices of river fishing licences (FIM/day) at 1997 values. sfa=statutory fishery association, NBF=The National Board of Forestry. Mean includes also other suppliers.

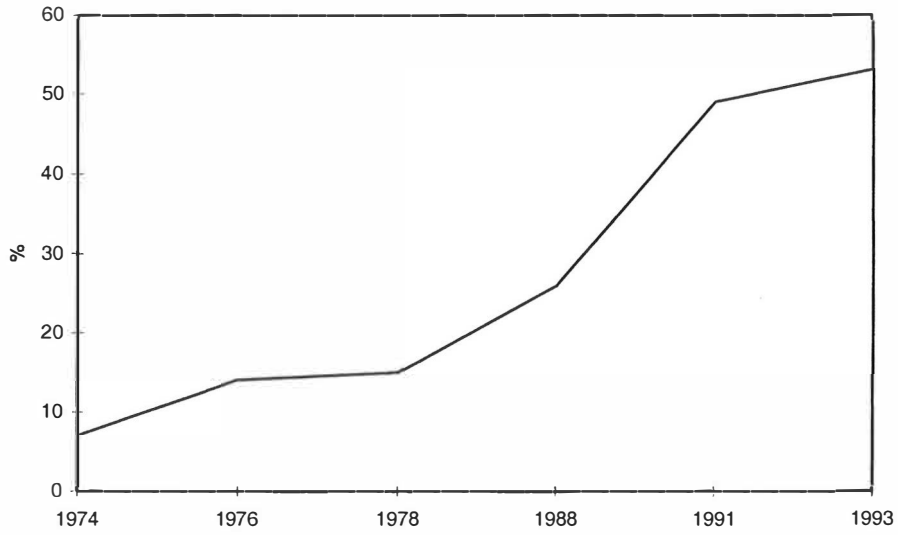

FIGURE 6a Supply of joint-licences for recreational fishing of the Finnish lake surface area (%).

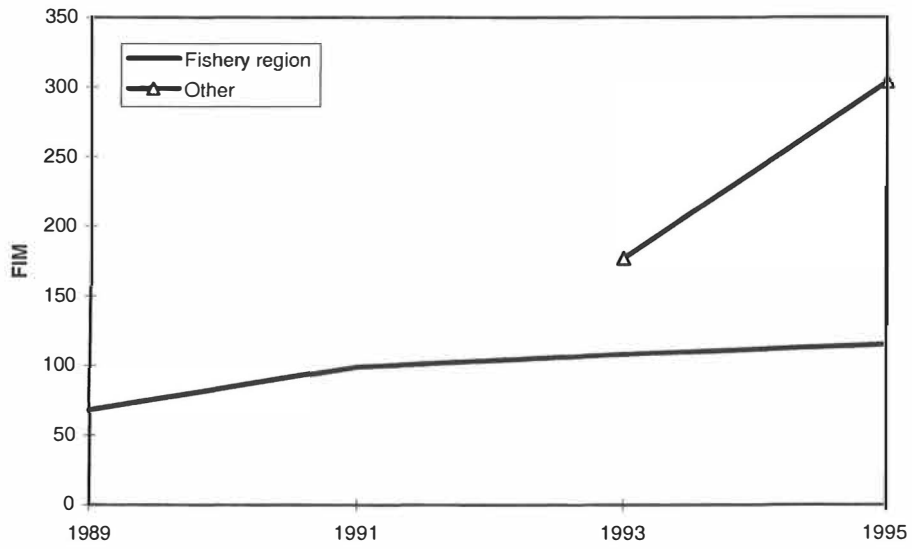

FIGURE 6b Annual prices of joint-licences for recreational fishing in Finnish inland waters at 1997 values.

The 50 percentage coverage of the lake surface area seems to form the actual limit for the market in recreational fishing opportunities. This figure was obtained in two different ways: from the aggregate supply of individual lakes, amounting finally to over 1 000, and of joint-licence areas, amounting finally to 170. The market includes the most important watercourses from the point of view of recreational fishing. The average unit size of the fishing opportunity supplied by owners has increased five-fold.

Why is the other half of the lake surface area not on the market? An economic explanation is that the transaction costs of marketing these small lakes exceed expected licence revenues, leading a rational supplier to withdraw from the public market. Fishery resources in this small-lake category are exploited mainly by shareholders´ own local fishing. However, the lure fishing licence also covers these areas.

The market for professional fishing licences has not improved. As only one *joint-licence for professional fishing* has been introduced, full-time professional fishermen in particular will have to stand the trial of trying to obtain fishing rights. Recruitment into professional fishing is hampered by a shortage of access to private fishing grounds. Professional entrepreneurs already engaged in fishing are also faced with the same problem. Public access management is of vital importance to entrepreneurs, since part-time fishermen utilising the waters of statutory fishery associations seldom switch to full-time involvement (VI).

3.4.4 Optimal or suboptimal management?

The application of the framework of Copes & Knetsch (1981) needs some interpretation relative to the types of private ownership. Neither sole ownership nor a producers´ monopoly in the strict sense is an appropriate regime in Finnish inland waters. However, some features and outcomes of the system may be explained on the understanding that the policy of a statutory fishery association equals that of a producers´ monopoly as regards issuing licences for professional fishing. Such an assumption is justified from the point of view of the fishing licence market, because professional fishing often takes place in waters where statutory fishery associations stand to some extent in a monopolistic position.

The predictive power of the framework illustrating management objectives was confirmed in the individual studies as regards professional fishing. Catch size and effort level are smaller in waters privately managed by statutory fishery associations than in those managed publicly (V,VI). The positive outcomes of a policy of public access have their roots in the fisheries legislation, which emphasises the needs of both professional fishing and local habitants. Regarding recreational fishing, market studies (II,III,IV) show that both the private and the public market produced the same equilibrium supply in terms of lake surface area, until the issuing of the lure licence. Generally, catch statistics (II, III) suggest a stable rate of exploitation, although the latest

statistics show an increase in the average catch from Finnish inland waters to 13 kg/ha/a (SVT 1998:3).

The regulation of fishing effort is one of the basic management measures. However, statutory fishery associations usually issue licences for recreational fishing that are valid for a year without specifying the total allowable effort. This means that the number of fishing licences is or could be known, but the actual fishing intensity remains undetermined.

3.4.4.1 Private access management

As regards *recreational fishing in lakes,* each statutory fishery association may supply part or, as is usual, all of its waters for this purpose. Because the physical extent of waters restrict the possibilities for a statutory fishery association to increase its supply, the supply curve of each statutory fishery association is rather inelastic, and consequently so is the respective aggregated supply curve.

Fishing sites supplied by individual statutory fishery associations have been considered as undifferentiable from those of other statutory fishery associations (II); this generalisation may need to be reconsidered particularly in the future. Although the price of a fishing licence is determined in the market, statutory fishery associations may employ local price discretion, e.g. dual pricing. Also the fact that statutory fishery associations run their daily activities at different costs may result in different prices (II).

The inelasticity of supply suggests that statutory fishery associations are operating at a level producing only normal profits, which will not attract new supply. Attemps by statutory fishery associations to make the sum of gross licence sales and other incidental revenues (II, III, IV, Kilpinen 1995, see also Honkanen 1985, p. 128) equal to maintenance costs (fish stocking, marketing, enforcement) results in the dissipation of the possible RR from licences. This dissipation is not caused by too high a fishing effort in relation to fish stocks. It results from a traditional input-oriented management policy, aiming at securing constant resource availability with the help of fish stocking, and the social goals observed by the owners. Statutory fishery associations also usually attempt to balance their accounts in order to avoid surpluses which could be liable to taxation. An additional motive behind an input-oriented policy is that owners may benefit themselves when engaged in fishing.

The pricing of fishing licences has obviously not been consciously used as an instrument for the management and regulation of fishing. Pricing has not been related to the fishing efficiency of different types of gear (II). Because approximately half of the annual catch of recreational fishing is brought in by gill nets (SVT 1995:2, p. 14, SVT 1998:15), low prices are reasonable, if the objective is to increase the rate of exploitation of fish stocks. However, the input restrictions on professional fishing do not speak in favour of this objective. If needed, the fishing effort could be intensified by allowing more access to professional fishermen.

The pricing policy may partly be explained by shareholders´ dual role as owners and consumers of their fishing grounds. As owners they would like to price up fishing licences and collect high licence revenues from non-shareholders, thus enabling some accumulation of potential RR. Dual pricing also facilitates owners participation at a higher level of usage that gains more CR for those shareholders who personally participate in fishing, assuming unit price elasticity. Both of these avenues of action coincide with the assumptions behind the rationalisation paradigm. Nonfishing owners will not benefit from any CR and they are also likely to lose the potential RR, as it is usually not distributed among owners.

A statutory fishery association may incur costs in maintaining a recreational facility which can be utilised by state supplied licence. Owners of waters are, however, to varying degree compensated by remunerations accruing to them from these licences.

Due to increased supply the importance of membership in private fishing clubs as prerequisite for *river fishing* has decreased, which has notably improved access, particularly in southern parts of the country. The statutory fishery association or sole owner of fishing rights may operate in an oligopoly, where profits are above normal and protected by a physically limited supply. This enables the generation of RR (II), even though its capture has not been studied here.

Instead of allowing effective *full-time professional fishing*, the policy pursued by statutory fishery associations in issuing fishing licences supports less efficient part-time fishing (V,VI). From a social point of view, this policy has resulted in social losses due to the suboptimal allocation of fishing rights and biological underfishing of vendace (V,VI). Another consequence are the deficiencies in that part of the food production chain which is based on lake fishing, and subsequent losses of benefits in the processing sector and trade. From a statutory fishery association´s point of view, restrictions in distributing licences for full-time professional fishermen have diminished licence revenues and consequently the RR that fishing grounds could have yielded. Even high offers for annual licence fees have been disapproved of by some statutory fishery associations (V). Gear restrictions increase the costs of fishing enterprises and diminish their profitability (V, VI). Shifting their fishing effort to other, more liberally managed fishing grounds, is usually expensive for fishermen.

Unless the shareholders fish themselves, they may be indifferent between allowing or forbidding professional fishing. However, the decisions of statutory fishery associations might partly be explained by the fact that as shareholders full-time and part-time professional fishermen have a dual role in statutory fishery associations. Among professionals part-timers form a numerical majority. When shareholders fish themselves, externalities (stock reduction) arising from competition for vendace and whitefish stocks become introduced into the statutory fishery association´s optimising criteria. By internalising externalities, the statutory fishery association moves the level of the fishing effort towards smaller catches and higher prices. The shareholders in the role of part-time professional fishermen may wish to maximise their own economic

rent (PR and RR) instead of favouring full-timers. Input restrictions also decrease rivalry (V,VI) between professional fishermen, favouring the less effective fishermen.

3.4.4.2 Public access management

The public sector has become involved in the supply of recreational fishing licences as the Finnish parliament has perceived the market to be an inadequate allocator of fishing opportunities. It has been believed that by governmental intervention a socially more desirable situation could be achieved, particularly on the coasts (Sipponen 1999), where market imperfections have been more frequent than in inland waters.

Government-led intervention into the market supplying fishing licences has taken place in three stages within the past 15 years, introducing access to private fishing grounds as well:

- licences for ice-fishing 1983-1993, legislation enacted in 1982;
- licences for angling and ice-fishing 1994-1996, legislation enacted in 1993; and
- licences for lure fishing 1997 onwards, legislation enacted in 1996. Lure fishing for fishermen under 18 and over 64 years became a public right.

Angling and ice-fishing became a common right of all citizens from 1997 onwards, except in the northern part of the country, where the fishery legislation followed in the rest of the country has applied since 1998. Whether this involvement has increased total net social benefits, depends on what has happened in different benefit categories, changes which would have to be measured empirically.

The supply of recreational fishing opportunities by the state has increased the accessibility of fishing sites to almost all inland waters, almost doubling the area available for active types of *recreational lake fishing*. Free access for angling legalises the practice of angling with hook and line which has taken place during the last decades, even though earlier legislation only allowed free angling in the waters of the individual´s municipality of residence. Open access to angling and ice-fishing contributes to social well-being, but the question of the extent to which it outweighs externalities remains open. The enlargement of open access caused at its peak a 9-10 million FIM loss in state fishing licence sales on the basis of statistics in 1997. There is no question here at the general level of stock or congestion externalities, but the willingness of fishermen to pay was no longer exploited. These fishermen thus receive CR.

In public waters fishing with a hook and line has been free for people inhabiting municipalities with a lake where there is public water. So far fishery regions have not recognised any need to restrict these types of fishing.

As regards *recreational fishing in rivers and rapids,* the National Board of Forestry (NBF) had a competitive advantage compared over possible competitors because of the abundance of flowing waters under its control in the northern Finland during the 1970s and early 1980s. Even though price

differences between private and public suppliers have diminished, particularly so in recent years, indicating an increased market-based valuation, the NBF still pursues a lower pricing policy on average than the statutory fishery associations (Appendix 1). The NBF has raised its prices by 33 per cent during the last few years under consideration, since it shifted from the status of a civil service department toward that of a state-owned enterprise. State-ownership as such does not quarantee a concern with CR. Pricing is a function of the values of the authority setting the objectives for state-owned firms, whose present policy seems to favour the maximisation of RR. As with the private supply market, public market for river fishing is developing all the time.

In *the professional fishing licence market* the outcomes of public access control (fisheries regions issuing licences for public waters, the NBF for state-owned waters) are in accordance with the predictions of the framework mentioned. Public access control has increased the efficiency of the use of fishery resources. The experience of professional fishermen confirms that public access control has best ensured the deployment of an appropriate combination of new fishing technology and fishermen´s individual skills (V, VI). Public access, therefore, allows for the formation of PR among full-time professional fishermen. Publicly controlled waters form a channel for recruitment into the fishing profession, particularly for newly starting-up fishing enterprises (V).

As a generalisation, the accumulation of RR for public bodies from professional fishing is unlikely, as licence fees are not charged or are low (articles V, VI). In this respect there is no essential difference from private access management; moreover publicly managed waters also are often stocked with fish.

4 THE DEVELOPMENT OF THE FINNISH INLAND FISHERIES SYSTEM

It has been anticipated that few domains of natural resource management are more complicated than that of fisheries (McGoodwin 1990, p. 145). If fisheries management is to improve the workings of a fisheries system, it should help the players to address the following general concerns: 1) human needs, values, and social equity; 2) biological conservation and resource productivity; 3) economic productivity and efficiency; 4) administrative feasibility; and 5) political acceptability (see McGoodwin 1990, p. 146). These items can be condensed into the concepts of conservation, efficiency and equity. The development and outcomes of the Finnish inland fisheries system depend more on how well the different institutions function than on the resource biology of fish stocks. Below, the development of the fishery system, mainly during the 1980s and 1990s, is assessed on the basis of such features as stability, efficiency, equity and resiliency. It will be shown that any single paradigm does not prevail; instead, rivalry between paradigms is in progress.

4.1 Administrative development

Human needs, values, social equity and administrative feasibility as well as political acceptability are, above all, concerns of the political-administrative subsystem, where the largest changes have taken place. First, the revision of the Fisheries Act in 1982 finally created the preconditions for inland fisheries to function as a comprehensive system, as new organisations were set up enhancing interaction between players who formerly worked more locally. The establishment of the Regional Fishery Districts at the intermediate level of public administration was a significant step in enlarging governmental participation in fisheries. The resources vested in these organisations enabled

governmental involvement in societal development and fisheries promotion throughout the country. Because looking after the common fishery interest became one of the most important duties of the Fishery Districts, this field of operation received much more attention when compared to the earlier situation, when it was the responsibility of the ministry alone. During the last few years the position of fisheries in the regional public administration hierarchy has changed, but from the point of view of this sector it is important, that the fisheries has remained a responsibility of its own. This has ensured that the goals of administration have been set by the fisheries interest itself.

Second, the uneven development and deficiencies in the workings of the earlier voluntary management units justifies the conclusion that the performance of the inland fisheries system improved in the later part of the 1980s. The older system, which was being eroded, was replaced by a decisively different one. Since the early nineties the fisheries regions have offered a new forum for participation and the reconciliation of conflicting objectives. The Fisheries Act of 1951, which for 30 years vested management responsibilities in the statutory fishery associations, finally became itself a source of inflexibility. The adaptive and operative capacity of statutory fishery associations have partly been overtaken by time as mere institutions for fisheries management. Contemporary understanding recognises the necessity of taking a broad view of management; the life span and ecosystem approaches, are both difficult to handle within the mosaic structure of single statutory fishery associations. Similarly the pursuits of professional fishing - as a part of the food production chain - can only be managed casually within a single statutory fishery association, but usually larger fishing grounds are required.

Third, a variety of management regimes lending themselves to co-operation have emerged world-wide (Berkes 1985, Jentoft 1989, McGoodwin 1990, p. 192, Pinkerton 1994a), among them fisheries regions. The functioning of fisheries regions, particularly where they have been seen as a resource (IV), has also, as in the case of Fishery Districts, led to the accumulation of institutional capital in the Finnish fisheries system. The relatively long experience of the statutory fishery associations as self-management organisations has contributed to the functioning of the fisheries regions. Because representatives of the statutory fishery associations form a majority in the decision-making bodies, it is evident that the operational capacity of the regions will be hampered unless necessary attention is given to sharing information and maintaining the facilities of statutory fishery associations. Their small size is one of the factors impeding rational management, as areas large enough are essential for the proper management of renewable resources (Ciriaty-Wantrup & Bishop 1975). The full advantage of the private ownership of fishing grounds is obtainable only by co-operating with other parties exploiting the same resources. The disadvantage generated by small fragmented areas can be counteracted by co-operation in fisheries regions.

The fisheries region system provides an example of application of the principle of subsidiarity. The delegation of some of the powers of administrative authorities to fisheries regions concerning the issue of fishing regulations is in line with this principle. In the continuum statutory fishery

association - fisheries regions - governmental regional authority, the fisheries regions have gained, and the other two lost, their powers in directing fishing. Because the expertise and scientific data needed to practise life span and ecosystem management may exceed the resources of individual regions, co-operation between regions, authorities and researchers is inevitable. However, a balance between resources and requirements has not yet been struck. The stipulation currently in force, which grants the ministry the authority to practise management by results with respect to fisheries regions, contradicts the aim of delegating administrative powers to the appropriate level.

The fisheries system at the level of statutory fishery associations has been stable and its ability the adapt spontaneously to altered situations has been rather limited (Table 2). State involvement has accelerated development and removed some of the obstacles for a more appropriate management of fishing grounds. The formation of administrative structures enhancing the practice of co-management, which alone can not be a remedy, provides a fruitful prospect for strengthening the fisheries system.

4.2 Development of efficiency and equity

The outcomes of the fisheries system can be explained in alternative ways, which support both the rationalisation and the social/community paradigm. Both the statutory fishery associations and the fisheries regions provide a forum for participation and thereby fulfil a social function in the fishery system (II, IV, Muje 1995, Pitkänen 1996, Salmi 1997), manifesting social/community paradigm. Although the players in the system usually agree on the broad goals and objectives of management, contradictory views are often observed as regards the selection of practical tools for operations. The success of management is measured not by its internal consistency and potential for success, but by the extent to which players comply with it (Smith 1990). Failure to reach a decision may lead to a particular question being raised in a larger political arena (see Hanna & Smith 1993), as in the case of lure licence. In opposition to the social function are some the concerns of rent accumulation and access management, which speak in favour of the rationalisation paradigm.

In the decision-making of the statutory fishery associations, in particular, numerous private and common interests are intermingled, which makes it difficult to predict, and sometimes also to understand, decisions. As an institution the statutory fishery associations appear to have a conservative resource utilisation policy, but it may be questioned whether this is based on explicit consideration of discount rates. The decision-making in the statutory fishery associations, which has resulted in the dissipation of resource rents (RR) from the fishing licence market, coincides in this respect with the results of public access management in inland waters (Table 2) and with marine open access. However, the cause is different: the lack of concern about costs imposed on others in the latter, the voluntary surrender of the RR in the former. An

essential difference is also that fish stocks are not threatened in inland waters, unlike the open access situation in the marine environment. It will be difficult for the amount of RR per shareholder to enter significance as an economic maximisation criterion. As the number of shareholders is more or less proportional to the size of water areas, the average potential RR per shareholder from fishing licence sales is bound to remain fairly small.

Another perspective is that of individual shareholders, some of who can capture some rent components even in the case of RR dissipation at a statutory fishery association level. Restrictions in granting fishing licences to non-shareholders and full-time professional fishermen should generate net benefits to shareholders such that these compensate for the lost licence revenues, if the pursued policy is to be economically justified. The "social carrying capacity" (Lappalainen 1995, Muje 1995) affects the allocative decisions of statutory fishery associations. In statutory fishery associations´ allocation decisions on fishing licences, the social/community paradigm has been observed to play a role also in a somewhat negative sense: equality has been understood as equal share of the catch (Pitkänen 1997), an understanding which effectively prevents any full-time professional fishing and does not pertain to an adequate consideration of distributive justice (see Loomis & Ditton 1993).

From the data presented by Kilpinen (1995), it can be shown, that the pricing policy of statutory fishery associations has changed. During 1987-1993 the average prices of fishing licences paid by shareholders have decreased by 14 % and those paid by non-shareholders increased by 22 %. Muje (1995) also has observed that non-shareholders have been charged considerably higher fees. Moreover, the average prices of active types of fishing methods (220 FIM) were double compared with those of passive ones in 1996 (102 FIM) (SVT 1998:3). This may indicate a rise in concern about pricing and a willingness to partly transfer the burden of management costs to non-shareholders. These findings display support of the rationalisation paradigm as an alternative explanation for the decision-making motives in the statutory fishery associations. If shareholders in the future increasingly attempt to maximise their rents, one reason may be the aversion towards state-supplied fishing licences on the part of shareholders.

In decision-making in the statutory fishery associations the equity of the shareholders is advanced by the practice of voting on the basis of the number of members present in the meeting, not on shares, even if it were allowed by the Fisheries Act. The statutory fishery associations also usually grant fishing licences over and above their share to shareholders with low holdings (Table 2). However, the position of full-time professional fishermen, particularly those of non-shareholders, is often rather difficult in the meetings of statutory fishery associations. The lack of understanding of the needs of professional fishermen among many shareholders contradicts what is otherwise a positive attitude, as reflected, for example, in assigning their shares to the common interest, as regards the flow of revenues accruing to the owners of fishing rights. Shareholders with high holdings carry proportionally and absolutely much higher costs than shareholders with lower holdings.

TABLE 2 The outcomes of the Finnish inland fisheries system and the effect of the ownership regime on the rate of utilisation of fishery resources. Each feature is compared with other management regimes. In respect of catches optimality is assumed. CR= consumer rent, PR= producer rent, RR= resource rent.

	Management regime		
Feature	**Statutory fishery association**	**Fishery region**	**State**
Stability			
* a strive towards change	No	Yes	Yes
Efficiency			
accumulation of rents			
*PR for full-time professional fishermen	Unlikely	Allows	Allows
*RR for the management body	No	No	No
*CR for recreational fishermen	Yes	Yes	Yes
effort			
* attitude towards the use of (productive) inputs			
**in professional fishing	Negative	Permissive	Permissive
**in recreational fishing	Positive	Positive	Positive
access fees			
*lake fishing	Low	Low	High
*river fishing	High		Increasing
catches			
*professional	Suboptimal	Optimality achievable	Optimality achievable
*recreational	Steady	Steady	Steady
market performance			
*percentage coverage of water area supplied for recreational fishing of Finnish inland waters	50	50	100
Equity			
*professional fishermen	Deficient	Satisfactory	Satisfactory
*recreational fishermen	Good	Good	Good
Resiliency			
*ability to change	Low	Satisfactory	Satisfactory
*basis of orientation	Owner	Mixed user / owner	User
Leading paradigm			
*rules the decision-making	Mixed rationalisation, conservation and social / community	Social / community	Increasingly rationalisation

Inland waters provide resources for the joint utilisation for both professional and recreational fishing. Recreational fishing, which is the most important way to utilise the fish stocks of inland waters, can be carried out without greatly restricting the other types of use of water resources. The catch statistics imply that the productivity of fishing grounds do not usually require restrictions on recreational fishing practised with active types of gear. Equity among recreational fishermen has been improved by state, as access to fishing grounds has been granted. Due to these changes, the concept of "intended underfishing" nowadays refers more to professional than recreational fishing.

In the beginning of the 1990s the fishing intensity of professional fishermen in inland waters totalled 26 500 fishing days, as calculated on the basis of the data compiled in articles V and VI. This represented 0.1 % of the volume of recreational fishermen (30 million days). Among other things, the efficiency of professional utilisation depends on the features of the fishermen. The average catches of improvers were 14 388 kg, of daredevils 29 750 kg, of quitters 9 111 kg and of participants 10 187 kg in 1990. If the relative proportions of these types of adaptation to fluctuating fish stocks (VI) were applied to the entire population of 225 full-time professional fishermen in inland waters (SVT 1993:11), the numbers and respective total catches of improvers would be 74 (1.07 million kg), quitters 41 (0.37 million kg), daredevils 36 (1.07 million kg) and participants 74 (0.75 million kg). Thus half of the fishing enterprises would use passive means of adaptation (VI), resulting in a catch of 1.12 million kg compared with that of the 2.14 million kg of fishermen adapting actively. This 1 million kg difference constitutes a considerable share of the total professional catch. Whether professional inland fishing will become a dying industry depends largely on recognition of the needs of enterprises. In order to maintain or improve fishing intensity in inland waters, it is essential to recognise that full-time and part-time fishermen are strategically different groups, whose different needs deserve special attention from the owners of waters.

Community development has not been greatly effected by professional fisheries directly during the last 20-30 years. As only few municipalities are dependent on the fisheries industry (SVT 1995:12, p. 8), on a general level inland professional fishing can not contribute to social equity by offering employment. From a local point of view the perspective changes: because of difficulties in maintaining a livelihood in rural areas, professional fishing deserve more attention on the part of decision-makers in statutory fishery association waters. They have to a great extent failed to provide professional fishermen the access to those fishing grounds they regard as necessary. Two alternatives to facilitate access to inland waters could be given priority as they are both governable and manageable although not fully in line with the principle of co-management. First, either the fisheries region or the Regional Fishery Authority could be entitled to grant licences for professional fishing in such private waters as are suitable for that purpose. However, as these measures would require amendments to the existing fishery legislation, their feasibility in the immediate future is not high. Second, the amount of state aid to the fisheries regions could be made dependent on their actions in improving

professional access to fishing grounds. This second alternative could be implemented by administrative action. One of the means by which professional fishing might adapt to new circumstances is through conscious integration with environmental protection, which is, at the moment, also a locally emerging opportunity.

In the statutory fishery associations the rationalisation paradigm has gained more support than in the fisheries regions, where the advantages of co-operation speak in favour of the social/community paradigm and co-management. Presently rivalry between these paradigms at different levels of the hierarchy is in progress within the fisheries system.

The results of this study suggest that many of the inland fisheries are not used to their full economic potential and, in line with Copes (1972), questions the superiority often self-evidently attached to private ownership as a type of stewardship. Another question is: could some other management access institution work better and more cost-effectively, when all the varied concerns are taken into account? Fisheries regions could undertake new managerial responsibilities, and be a credible alternative in improving the functioning of the system. Needless to say, this would require a better realisation of the principle of subsidiarity in fisheries administration as regards, for example, management by results with respect to regions.

4.3 Development of conservation and management

In the preceding chapters I have stressed the importance of the socio-economic features of the fisheries system. Also the conservation and management of fish stocks are discussed here mainly from an instrumental point of view, which most easily combines the issues with existing legislation. Apart from maintaining the attractiveness of fishing grounds, management can maintain or increase their capital value, which will have repercussions on the permit procedure. However, enlargement the scope of management, is the most effective method.

The roots for built-in emphasis on the conservation of the fish stocks lies in the earlier fisheries legislation, which also accounts for the rigidity of the biological and economic considerations found in the statutory fishery associations. Up to now there is no evidence that the practice of fishing alone has brought about irreversible consequences for fish stocks in Finnish inland waters. The conservation paradigm has in some lake fisheries been understood and used in an inappropriate way in order to protect fish stocks from full-time professional fishing - not because of protection as a goal in itself, as e.g. Pitkänen (1997) has observed. As the necessity to protect the aquatic habitats of fish is well understood, it is left to societal development to challenge the owners of jointly possessed waters to more allow economic operations in their fishing grounds.

Another intrinsic factor influencing management and conservation decisions is the tradition of balancing revenues and costs. State subsidies for fisheries management has recently been handed out on the basis of fishing intensity as measured by the number of fishermen and fishing days. Within provinces the dominant traditional management policy has encouraged a rather widespread low-intensity improvement of fishing opportunities. Cole & Ward (1994) suggest that a conscious decision by managers to allocate fishery management resources non-uniformly across fishing sites is likely to produce maximum benefits to the fishing public. Contemporary trends suggest that the allocation of catches, and also of space, in fishing grounds between different groups of fishermen will increasingly be based on their market power.

Therefore, in the future a more active hold in management is needed, if the varied interests of different groups of fishermen are to be taken into account. A more conscious choice in the allocation of fish stocks between professional and recreational fishing than is performed at present is required. Attention should be given to multiple-use goals instead of rigidly planning water areas for separate purposes. The standard required for managerial decisions has also risen. Fishing regulations aiming to ensure biological diversity and catches from stocking programs require further consideration, as many groups of fishermen are affected.

Fish restocking has been the usual way of maintaining the quality of fishing and the level of the existing fishing effort for recreational purposes. A shift of the demand curve upwards is a basic market reaction to increased fish stocks, which corresponds to increased quality of fishing grounds. If the fish stock are not restocked to ensure a fishing experience of constant quality, the demand curve will shift downwards, resulting in reduced revenues from licences. This, in turn, through diminishing externalities (less congestion, a better probability of catching something), tends to shift the demand curve of the remaining fishermen upwards. However, the high degree of locality in recreational fishing counteracts these shifts. It can allow a margin for the bodies responsible for management to try out some new procedures - for example, to regulate fishing in order to protect biodiversity. Up to now, Finland´s geographically isolated situation has largely promoted the possibilities to exercise a cautious policy as regards the introduction of new fish or crayfish species.

An input-oriented management policy can indirectly improve the protection of fishing grounds. In waters where management enhancement of fishing steadily exceeds the average level, their capital value increases more than that of more extensively managed waters. In the context of permit procedure, the increased capital value of fishery resources supports the broad objective of conservation by increasing the threshold to alter natural conditions. Thus an input-oriented management policy in part travels full circle and reinstates to the conservation paradigm.

Effects on the regional economy arising from decreased fisheries input ("undercompensations") (I) were smaller than intuitively expected in the Province of Central Finland. This obviously contradicts the preconceived attitudes of many participants involved in permit procedures. However, input-

output analysis is useful in evaluating secondary benefits accruing to regions e.g. from fishing tourism, as it is worth knowing the monetary flows generated by a fishery. It is also essential that in accounting for environmental assets, degradation of natural resources and growing pressures on global life-support systems should be taken into account (Repetto 1992).

5 CONCLUSIONS

During the past 15 years, the efficiency of inland fisheries has been enhanced by the various amendments made to the fisheries legislation. The old system based mainly on the statutory fishery associations have been replaced with more versatile one. The most prominent changes encompasses the development of fisheries as a system, the successful establishment of new institutions for management and a reduction of deficiencies in the supply market. The stability of the inland fisheries system turned out to be higher the lower the hierarchical level. Consequently the improvement of the system has owed much to political initiatives.

Access to fish resources is of vital importance in both professional and recreational fishing. The results obtained show that access policy can not be left to market forces alone. It has not functioned as a rationing device, nor has it provided information as to what kind of fishing should be provided in lakes. However, as regards fishing in rivers, supply has reacted better to increased demand. Even though the low prices of fishing licences can cause inefficiencies in the strict economic sense, in a wider context they exhibit local and national features, which enable participation in fisheries at reasonable prices.

The establishment of the Regional Fishery District and the fisheries regions organisation has led to the accumulation of institutional capital in the fisheries system. Inherent in the fisheries regions are many features typical of co-management, which is widely considered to be the management regime which best provides for the potential to resolve management problems through participation and the process of social learning. Within regions, owners of fishing rights, fishermen, administrators and researchers have all been involved in working towards common goals. The most advanced fishery regions have also established their role as supplementary instruments for putting into practice the regional prospects of fisheries policy.

In state-owned waters, the policy goal of giving priority to professional fishing has been successful, as fishermen have obtained adequate access to fishing grounds and the right to use effective types of gear. These factors have improved the prerequisites for carrying out full-time professional fishing, which is also an important source of supply to the food-processing industry. As

regards recreational fishing, state intervention in the supply market has increased access, particularly to lakes. In these ways, the commutation of property rights has improved both professional utilisation of and recreational access to fish resources.

The ownership structure of mainly privately owned fishing grounds has resulted in contradictory outcomes in respect of the primary goal of the Fisheries Act. The definition of a statutory fishery association has resulted into the division of fishing grounds to small and dispersed water areas. However, this unsuccessful structure originates basically from the provisions concerning land parcelling, not from the Fisheries Act. Consequently, this inappropriateness of scale in relation to contemporary requirements has led to biological and economic inefficiencies. The tendency of statutory fishery associations to keep societal resources idle, particularly in professional fishing, have caused social losses throughout fisheries as a whole. The obverse is, again, that by giving priority to social goals instead of economic ones, the statutory fishery associations will help to maintain social and community values, which are locally important.

These findings lead to the question of the supremacy of private ownership as an institution for the stewardship of fishing grounds. Management could achieve better results given an appropriate institutional scale. Within the fisheries regions, private ownership and stewardship could be combined with larger management responsibilities and with the experience of reconciling private and social interests. It would accord with the principle of subsidiarity, if more responsibilities were vested in the fisheries regions.

Is the Fisheries Act self-contradictory? On a dichotomous scale a negative answer would emerge. The goal of the Act is still relevant, and market deficiencies have partly been reduced by amendments to legislation. Although many of the difficulties emerging in daily management routines can be overcome by collaboration, revisions to legislation may be needed in order to increase the access of professional fishermen to fishing grounds, if other means finally fail. Also, if a minimum geographical area was settled for the waters of statutory fishery associations, their function, as well as that of the fisheries regions, would obviously benefit.

The foreseeable trend is that the interaction between the fishery industry and environmental concerns will continue to deepen. This emphasises the importance of research focusing in more detail on the economic value of recreational fishing in inland waters. In addition, social research addressing our unique ownership institutions, as well as the dual role of owners of fishing rights as owners and fishermen, either professional or recreational, would increase our understanding of the function of the fisheries system.

A balance in the fisheries system between the alternative paradigms illustrating the forces that direct the system has not yet been fully achieved. What direction will the future developments take? Will inland fisheries face an increasing or declining trend in their utilisation? It is hard to believe that Finnish citizens will voluntarily allow inland fisheries to be wiped out. However, the recognisation of the contribution of inland fisheries to biological and economic values and to social welfare still awaits its breakthrough.

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YHTEENVETO

Suomalainen sisävesien kalatalousjärjestelmä ja sisävesikalastus muodostavat monella tapaa omaleimaisen kokonaisuuden. Erityisesti yksityisten kalavesien yhteisomistus kalastuskunnissa tarjoaa oivan mahdollisuuden tutkia empiirisesti tämän instituution vaikutuksia kalavarojen käyttöön - ja liittää samalla omat kokemuksemme osaksi yleismaailmallista kalastuksen säätelyjärjestelmien pohdintaa.

Tutkimuksen kuudessa erillisartikkelissa kuvataan maamme sisävesien kalatalousjärjestelmää biologisesta, taloudellisesta ja poliittis-hallinnollisesta näkökulmasta. Kalatalousjärjestelmän toiminta on tehostunut viimeisten 15 vuoden aikana kalastuslainsäädännön uudistusten seurauksena: on luotu valtion kalatalouden aluehallinto sekä kalastusaluejärjestelmä. Kalastusalueissa yhdistyvät inhimilliset ja luonnon resurssit kalataloudellisen päätöksenteon kannalta sopivassa mittakaavassa. Ne kokoavat kalavesien omistajat, kalastajat, hallintoviranomaiset ja tutkijat yhteistyöhön. Kalastusaluejärjestelmästä löytyykin monia yhteisiä ominaisuuksia menestyksekkään kalavesien yhteishallinnon kanssa eri puolilla maailmaa. Kalastusalueet ottavat politiikka- ja strategiatason päätöksissään kalavesien käyttäjien tarpeet paremmin huomioon kuin toiminnallisella tasolla, jossa korostuvat kalaveden omistajien näkemykset.

Kalastajan kannalta pääsy kalavesille on ydinkysymys. Olen tarkastellut kalastuspaikkojen tarjontaa ja kysyntää koko sisävesialueella. Järvillämme yksityisomistuksessa olevien kalavesien tarjontaa vapaa-ajankalastuksen tarpeisiin on leimannut joustamattomuus. Kalastuskunnat ovat vuosikymmenien ajan markkinoineet kalastuslupia järvialalle, joka yhteensä on kattanut puolet sisävesiemme pinta-alasta. Myös kalastusalueiden myymät ns. yhtenäisluvat vapaa-ajankalastajille kattoivat lopulta saman suuruisen alueen, joka tosin sisälsi kalastuksellisesti keskeisimmät järvemme. Virtaavan veden kalastuksessa tarjonta on reagoinut herkemmin kysynnän muutoksiin.

Järvikalastuksessa kalastuskuntien harjoittama kalastuslupien hinnoittelu ei ole perustunut eri pyyntimuotojen tehokkuuteen. Suomalaisen vapaa-

ajankalastuksen leimallinen piirre on paikallisuus, eikä tutuilta vesiltä siirrytä helposti uusille alueille. Niinpä markkinat eivät ole tuottaneet kalastuskunnille informaatiota siitä, miten kalavettä tulisi kehittää. Kalastusalueiden lupapolitiikka on seurannut paremmin kysyntää ja monet kalastusalueet ovat antaneet alennuksen nuorison kalastuslupiin. Kuitenkin kalastuslupien saatavuudessa on koettu siinä määrin puutteita, että pääsyä kalavesille on helpotettu lakiteitse, viimeksi laajentamalla viehekalastusoikeuksia.

Kalastuskunnat ovat pääsääntöisesti käyttäneet kalastusluvista kertyneet tulot kalavesien hoitoon. Siten kalastuskunnan osakkuus ei ole tuottanut osakkaille eli kalaveden omistajille luonnonvaran korkoa. Tulos on ristiriidassa yksityiseen omistukseen liittyvän tehokkuusodotuksen kanssa. Toisaalta osakkaiden runsauden vuoksi mainittu korko osakasta kohden jäisi yleensä vähäiseksi, vaikka se jaettaisiinkin osakkaiden kesken.

Tutkimukseni vahvistavat valtion omistamien vesien keskeisen merkityksen sisävesien ammattimaiselle kalastukselle. Säädösten velvoite ottaa ammattimaisen kalastuksen tarpeet huomioon on yleensä toteutunut varsin hyvin: kalastajat ovat saaneet tarvitsemansa kalastusoikeudet ja ovat siten voineet käyttää yrittäjän ominaisuutensa täysipainoisesti hyväkseen. Valtion vedet ovat tärkeä rekrytoitumisväylä kalastajan ammattiin. Kalastajien käyttäytyminen ja heidän sosiaalinen ympäristönsä on pysynyt melko muuttumattomana, vaikka alan teknologinen kehitys on ollut nopeata.

Kalastuskuntien hallitsemien kalavesien pirstoutuneisuus on aiheuttanut kalavesien käytön biologista ja taloudellista tehottomuutta. Sirpaleisuus johtuu kuitenkin perimmiltään kiinteistönmuodostusta koskevasta lainsäädännöstä, ei kalastuslaista, ja siitä johtuvia ongelmia on osaksi voitu lieventää kalastusaluetoiminnalla. Voimavarojen taloudellisesti vajaan käytön kääntöpuoli on, että priorisoimalla sosiaalisia ja yhteisöllisiä arvoja taloudellisen tehokkuuden sijasta kalastuskuntalaitos osaltaan tukee yhteisöllisyyttä.

Kalatalouden ja ympäristönsuojelun yhteys tiivistynee tulevaisuudessa. Haasteellisia tutkimustehtäviä tarjoavat vapaa-ajankalastuksen taloudellinen arvo, kalavesiemme omistusinstituutio sekä kalaveden omistajan ja kalaveden käyttäjän kaksoisrooli.

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Appendixes

APPENDIX 1 Prices of river fishing licences (FIM/day) in Finnish inland waters at 1997 values. Rivers providing fishing of ascending salmon (Salmo salar) are excluded. sfa=statutory fishery association, NBF=The National Board of Forestry, i.e. state. Mean includes also other suppliers.

Year	sfa	n	NBF	n	Mean	n	sfa/NBF
1963	21	32	14	2	33	36	1,5
1967	25	44	24	3	32	49	1,0
1971	22	49	14	3	28	55	1,6
1974	21	51	40	9	28	62	0,5
1976	21	44	30	40	29	86	0,7
1978	21	47	26	39	25	87	0,8
1981	43	29	26	25	37	55	1,7
1982	42	29	27	25	37	55	1,6
1983	41	32	26	27	36	60	1,6
1984	41	33	27	28	36	62	1,5
1985	41	42	29	30	37	75	1,4
1986	35	120	29	37	35	162	1,2
1987	43	50	28	33	40	87	1,5
1988	44	53	32	32	42	89	1,4
1989	41	60	32	31	40	95	1,3
1990	46	60	35	32	44	96	1,3
1991	47	81	33	37	44	122	1,4
1992	46	70	35	39	44	115	1,3
1993	44	74	35	38	43	120	1,3
1994	45	95	36	34	46	141	1,3
1995	49	96	47	32	52	139	1,0
1996	51	91	47	44	54	146	1,1

APPENDIX 2 The number (a) and the total surface area of joint-licence areas (km^2)(b), their share of Finnish lake surface area (%)(c) and their average size (km^2)(d). During 1974-1978 the seller was a management unit prior to the setting up of fisheries regions.

Year	Seller	a	b	c	d
1974		35	2220	7	63
1976		51	4777	14	94
1978		52	5115	15	98
1988	Fisheries region	25	5637	17	225
1988	Other	34	2927	9	86
1988	Total	59	8564	26	145
1991	Fisheries region	66	10168	30	154
1991	Other	84	6187	18	74
1991	Total	150	16355	49	109
1993	Fisheries region	83	11380	34	137
1993	Other	87	6441	19	74
1993	Total	170	17821	53	105

APPENDIX 3 Annual prices of joint-licences for recreational fishing in Finnish inland waters sold by fisheries regions and other management organisations at 1997 values.

Year	Fishery region		Other	
	FIM	n	FIM	n
1989	68	59		
1991	99	116		
1993	108	112	177	54
1995	115	111	303	38

APPENDIX 4 Prices of joint licences (FIM/person) for recreational fishing in Finnish inland waters in 1993-1994 and 1995-1996 at 1997 values.

	1993-1994				1995-1996			
Valid for a	Year	Month	Week	Day	Year	Month	Week	Day
Fishery regions' licences								
Mean	108	67	45	21	115	73	51	24
n	112	31	83	45	111	33	82	43
Other sellers								
Mean	178	183	84	30	304	311	143	43
n	54	8	54	59	38	7	43	47
On avera e								
Mean	131	90	60	26	163	114	83	35
n	166	39	137	104	149	40	125	90

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