COASTAL FISHERIES PRACTICED BY VESSELS BELOW 20HP IN GREECE: BIOLOGICAL, ECONOMIC AND SOCIAL FRAMEWORK

Project no 97/0051

EC DG XIV Directorate -General for Fisheries

FINAL REPORT
Vol. 1

Nireus Fisheries and Aquaculture Consultants SA

National Center of Marine Research

DECEMBER 2000

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This study has been carried out with the financial assistance of the European Commission."

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I. ABSTRACT

The 'under 20HP' segment of the 'coastal fishery' fleet, is an important one for the rural coastal and island communities of Greece. Not just because of its traditional nature, but mainly due to the number of people directly or indirectly professionally involved in this segment, has it been considered an important one, in sociological, demographic and regional economic terms. The fleet, accounts for the largest share in the number of vessels and employment offered, over the total of the national fishery sector. In addition, the ecological importance of the areas within which such vessels operate, render the sector -through its volume of landings and diversity of the species caught- a rough but reliable potential indicator for the state of the national fishery resources.

However, despite these characteristics, the 'under 20HP' segment of the fleet has been largely overlooked by the national statistical recording systems, which inadequately monitor only several structural and operational aspects of it. Acknowledging this information deficit, the present study aimed at the gathering and presentation of information on a number of critical issues, in order to provide – through an integral and largely holistic approach- a reliable basis upon which research can be directed towards the drawing of potentially efficient management plans, taking into account the biological, economic and social framework of this particular segment of the fisheries.

National inventory and registry data were compiled and comparatively evaluated, while low-cost sampling techniques were devised and implemented for the collection and evaluation of information. A representative sample of fishermen and their vessels was established in ten areas, and detailed information was regularly monitored and recorded, for the duration of one year, aiming at the 'quantification' of several issues of importance. Moreover, meetings and interviews with fishermen and their representatives, from a number of places around the country, were arranged, in order for more 'qualitative' information to be compiled. It is noteworthy, that the results of these two complementing approaches largely support one-another, providing valuable insights into socio-economic, biological, technical and operational aspects of the sector.

In brief, conflicts were identified with other types of fisheries, professional and amateur, while widespread was the notion of overexploitation of the fishery resources. Additionally, the increasing operational costs and shrinking income from the reducing catches, the largely ineffective management measures and the low rate of success in the enforcement of the law, if coupled by a number of operational issues (ie: damages incurred by marine animals, abandoned non-degradable gear), and various socio-demographic aspects, such as the age of fishermen, the number of youngsters entering the profession, the social security schemes etc, provide a clear depiction of a rapidly shrinking segment of the national fleet.

The time is considered critical for significant and bold reforms to take place, through an integral and largely holistic approach, towards the sustainable conservation of the marine resources as well as the people making a living out of it.

II. NON-SPECIALIST SUMMARY

It is being widely acknowledged that the Greek 'Fisheries' sector, despite its relatively low contribution to the GNP, is considered as an important one, particularly in the rural, coastal and island regions of the country. Its 'marine fishery' category in specific, is the most numerous in terms of employment and the most important in terms of production volumes. Within the latter category, is included the sub-category of 'coastal fisheries' which, in turn, contributes the most to the sector with regard to the total employment.

It is within the 'coastal fishery' sub-category where the 'under 20HP' fleet is included. The regional distribution of this fleet, indicates that vessels of engine power 'under 20HP' are dominant both in absolute and proportional units in most island areas and in mainland coastal regions with protected gulfs or lagoons. By contrast, the share of these small-engine vessels is lower near the large national urban areas with extensive port facilities.

The Greek fisheries statistical-recording-systems insufficiently monitor the 'under 20HP' segment of the fleet, despite the fact that it has traditionally been greater –in absolute numbers- than the 'over 20 HP' part of the 'coastal fishery' fleet. According to the results of the fisheries census conducted in 1988, the former fleet numbered 14,232 vessels, more than half (59.8%) of the professionally operating fishing vessels in Greece, accounting for 45.8% of the employment of the total national fisheries sector. On the other hand, its contribution to the total tonnage and engine power of the total national fishing fleet was relatively low (12.7 % and 13.2 % respectively). The greatest part of the fleet comprises of vessels employing bottom nets and longlines, while a relatively small number of vessels operates surface long-lines.

The ecological importance of the areas within which such vessels operate, render the monitoring of the volumes of landings, and the diversity of the species caught, as a valuable tool towards an assessment of the state of the national fishery stock resources. Moreover, from the geographical distribution of the fleet, it becomes apparent that the 'under 20 HP' fishery sector plays an important role in the employment and the social structure of particular regions. Not only it contributes greatly to the regional economies - especially in isolated communities where alternative employment possibilities are limited or highly seasonal- but it may also be strongly linked to other important regional economic activities such as tourism, agriculture, aquaculture, etc.

Acknowledging the information deficit that the 'under 20HP' fishery segment exhibits, the general objective of the present study aimed at the gathering and presentation of information on a number of critical issues, in order to provide – through an integral and largely holistic approach- a reliable basis upon which research can be directed towards the drawing of potentially efficient management plans, taking into account the biological, economic and social framework of this particular segment of the fisheries.

Through the compilation and comparative evaluation of the national inventory data, it was proved that these are largely unreliable, with high degrees of statistical biases, for both bodies which collect and process data on the 'under 20HP' segment of the fleet. It therefore gains additional value to present the information provided from the processing

of questionnaire-collected data, based on the regular and consistent monitoring of a sample of 124 vessels from 10 representative areas of the country . The majority of these vessels had registered engines from 15 to 20HP, with 41% of the total sample being at 15HP. Accordingly, 60% of the vessels measured 5 to 7 meters long. Regional variations were, of course, observed for both the engine power and the length, for all areas examined. As for a number of the socio-demographic issues examined, the majority (roughly ¾) of the sampled fishermen were found to be from 41 to 70 years old. Within this context, an alarming issue emerged as the group of 21-30 years old accounted for only 5% of the sample, indicating very low recruitment rate. The majority of the sampled fishermen were married (93%) and require the assistance of their wives and/or their children (67%). It should be noted that although the need for assistance increases with increasing boat length, almost 40% of the sample stated that they work alone. The latter indicates the fact that fishing in these vessels is largely a solitary and in most cases shelf (or family owned) business profession. As regards the total annual average yield of an 'under 20HP' vessel, this was estimated at the mere 1,812 kg, providing an average monthly 'net' income of 182,000 Drs. It becomes, therefore, of no surprise to see that the majority of the sampled fishermen have complementary and income supplementing occupations. As would be expected, the catch quantity and composition, and consequently the income, manifest regional variations, depending largely on the geographic location and the meteorological conditions. These factors also strongly determine the available days of operation, the distance from the coast and the port that is required for an adequate catch, the gear employed and ultimately the operational costs. Similarly, the distribution and marketing of the catch exhibit regional and seasonal variations.

Apart from the quantification of several issues, of significant importance (and special value to this study) was proved to be the *'in situ'* investigation of various socio-economic and operational aspects, through meetings and interviews with workers and representatives of this fishery segment from around the country. It should be noted that through the results of these meetings and interviews, the quantified findings of the previous section were further backed, while at the same time a number of other very important issues arose. Such issues, when analysed, where found to be on common grounds for the majority of the areas examined. Taking into account that these areas where selected in such a way as to largely represent the national situation, a number of these issues should be given further attention.

To the surprise of the researchers, out of all the coastal fisheries associations and co-operatives contacted, a common notion emerged; the fact that the catches have declined significantly, and continue to do so. Without overlooking the fact that it is within the 'nature' of the fisherman to complain about the catch, it was, nevertheless, unanimous the adoption of this notion, which in many cases was backed by strong example-cases that quantified the problem in relation to the past. It should therefore be without a doubt that the fishery stocks are suffering a decline in the Greek waters. In addition to the problem of the reduced catches reported by the coastal fishermen, is the one related to the all-the-more increasing incidents of gear and catch damage caused by marine mammals and turtles, which has come to be a very serious problem, nationwide.

The majority of the fishermen claim that it is the overall increase in the fishing power that has led to the overexploitation of the resources, while considerable share of responsibility is given to the inefficient and/or 'non-implemented' national conservation

and technical measures. On the matter of over-exploitation, claims and allegations pointed mostly to the medium fisheries (trawlers, purse seiners, etc) and the state (local and national administration, coast-guard), emphasizing on the allowed number of fishing vessels. Within the same context serious is the problem that is being encountered by the lack of control on the '*amateur*' (sport / recreational) fishery, of which the volumes caught, the methods employed and number of vessels operating, would certainly constitute a fishery type of its own.

Another interesting aspect that emerged through this investigation, in an indirect and subtle but rather clear way, is that a number of fishermen seem to have fitted engines of greatest actual HP than their licensed nominal one. Provision of evidence on this matter would require technical and mechanological investigations, tasks far beyond the scopes and resources of this project. The researchers however, under this notion, attempted through a cautious and careful approach to identify the underlying reasons and the extend of this problem. The reasons discovered were far from the obvious (increased fishing capacity), and the origin of the problem was traced in the past, when a different engine-registering classification system existed. Fishermen with vessels originally equipped and licensed with 'under 20HP' engines, when required to modernise these, were placed under a new engine classification regime which 'stuck' them with engines of similar nominal power but of much less actual. It was therefore a matter of safety and a way of struggling to maintain a viable income, that led to fishermen to fit stronger engines to their boats. The latter however, created a disadvantage for the fuel subsidies (a state-scheme), distributed according to the nominal power of the engine. An additional cost is therefore incurred, as fishermen do not get subsidized for their actual fuel requirements. Though this issue is not openly and directly admitted, it is a common *secret-of-the trade*, and one which requires an integral and quite diplomatic approach in order to be quantified and resolved.

Finally, if to all the afore-mentioned problems, the issue of inadequate social security schemes, under which fishermen fall-in, is added, it becomes of no surprise to see why recruitment to this profession is low, and why this fishery sector is in desperate need of attention.

The problems described stem primarily from the inability of the state to adequately plan, organise, guide and control the various fisheries segments. Planning should be based on the pragmatic, actual, status of the fisheries, taking into account social, economic as well as environmental issues. Resources to implement any management plan should be efficiently organised and allocated, while an infrastructure for guidance and support should also be devised. Finally, a mechanism for continuous monitoring and evaluation of the progress of any such management plan should become an integral part it, for the effective sustainability of the sector and the compliance with the national and international law.

1. INTRODUCTION

1.1. Overview of the fishery sector.

The national 'Fisheries' sector, despite its relatively low contribution to the GNP, remains an important one, particularly in rural areas with intense socio-economic problems such as in coastal and island communities. In general, the sector can be divided into three categories:

A) Marine fishery

B) Aquaculture

C) Processing and marketing of products

The marine fishery category includes the professional-fishermen which is the most numerous in terms of employment and the most important in terms of production volumes. According to the Greek administrative classification criteria, the national fishery sector is separated into three main sub-categories:

a) The "coastal fisheries", perceived as the fisheries operated in coastal waters by vessels employing set gear (gill) nets, trammel nets, surrounding nets, hook lines, longlines, traps, etc.), and also certain types of towed gear, such as dredges and beach seines.

b) the "medium fishery", operated by trawlers and purse- seiners and

c) The "transatlantic fisheries" operated by large trawlers fishing for fish and shrimps in the high seas. Within this sub-category is included a number of vessels that serve as mere transporters of the products from the fishing area.

However, apart from the three officially recognised sub-categories, there exists an additional one. It is the *sport* (recreational or amateur's) sub-category, which, as shall be described in later sections of the report, is a significant aspect of concern, particularly as it regards competition with the small-scale coastal fisheries.

The capture fisheries sector presently faces significant problems, primarily based on the reasons briefly presented below:

A) The large number of small, aged and insufficiently equipped fishing vessels, with high operating costs rendering them as non-profitable enterprises. (In most cases the working conditions are below the internationally accepted standards).

B) The large number of employees, mainly of greater age, without any professional training.

C) The practising of fishing in coastal island areas where harsh competition exists for the exploitation of the available natural resources, a fact that has resulted in the degradation of the delicate coastal environment.

D) The complete lack of, or insufficiently equipped, infrastructure facilities regarding fishing ports, supply services and marketing channels.

1.1.1 Major characteristics of the Greek Fishery sector.

The conditions, which are distinctive of the Greek fishery sector, are:

- the extended length of the coastline,
- the narrow continental shelf and slope,
- the low biological productivity of the waters,
- the great number of exploitable species,
- the –mostly- rocky nature of the bottom and,
- The limited extent of grounds suitable for trawling.

Because of the presence of a relatively narrow continental shelf, fishing vessels are confined to operate over a narrow zone (usually, from 1 to 3 miles from the coast and rarely beyond 4 miles). The main area of operation of the Greek fishing fleet is the Aegean Sea, the gulfs of the mainland, which are connected to this sea, the northern coasts of the island of Crete, and the southern coasts of Peloponesse. The presence of very deep waters in the Ionian Sea and the extremely narrow continental shelf around the islands do not favour the development of important fishing activities in the western part of the country.

As regards productivity, the waters of the Mediterranean Sea are generally considered as oligotrophic due to:

a. the absence of large rivers limits the replenishment of the nutrients,
b. the narrow continental shelf, limits the spawning grounds available,
c. the absence of upwelling currents, limits the mixing of the surface waters with deeper 'richer' water masses,
d. The existence of two strong currents, one on the surface which enters from the Atlantic Ocean and a deeper one on the opposite direction which removes the nutrients present in the area.

These characteristics along with a number of socio-economic aspects that have shaped the rural population during the second half of the 20th century have favoured the development of the multi-gear coastal fisheries. This fishery is composed of vessels, many of which are of reduced engine power, operating within the 100 m contour depth-line, which in many areas does not extend beyond the 1 mile zone. It is noteworthy that the 1-mile zone from the coast determines the boundary between the wider coastal fishery sector and the medium fishery (conducted mainly by trawlers, not permitted to operate within that zone). However, since the most of the national fisheries is conducted over the narrow coastal zone, vessels of different fishing categories often get

to operate on the same fishing grounds, often creating tension between fishermen of different categories.

The resulting over-exploitation of the Greek fishing grounds, as a result of the increasing demand for fishery products, has become an aspect of concern as the production trends show signs of fatigue and quality of the catch is being reduced.

Finally, the degradation of the coastal environment due to the high urbanisation rate of the coastal areas, and the intense competition for its resources, exert an additional negative influence particularly on the coastal fisheries sector.

1.1.2 General socio-economic aspects of the fishery sector

Because of the great diversity of the rural natural environment and the profound economic differences between areas, coastal fisheries and fisheries in general, play different roles in the societies of different regions.

In coastal regions of the mainland, fishing may often be a full-time occupation though it may be practised in parallel to other income-generating activities. The degree of involvement to fisheries highly depends on the existence of alternative employment opportunities, and therefore exhibits seasonal and spatial variations.

Fishing may be the only or the main activity of fishermen in the 'poor' areas, such as Peloponesse and western Greece (mainland coastal regions). It is often observed that fishermen of such regions have supplementary sources of income, from sources largely related to agriculture. Fishing is mainly practised during the summer months, because of the favourable weather conditions, and the increased demand for fisheries product, which rises the prices. In the islands, particularly of the Aegean Sea, the fisheries sector is relatively a more important one, though regional differences exist. In many of the 'rocky' and dry island, fishing seems to be the only viable activity, with a significant part of the population directly or indirectly engaged in fisheries related businesses. On the other hand, in islands with cultivated land or a developed tourist industry, part of the population is fully engaged in fisheries, with a portion employed in supporting services. In such areas fishing exhibits high seasonallity, in parallel to the tourist industry. Still, however, fishing engages a significant portion of the local population, as the land available for cultivation is generally limited, not allowing a full occupation in the agricultural business while employment in the tourist industry is highly seasonal.

It is important to note that while the 'medium fishery' category contributes most to the total national fisheries production, the 'coastal fishery' category makes a greater contribution with regard to the total employment, as it provides a high number of low paid jobs and –in social terms- is the most important part of the Greek fisheries sector.

1.2. Legislative and administrative framework

1.2.1 Management bodies and procedures

The fisheries management and conservation policy is under the authority and responsibility of the Ministry of Agriculture. The legal framework for regulating all fisheries issues is provided by the Fishing Code (Law Decree 420/70). This decree is actually a compilation of previous laws concerning competent authorities, gear, vessels, fishing practices, fishing seasons, enforcement of discipline, and procedures for the introduction or modifications of rules. Since 1970 the Fishing Code has undergone only minor modifications and improvements, especially with regard to penalty levels and the mechanisms for modifying conservation measures (e.g. Law Decrees 1740/87 and 2040/92). Therefore, it could be stated that the Fishing Code of 1970 still forms the basis of the current Greek fisheries legislation.

The Greek legal system is highly centralised. As the rules now stand, the Directorate of Fisheries, of the Ministry of Agriculture, investigates the various problems of fisheries and the management requirements and suggests to the Minister of Agriculture a 'Proposal' for a Presidential Decree (the 'Proposal' may be concerned with the introduction of new measures or the amendment of existing ones. The Minister first requests the opinion of the Fisheries Council, an advisory committee consisting of 7 members (representing the Minister, the Directorate of Fisheries, the National Centre for Marine Research, the Panhelenic Association of Ichthyologists, the Ministry of Merchant Navy Marine, the Legal Council of the State and the Panhelenic Confederation of Unions of Agricultural Cooperatives). The Minister then requests the Legal Council of the State to express opinion on conformity with general legislation and previous fisheries legislative provisions. If the opinion is positive, the Proposal takes its final form and is signed by the Minister of Agriculture (and by the Minister of Merchant Navy Marine if it concern aspects of the prosecution and law enforcement policies). Subsequently, the proposal is signed by the President of the Republic and is published in the Official Journal of the State.

The local fisheries authorities (Prefecture Inspectorates of Fisheries) do not have direct legislation-making powers. Even when the need for measures of strictly local interest arises, the decrees are issued through the procedure described earlier. In practice, the Prefecture Inspectorates make all the assessments necessary for the proposal of local measures and elaborate the plan for the new Decree, which is forwarded the Directorate of Fisheries for further action.

In the past, attempts were made to decentralize the system through providing legislation- forming powers to the Prefectures for issuing local Decrees. These attempts however, failed due to problems arising from legislative discrepancies and conflicts between the fishermen. In many cases the Prefecture issued measures were in favour of local fishermen, i.e. by reducing access to the local waters of trawlers originating from other areas. Such measures gave rise to serious conflicts among fishermen from different locations. Unable to resolve this situation, the central authorities decided to

remove the legislation-forming previously granted to the Prefectures. This decision can be characterised as the easiest way to avoid a conflicting situation difficult to solve. In 1993, however, the Prefectures were granted again the authority to issue "local" measures, such as seasonal bans or prohibitions of some gear, but only for situations requiring an urgent action in order to preserve the stocks, and for a period never exceeding one year.

1.2.2 The inspection and prosecution policy

Surveillance and the prosecution policy is under the authority of the Ministry of Merchant Navy Marine. The responsibility for controls and enforcement of discipline has been transferred to the patrol services (port authorities/ coastguard), which are located in all important navigational and fisheries ports of the country, and fall under the same Ministry jurisdiction.

In line with the current legislation (article 9 of Law Decree 2040/92), violations of fishing regulations in marine areas can be ascertained only by the coastguard patrol officers. Sanctions are imposed by decisions of the head-officer of central or local port authorities. The decisions must be justified and are issued after receiving the plead of the offender or after the period of time given to him in writing for pleading has elapsed. The sanctions are of three kind: fines, temporal or permanent suspension of the fishing license, and confiscation of any illegal equipment. The fisherman has the right to make, within 15 days from the notification to him of the first degree decision, an appeal for a re-examination of his case (at a second degree) by the Fisheries Council.

The suspension of the fishing license (individual-vessel) is taking place after the legal time available to the offender to appeal is elapsed. In case that an appeal is made, the suspension of the license starts after the appeal is rejected and the rejection is notified.

1.2.3 Management and conservation rules

The Greek fisheries legislation contains a great variety of conservation/management measures which can be broadly be separated into two major categories: those aiming to keep fishing effort under control, and those aiming to rationalise the exploitation of the resources. The first set of measures contain restrictions on the number or fishing capacity of the vessels. The second set of measures contain provisions on gear, fishing practices and fishing areas or seasons, and are commonly known as technical measures. The Greek legislation does not contain provisions on catch limits (TAC's) and discards or by-catches, which are extensively applied in the Atlantic.

Until 1994, the Mediterranean was not included in the EU Common Fishery Policy on aspects of resource conservation and management. The conservation of resources was left to the national jurisdiction and it was only the problem of fishing capacities that was

tackled within the EU through the Multi-Annual Guidance Programmes and structural aspects of the Common Fisheries Policy.

Following the political decision to extent the Common Fisheries Policy in the Mediterranean (Council Regulation 1624/94), a set of provisions that specifically apply in this region have been introduced. Central elements of the Mediterranean CFP are the monitoring of fishing effort, the restriction of access to the stocks and the application of a set of common technical measures. The technical measures are obligatory and are enforced in addition to the national measures. With rare exceptions, the Community measures complement and extend provisions already existing under the national fisheries policy. Only few of these measures have a direct relevance to the net-longline fishery, which is the principal component of the coastal fishery (e.g. rules on landing sizes). However, some provisions have a great indirect relevance because they concern competing fisheries, as for example the articles of the above regulation that call for the abolishment of beach-seiners by the end of 2001 and a prohibition of trawling in the 3-mile coastal zone or within the 50 m isodepth.

1.2.3. A. Measures controlling fishing effort

Measures restricting effort were gradually introduced during the evolution of the Greek fisheries policy. Some of these measures aim at controlling the number of fishing vessels, through a licensing system, and can be characterised as direct measures. Other measures aim at controlling the fishing capacity of individual vessels, through engine power and tonnage limitations, and can be characterized as indirect. Note that the Greek management system does not include limitations on amount of catches or gear and on time spent fishing (e.g. length of nets, number of hooks per longline on board, catch limits, number of exits or duration of fishing expeditions, etc).

Under the existing regulations, two types of licenses are required for practising professional fishing: an individual (fisherman's) license, and a boat license. The first type of licenses are issued by the port authorities. Such licenses are not difficult to obtain, and do not actually restrict effort. In fact, these licenses play the role of the fisherman's identity card. The criterion required for their issue is the professional engagement in fisheries, which is ascertained by membership in a local fisheries association, and in the absence of it, in an agricultural association. This criterion is very loosely applied. As a result, an enormous number of individual fishing licenses have been by issued to persons who, by professional and social standards, should not be allowed with a license.

The second type of licenses comprise the only effective "limited entry" scheme to the fisheries. The vessel licensing system is based on the principle "one license for a specific gear", which implies that any professional vessel should be equipped with only one license. However, vessels which had been equipped with more than one licenses before this legislation came into force have been allowed to maintain the advantage of using two or more gear. Netters and longliners are allowed to use both nets and longlines, as well as certain other "coastal" gear, such as traps, harpoons and lines.

Vessel licenses are issued by the Prefectures, are renewed every two years, and are transferable, along with the vessel. Registers of fishing vessels are kept by the port authorities.

Brief mention should be made to the licensing system for sport (recreational) fisheries. Licenses are issued on a simple application by the port authorities without specific requirements for their acquisition or any limitation concerning the characteristics of the vessel. They are renewed every two years.

Below, reference is made to the most important effort-restricting provisions of the Greek legislation by type of fishing activity.

1.2.3. A.i Coastal fisheries

Up to 1988, there were no restrictions on the issue of licenses for coastal fishing vessels, except for beach-seiners. Restrictive measures on beach-seiners were introduced in 1979, and these were accompanied by limitations on technology and capacity (beach-seiners are not allowed to have an engine power higher than 150 HP). In addition, beach-seiners were excluded from any kind of national or Community financial aids (except for withdrawal). As a result of such measures, the number of beach-seiners is constantly declining, but at a low rate. The reason is that because beach-seining is a profitable fishing activity, quite old vessels are kept into operation through careful maintenance. Now, less than 540 beach-seiners remain active. In their majority, these are obsolete and small vessels (6 to 10 m). Strong incentives are being granted under the programme PESCA for their withdrawal.

As far as other segments of the coastal fishing fleet are concerned, until restrictive measures were enforced, there was a steady increase in the number of fishing units. Between 1983 (when Greece joined the EU) and 1988, the average rate of increase of the number of coastal fishing vessels was about 6.1 % per year. The highest rate of increase was observed towards the middle of the last decade, and can be attributed to two factors: first, the existence of favourable financing opportunities for the construction of coastal vessels from national grant support programmes (Law Decree 1262/82); and second, the enforcement of stricter regulations to sport fisheries (Presidential Decree 373/85). In the absence of restrictive policies for entry to the coastal fisheries at that time, the restrictions imposed to the sport fisheries encouraged many sport fishermen to apply for a professional fishing license in order to maintain the right of using professional gear.

The restrictions on fishing licenses for coastal fishing vessels that were introduced in 1988 had an immediate inhibiting effect on the rate of increase of the fleet. Indeed, the average rate of increase between 1988 and 1990 dropped to about 2.6 % per year. On 1 July 1991 a general ban on the issue of new fishing licenses was implemented. This effectively means that new entrants may start fishing activity by acquiring an existing

licensed vessel (however, licenses for new vessels can be granted if the obligation of the country to reduce the capacity of the fleet, in accordance with the MAGP, has been satisfied). This ban was accompanied by two additional measures:

1) Measures of social character (vessel owners are not allowed to sell or transfer the vessel to persons who are not professionally engaged in fisheries themselves).
2) Measures preventing the expansion of fishing effort (vessel owners are not allowed to replace their engine with another of higher power, neither to replace their boat with another boat of a higher tonnage or a higher engine power).

The Administration has adopted the opinion that the number of Coastal fisheries vessels is not in balance with the availability of resources. In line with the MAGP, a restructuring programme for the Coastal fisheries has been designed based on permanent withdrawals, new constructions and a limited number of modernisations. The objective is to reduce the fishing effort of the segment of the fleet, of the vessels with length less than 12 m, by 3.6% in terms of engine power and tonnage by the year 2001. There is however, no zonal plans for the restructuring programme have been defined.

One difficulty towards the achievement of the restructuring objectives was how to monitor the reduction of the fleet. When the restructuring programme was effected, the capacity of most vessels of the coastal fisheries fleet in tonnage units was not registered (there was only an indicative "below 5 GRT" note). In addition, there were no accurate data on the engine power of many vessels. To solve these problems, a census of the fishing fleet took place in 1988, during which the engine power and tonnage characteristics of all vessels were recorded. It was decided the monitoring to be based both on engine power and on tonnage.

The objectives of the MAGP for the year 2001 have already been satisfied. To achieve these objectives, a significant number of permanent withdrawals took place, accompanied by the construction of fewer vessels. The greatest difficulty was to reduce the engine power of the fleet. Accordingly, a "status-quo" was introduced, with reference point the year 1988. In practice, vessels were obliged to have an engine of lower or equal capacity as the one registered in 1988, effectively meaning that the vessel owners could not replace their engines with others of higher power.

1.2.3. A.ii Medium fisheries

A limited entry scheme to the Medium fisheries was introduced in 1986. This scheme has generally been effective, preventing the uncontrolled increase of the number of vessels. A complete prohibition of the issue of new licenses has been enforced in 1988. However, the total engine power and tonnage of the medium fisheries vessels has increased significantly since then, due modernisation and reconstruction of such vessels, especially so after the middle of the 1980's.

In addition to the limited entry scheme, capacity limitations for both trawlers and purse-seiners also exist. Trawlers are not allowed to have an engine power higher than 500 and purse-seiners are not allowed to have an engine power higher than 300 HP.

Minimum vessel dimensions are determined by Law Decree 666/1966 which specifies among others that for trawlers, length between perpendiculars should be at least 14 m and the engine power should exceed 80 HP. A very small number of trawlers with a length 10 – 14 m which had been constructed before the above Decree came into effect are kept into operation. The same Law Decree 666/1966 specifies that purse seiners should be at least 11 m in length between perpendiculars and their engine power should exceed 30 HP unless the vessel was constructed before the above mentioned Decree came into force.

The administration has adopted the opinion of the EU services that the capacity of the trawling fleet is not in balance with the availability of resources. It is the scope of the long term management policy to reduce the fishing effort of trawlers by 20% by the year 2001, through withdrawing operations accompanied by a limited number of modernizations and construction of fewer new vessels of equivalent total engine power and capacity, but which will satisfy the present-day requirements of safety, hygiene and preservation standards. These objectives have not yet been satisfied.

1.2.3. A.iii Sport fisheries

The first legislation regulating sport (recreational) fisheries appeared in 1985 (Presidential Decree 373/85). Previous to that, recreational fishermen had the right to use all types of fishing gear available without any restriction. The legislation does not introduce limitations on the number of licenses to be issued or the capacity and engine power of recreational fishing vessels.

1.2.3. B. Measures controlling fishing activities (Technical measures)

The technical measures comprise an important part of the Greek management/ conservation system. Such measures may deal with gear specification, gear deployment, fishing techniques and fishing seasons or areas However, in the absence of adequate results from scientific investigations on spawning or nursery grounds, maturation sizes, mesh selectivity studies, etc., the adequacy, effectiveness and suitability of many of these measures have yet to be verified.

As Greece has not defined an Exclusive Economic Zone, the technical measures are applicable for the fishing activities conducted in the territorial waters (6 miles). Note, however, that in most regions, fishing is practically restricted within the six mile zone due to extremely narrow continental shelf and slope.

The existing technical measures can be separated into nation-wide and local. As the names imply, the first have a general applicability over the whole country, while the second concern a specified geographical area. Almost all measures refer to particular gear or fishing techniques except those concerning minimum landing sizes, which apply to all gear. The most important provisions by fishing category and gear are described below.

1.2.3. B.i Coastal fisheries

For the majority of the coastal fleet, which consists mainly of bottom netters and longliners, there are not important nation-wide restrictions, except those concerning landing sizes. Thus, there are no nation-wide regulations on mesh size or hook size, distance from shore or from home port, depth of fishing, seasonal or geographical prohibitions of fishing, etc. However, there is a general prohibition of certain gear throughout the country (e.g. midwater trawls, drift nets, nylon nets and small surrounding nets). There is also a general ban of some gear in estuaries, mouths of lagoons, other ecologically sensitive zones and ports, as well some minor restrictions on gear deployment, such as in the production of noise in order to drive fish towards the nets.

For some specialised branches of the coastal fisheries, more severe nation-wide limitations exist. Thus, there is a general ban of fishing with beach-seiners from the 1st of June to the 30th of September, and of fishing for swordfish with drift-longlines from 1 October to 31 January.

In many areas, especially productive gulfs, there are locally applied measures. These measures have been introduced through Presidential decrees and may concern gear types or gear specifications, fishing areas or seasons, mesh sizes, etc. Some gulfs are permanently closed to the beach-seine fisheries.

1.2.3. B.ii Medium fisheries

The Medium fisheries sector is subject to more severe restrictions in comparison to the Coastal fisheries one. Under the national legislation, demersal trawling is generally prohibited during the summer period (from 1 June and 30 September) and within the one mile coastal zone (in river estuaries the trawling prohibition is three miles from the shore). In some regions, the seasonal ban is longer, and can reach up to 6 or 9 months. Some gulfs or sections of these are permanently closed to the trawl fishery.

Under the provisions of article 3, par 1, of Council Regulation 1626/94, the prohibited fishing zone for trawlers has recently extended to 3 miles in all areas. Trawl fishing is also prohibited within the 50 m depth contour line. Under article 6, par. 1 of Council Regulation 1626/94, a minimum trawl bag mesh size of 40 mm stretched has been introduced, which is much higher than the 28 mm mesh size provided under current national rules.

For purse-seiners, a seasonal fishing prohibition (from the beginning of December to the end of February) was introduced in 1991. In addition, for purse-seiners operating at night, fishing is prohibited within the 100 m from the shore or within the 30 m depth contour line. The allowed minimum mesh size is 14 mm for night purse-seiners and 40 mm for day purse-seiners.

1.2.3. B.iii Sport fisheries

The recreational (by boat) fisheries sector is subject to all conditions which apply to professional fisheries and additional ones (specified in the Presidential Decree 373/85). There are no specific provisions concerning fishing practised from the shore.

Regarding fishing with a boat, there are limitations on the type and amount of gear and on the daily catch. The following is a synopsis of the most important effort-limiting measures:

- Trammel nets are forbidden. Gill nets should not exceed 100 m in length per boat, with minimum mesh size 24 mm. Fishing with nets in May is prohibited.
- Longlines should not have more than 150 hooks per fisherman on board. The number of hooks per boat cannot exceed 300, independently of the number of fishermen. Fishing with longlines in May is prohibited.
- Only two fishing traps per fisherman on board are allowed; the mesh size of the traps must exceed 40 mm, from knot to knot. Harpoons, scoop nets, handlines, fishing poles, and other hooked gear are not subjected to specific limitations or restrictions.
- The daily catch per fisherman must not exceed 5 kg (unless a single fish exceeds this limit). An exception exists when a fisherman is using nets or longlines, in which case the catch must not exceed 10 kg per day.

In addition, there are limitations concern the disposal of sport fishery products (fish cannot be sold), the use of light (the use of light is prohibited except when fishing is operated with a harpoon and when the light is diffused and its intensity is less than 500 lux) and underwater fishing (fishing by diving is prohibited in May and after sunset; diving fishermen are not allowed to use breathing devices, to employ nets, to catch fish smaller than 150 grams, to use light, and to employ certain types of spear-guns).

In practice, the enforcement of these measures has been extremely difficult, due to the enormous number of sport fishing boats (about 70,000 boats in the country) and to the fact that the extremely long coastline does not allow effective monitoring of the fishing activities, controls on gear and inspections of catches.

1.3. The 'under 20 HP' sector

Within the 'coastal fishery' category is included the 'under 20HP' fleet. Its regional distribution, reveals that vessels of engine power under 20 HP are dominant both in numeric and proportional units in most island areas (Chios, Lesvos, Kefalinia, Kerkyra, Lefkada, Kyklades, Samos, Zakynthos) and in mainland coastal areas with protected gulfs or lagoons (Argolida, Etolia/Acarnania, Fthiodida, Magnisia, Messinia, Preveza). By contrast, the proportion of these small-engine vessels is lower near big towns with extensive port facilities (Thessaloniki, Pireas, and Patras). This section, out of the total national fisheries sector, makes a significant contribution to the total fleet, in terms of numbers of vessels and employment. On the other hand, its contribution to the total tonnage and engine power of the fishing fleet is relatively low.

The Greek fisheries statistical recording systems insufficiently monitor the segment of the fishing fleet composed by vessels of registered engine power below 20 HP. In fact, this segment is totally neglected in the official monthly sampling surveys conducted by the National Statistical Service of Greece (NSSG). The only data available, can be indirectly obtained through the data and information of the 'Yearly Crop and Livestock Production Survey', an annual investigation executed by the NSSG which evaluates the gross assessments of active fishing vessels and volume of products.

However, in qualitative terms, the statistics produced by the 'Yearly Crop and Livestock Production Survey' is considered as quite poor and not readily reliable. (*See Integrated Fisheries Information System for the Mediterranean: Design of a Scientific and Technical Observatory in Greece; EU contract TR/MED/92/021 - March 1993*). The methodological approach employed for the collection of the data is highly biased and subjective, reducing –in effect- the estimates to rough guesses, or mere indications at the best. In practice, neither the evolution of the fleet is statistically monitored, nor the production actually measured. Assessments of the number of fishing vessels are provided by the secretariats of the municipalities and communes. The production is estimated simply by multiplying the number of vessels by the assumed annual average catch per fishing vessel (calculated over the period 1964-1970!). This average (*approx. 2 tons/vessel/year)* has been assumed stable since then, despite the drastic changes on the fishing effort and efficiency that have occurred by the introduction of modern fishing technology. Other important statistical parameters such as seasonallity of fishery, value indications, employment status, composition of the catch, and other, are being grossly overlooked in these investigations.

For an efficient evaluation of the sector, it becomes imperative that its economic importance is not underestimated. Based on the results of the fisheries census conducted in 1988, this fleet amounted 12133 vessels, more than 50% of the professionally operating fishing vessels in Greece. To these must be added an unknown number of fishing vessels with outboard engines, some of which are equipped with a professional license, the activities of which are practically out of any statistical control.

1.4. Objectives of the program

The "under 20 HP" sector of the fishing fleet plays an important role in the employment and the social structure of particular regions. It contributes significantly to the regional economy, especially in isolated coastal or island communities where alternative employment possibilities are limited or highly seasonal. Moreover, it is intimately but inexplorably linked with other important economic activities (tourism, agriculture, aquaculture, etc.). Because very little statistical information is available on the operational aspects of this fleet, this study aimed at gathering information on a number of critical issues associated with this fishery –as described below- using inventory data and low-cost sampling techniques:

1. Size of operational fleet and seasonal and geographic distribution of the fishing effort.
2. Employment status (part-time and full-time employment).
3. Production characteristics.
4. Conflicts and links with other economic activities and potential uses of coastal waters.

In addition, the study aimed at examining the influence of restrictive measures imposed by the conservation policy towards the increase of engine power of individual vessels for the purpose of maintaining the status quo in the fishing capacity of the fishing fleet. These measures have an especially adverse effect on the viability of small fishing units and give rise for a serious dissatisfaction of fishermen with the national and EU fisheries policies.

2. MATERIALS AND METHODS

2.1. Methodological approach

For the operational requirements of the current program, the following methodological approach was employed, in an effort to achieve an optimum allocation of the available resources towards an efficient and successful accomplished of the proposed tasks.

2.1.1 Collection and evaluation of the existing statistical information

Published and unpublished data-sets and time-series information concerning the "under 20 HP" sector of the fishing fleet were collected and a general database was established. Conceptual aspects and issues of methodology in data collection and processing were analysed and the quality of the statistics produced was evaluated.

The methodology for this task included:

- identification of sources of relevant statistical information and brief description of the methodological and operational aspects of the survey systems;
- evaluation of the coverage, completeness, quality and reliability of the existing datasets;
- estimation of the number of fishermen and fishing vessels with engines below 20 HP by geographical area and at national basis;
- comparisons of the numbers of fishermen and vessels below 20 HP with those having larger vessels.

2.1.2 Construction of an area-sampling-frame of fishing vessels below 20HP and supporting enumeration maps using inventory data

A detailed computerised area frame of the survey fishing fleet has been prepared providing information on the number of the fishing vessels with an engine power below 20 HP on a "registration port" basis. Enumeration maps have been constructed showing the location of each port. Finally, statistical measures were calculated showing local densities of the survey fishing vessels and its large scale pattern of spatial distribution.

2.1.3 Design and execution of field surveys for data collection

Certain aspects of the 'under 20HP' fishery sector, including effort, catches and social parameters, are insufficiently covered by the existing national survey systems. This lack of reliable data from inventory statistics, coupled by the widespread distribution of the recreational fishing activities, rendered imperative an extensive field investigation, in order to acquire the desired information. The investigation was undertaken with a two-fold objective in mind, to arrive at assessments of the productive capacity of the "under 20" segment of the fleet and to obtain a better understanding of the socio-economic framework of this fisheries sector.

Specific targets of the investigation were:

√ Evaluation of fishing periods and frequency of fishing 'outings'.

√ Gear employed and species caught.

√ Assessments of effort (in terms of days spent fishing) and of the geographical and seasonal distribution of effort.

√ Assessments of the average daily, seasonal and annual production (per vessel) that could provide rough approximations of the volume of production of this particular fishery.

√ Distribution of the landings.

√ Importance and contribution of the study fishery to the local economy and social life.

√ Identification of the most important conflicts of interest with other fisheries sectors.

√ Attitudes and perceptions towards the overexploitation problem.

√ The perceptions of fishermen on the effectiveness, usefulness and weakness of the management rules, the degree of compliance with the discipline rules and the efficiency of the detection and prosecution policy.

√ Constraints regarding the implementation of the law. - The most common evasive strategies.

√ Suggestions for modifications and improvements in legislation.

Two approaches were followed for obtaining data on the productive capacity and the socio-economic elements of the study fisheries: a routine monitoring of the activities of a number of fishermen, and open interviews.

➢ The **monitoring** was performed under the perspective of obtaining quantitative data on production and effort, ascertaining the economic basis and technical aspects of the study fishery, and assessing the diversity of fishing practices. For this purpose, specific manuals for the recording of information were designed. These were addressed to individual fishermen of the ten areas and were filled-in at a fortnight basis.

- The **interviews** were undertaken with the perspective of a sociological analysis focusing on public policy, assessment of the grounds of conflicts with other fisheries categories, and other social aspects. The interviews were held with the presidents of fisheries organisations as well as with individual fishermen from different areas, representing different social groups and types of activities. Interviews were also held with administrative authorities (fisheries officers at local and central services), who were asked to comment on the fishermen's claims and allegations.

The two approaches have provided complementary and partly independent information, the first focusing on the quantitative aspects of the small-scale fisheries, and the latter paying attention to problems, conflicts and other qualitative aspects. These approaches were employed in a limited number of areas, nevertheless considered as representative of the geographical and socio-demographic profiles of the country.

2.1.3. A The monitoring approach

A low-cost, large-scale survey was designed and executed for the collection of sample data on activity, daily catches, production and other related items. Research effort was more sharply concentrated in a limited number of areas (ten in total) where the "under 20" segment of the fleet is well developed and/or it was possible to establish contacts with suitable enumerators and fisheries organisations. The survey was –in its greater part- conducted through the cooperation of the field staff of the Agricultural Bank of Greece (ABG) and lasted one calendar year (January 1999 – December 1999).

(Appendix I, describes in detail the process for the identification of the potential survey areas, the establishment and inclusion of the fishing vessel within these areas, the execution the surveys these, as well as other methodological details).

Ten (10) areas were finally evaluated and surveyed for the routine collection of data of socio-economic and bio-ecological importance. These areas represent big urban centres, medium size towns, agricultural regions, big and small fishing centres, tourist centres, islands heavily dependent on fisheries, etc. where the possibility of space or resource use conflicts make them of particular interest to the study. The geographic location of these ten areas is illustrated in Fig. 1.

A basic manual for field recorders was prepared and distributed to the local enumerators, the structure and content of which (information sheets) also appear in Appendix I.

Finally, a user-friendly database was designed and installed, and the data of the sample surveys were recorded. When data entry was complete, a data processing program was 'written' for data analysis. Details of the database environment are given in Appendix II.

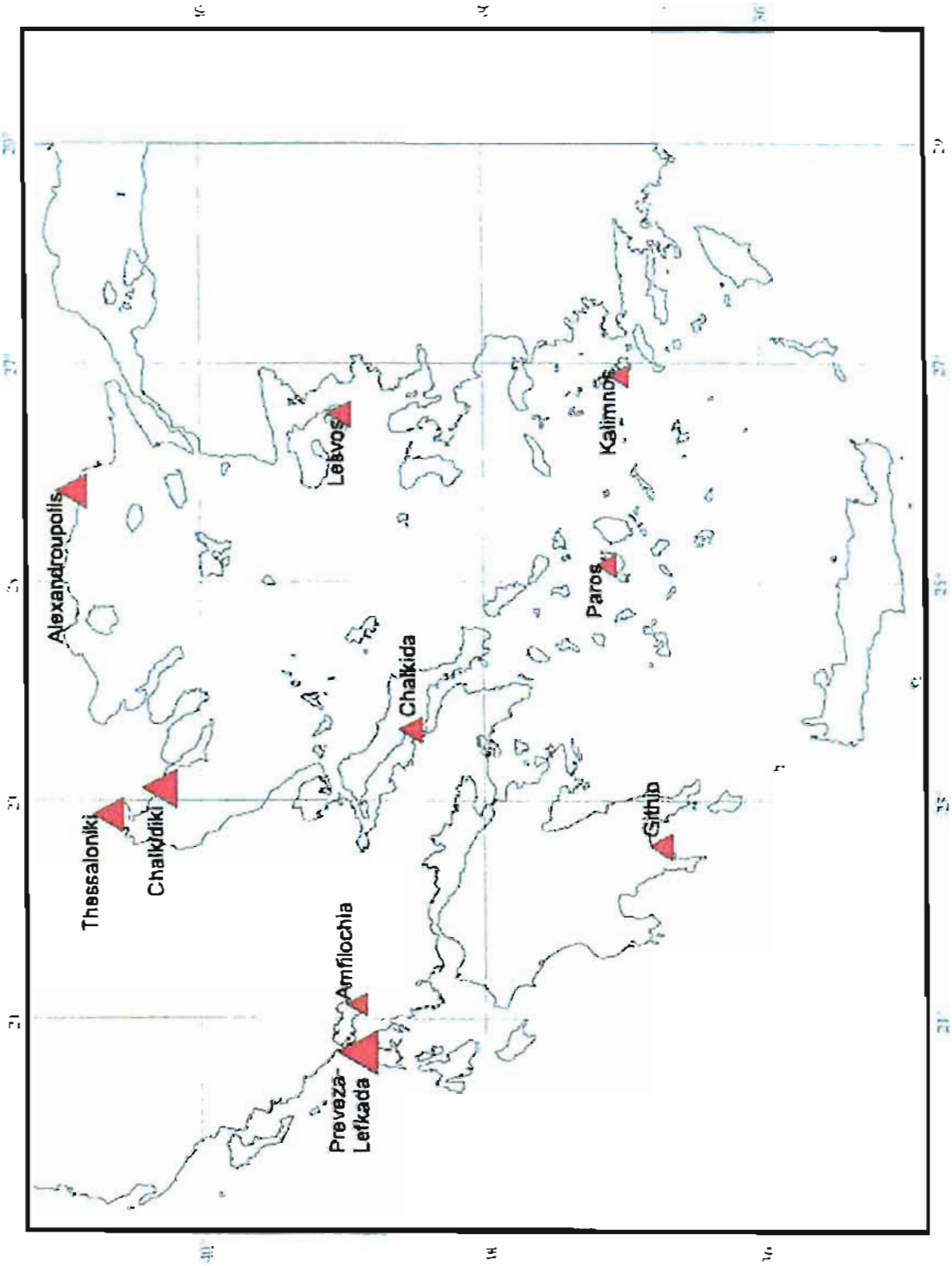

Alexandroupolis
Lesvos
Kalimnos
Paros
Chalkida
Thessaloniki
Chalkidiki
Gytho
Amfilochia
Preveza-
Lefkada

Figure 1

2.1.3. B. The interviewing approach

Face-to-face interviews were held with fishermen representing professional fisheries organisations (associations and cooperatives), as well as with relevant administrative authorities. During the interviews the project researchers attempted to get an insight into the fisheries practised with vessels below 20 HP with respect to its size, undertakings, economic and social elements, problems and relationships with other economic activities. The researchers also examined certain issues of raised debate, and eventually of conflicts, with other fishing categories and users of the coastal zone, by theme and by region. Such an issue of significant importance, was the suspicion of engine replacement by stronger ones. Though not openly nor directly stated, it became quite apparent, during the course of the project, that a number of fishermen had replaced their engines. It was therefore within the intentions of the interviewing-approach method to surface the reasons behind such actions.

In total, nineteen (19) fisheries organisations, located in different geographical areas and representing different fishery characteristics were finally selected for the investigation. The selection was based both on previous experience and on information from central administrative authorities and local fisheries inspectorates, which were consulted during the selection process. The geographical location of these organisations is illustrated in Fig. 2

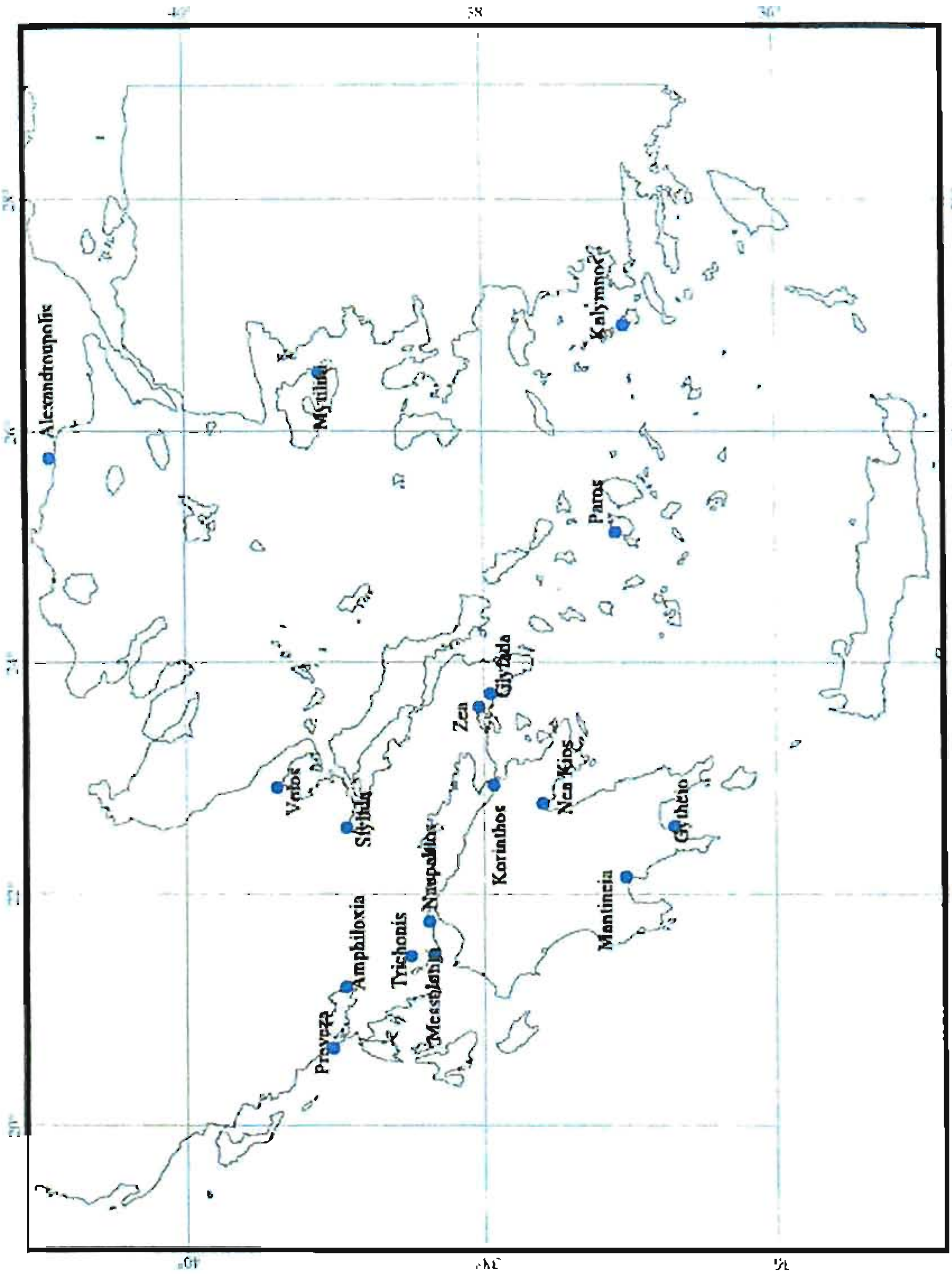

Alexandroupolis
Mytilini
Kalymnos
Paros
Glyfada
Zea
Volos
Korinthos
Nea Kios
Gytheio
Amphiloxia
Trichonis
Mesolongi
Preveza

Figure 2

2.2. Deviations from, and modifications to the original work programme

During the exploratory, as well as the implementation, phase of the project, a number of problems arose. It was therefore considered imperative for certain deviations and modifications to take place in order to ensure the successful development of the program.

In particular, as stated in the interim report (June 1999), the actual field operations only began on January 1999, instead of September 1998 as had originally been planned, due to the difficulties encountered to locate suitable and reliable enumerators. More specifically, problems were faced in identifying a sufficient number of experienced field collaborators for a number of selected ports with important development of fishing activities with vessels below 20 HP, as well as ensuring the co-operation of a sufficient number of local fishermen in the investigation.

Because of the afore mentioned problems, it was not possible, initially, to locate more than six areas satisfying all criteria set for the selection of sampling areas. It was then decided to search for areas not representing single ports, but two or three adjacent fishing places, which altogether yielded a sample of at least 10 fishermen. Through the co-operation of the local inspectorates, two such areas were identified (Preveza, Chalkidiki) and were included in the investigation, which started in January 1999. In all these areas, the geotechnical inspectors of ABG were to act as the local co-ordinator for the activities required.

In order to complete the sample size of fishing areas to the required number of ten, an effort was made to identify two additional ports suitable for the scopes of the investigation in areas other than those in which the co-operation of the staff of the ABG was feasible. Two such areas were identified, Lesvos and Alexandroupolis. The first represents three adjacent fishing places, and the co-ordinators selected were the presidents of the local fisheries co-operatives. The inclusion of these areas in the sampling scheme started at a latter stage (March 1999). However, the fisheries co-operatives in these areas have been collecting fisheries data on a constant basis for the past few years. It was therefore considered that the data concerning the period January - March 1999 were indeed applicable to the database designed for the present investigation.

These modifications, as dictated from the constraints described, resulted in a three-month delay of the submission of the interim report and required an overall readjustment of the original timetable. Taking into account the need for a three-month period after the end of the field survey (December 1999) for data processing and analysis and the subsequent writing and editing of the final report, a shift of the date of submission of the draft final report from December 1999 to 30 April 2000 was requested and granted.

Following the Interim report and its Addendum, an additional change had to take place, with regard to the sampled areas. In detail, the area of Salamina had to be taken out of the survey scheme, due to the high unreliability of the initial data which were initially obtained (with significant delay) from the local enumerator. Fortunately, good co-operation had been already established with local fishermen and researchers from the area of Githion (Southern Peloponese). A fisherman was therefore located, who under the instruction of local research scientists, had been collecting detailed time series fisheries data. Following a prompt evaluation of the methodology employed for the collection of these data, it was decided that the latter region be included in the survey, thus covering a significant area of the national small-scale fleet.

A further modification dealt with the methodology for more accurate and reliable data. More specifically, instead of monthly recorded information, it was decided that the questionnaires should be filled on a fortnight basis, for the reduction of possible memory errors from the fishermen.

A last problem concerned the validation and revision of the existing datasets and time-series information. The initial was to use the sample estimates obtained from the present survey for the validation of the of the existing datasets and time series. More specifically, it was planned to use the tabulated estimates of landings from the sample surveys in order to test the accuracy of inventory statistics on production, and if possible, to make a an assessment of the gross and net errors of the available datasets and a revision of the existing time-series.

This task however, faced two kinds of difficulties. The first was the finding the data on landings provided by the NSSG are not the product of sampling and statistical procedures, but rather the by-product of the assessment of fleet size, therefore not reliable for such a correlation and comparison (see Appendix IV). More specifically, it is not possible to make appraisals of errors and biases introduced during the processes of data collection and treatment, simply because the NSSG data are out of any statistical control.

The second difficulty relates to the inaccuracy of the registry data concerning the number of "under 20 HP" vessels, one of the two parameters required for the evaluation of the 'national production' from these vessels. However, while the data concerning the catches of vessels below 20 HP obtained during the course of the project were considered quite 'accurate', the national registry data concerning the size of the fleet under examination were evaluated and considered as biased and unreliable. The main biasing reason lies in the fact that the official registry data refers to the recorded 'nominal engine power' which, as was found during the course of the project, could be far different than the 'actual'.

Nonetheless, under a number of assumptions, the data obtained were extrapolated to the registry data in order to make assessments of the landings of the vessels that are administratively classified – for statistical purposes - in the fleet category "under 20 HP", and which actually refers to vessels with a nominal engine power below 20 HP.

3. RESULTS

3.1 Evaluation of the existing statistical information

3.1.1 Identification of sources of information

In Greece, a number of independent bodies are involved with the collection of fishery statistics, namely fleet size and production volumes. Each of these, has developed their own methodologies and approaches, employing a great variety of data-collecting mechanisms, depending on the segment of the sector targeted.

In brief, these bodies are:

1. The National Statistical Service of Greece (NSSG).
2. The Agricultural Bank of Greece (ABG).
3. The Fisheries Development Company (ETANAL).
4. The Ministry of Agriculture (MA).

(Appendix IV describes in detail the methodology of each of the afore-stated bodies).

Concerning however, the "under 20 HP" it appears that only two bodies collect and process data segment of the fleet: The first is the NSSG, from which of direct interest to the present investigation is the 'Annual Agricultural – Livestock Survey' which provides information on the numbers of vessels under 20 HP, the fishermen involved and their products. Also of some interest, though for purposes of comparison only, is the 'Sea Fisheries Survey for Motorised Vessels' (See appendix IV for details).

The second body of some relevance to the current investigation is the Ministry of Agriculture (MA). The MA has conducted the 'Fishing Fleet Census '88 Survey', and in co-operation with the NSSG, keeps the current registry of fishing vessels. The registry provides information on the number, engine power, tonnage and capacity and technical characteristics of all vessels of the Greek fishing fleet, and also on their crew number. In the context of the present investigation, the registry data can be utilised to estimate all magnitudes which relate to the "under 20" portion of the fleet.

None of the other surveys provide any data of relevance to the scopes of the present investigation. The data of the NSSG's 'Overseas Fisheries Survey' have no direct relevance due to the obvious differences in the engine power. Those of the Agricultural Bank of Greece refer to the whole of the fleet and do not provide separate information on aspects related to large and small vessels. The data of ETANAL refer to landings transacted through the fishing ports, regardless of the number and typology of vessels from which the landings have originated.

3.1.2 Evaluation of the quality of existing statistical information

The methodological approaches of the three relevant types of surveys described earlier provide information of relatively little use for the present study. The reason for this is that the methodologies employed have developed independently of one another, hence have led to the formation of a complex structure of statistical data which are not mutually comparable. The output of these reflect the different statistical objectives and the means available, thus exhibiting significant differences in their accuracy and reliability, resulting in most cases at mere 'guestimates'.

Another reason is that none of these surveys records data on the production aspect of the under 20 HP segment of the fleet, and although the second survey does provide production statistics, the figures are based on a correlation of the size of the fleet and on an assumption that each boat yields about 2 tons annually (based on production estimates from the period 1964-1970 !!).

In conclusion, there is no official body recording -or estimating in a reliable manner- the production of the under 20 HP segment of the national fleet.

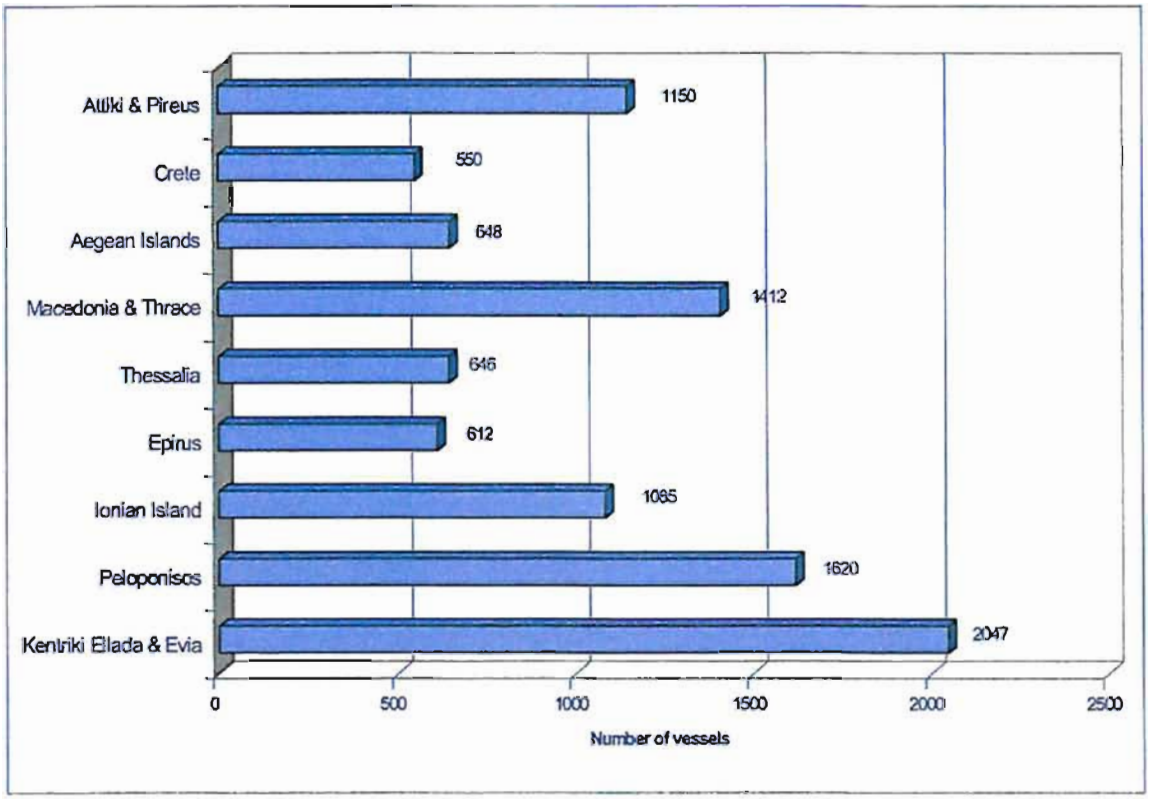
In more detail, the most important deficiencies and limitations of these surveys are described in Appendix IV.

3.2. Characteristics of the "under 20 HP" segment of the fleet

3.2.1 Distribution of the fleet

Table 1 provides the magnitudes of the "under 20 HP" segment of the Greek fishing fleet both by prefecture and over the whole country (total number, tonnage and engine power (HP) of vessels, total crew, and averages of tonnage, engine power, vessel length (m) and crew per vessel). The data refer to the year 1998 and were obtained from the national registry of fishing vessels, which is based on the census 1988 survey, updated since then annually, as already stated. Figure 3 illustrates the distribution of the "under 20 HP" fleet, in Greece.

FIGURE 3: Distribution of the "under 20 HP" fleet by major geographical region.



For comparison, equivalent figures for the whole Greek fishing fleet are given in Table 2. These data also refer to the year 1998 and were obtained from the national registry of fishing vessels. To facilitate the comparison, Table 3 provides for each of the estimated magnitudes the percentage of the "under 20 HP" segment to the total fishing fleet.

It appears from these data that the "under 20 HP" segment makes a significant contribution to the total fleet in terms of numbers of vessels (59.8 %) and employment (45.8 %). However, its contribution to the total tonnage and engine power of the fishing fleet is relatively low (12.7 % and 13.2 % respectively).

As regards the regional fleet distribution, vessels below 20 HP are dominant both in numeric and proportional units in most island areas (Chios, Lesvos, Kefalinia, Kerkyra, Lefkada, Kyklades, Samos, Zakynthos) and areas with protected gulfs or lagoons (e.g. prefectures of Argolida, Aetoloacarnania, Fthiodida, Magnisia, Messinia, Preveza). By contrast, the proportion of these small-engine vessels is lower near big towns with extensive port facilities (Thessaloniki, Pireas, Patras).

Table 1. The characteristics of the "under 20 HP" segment of the fleet by prefecture (Registry data, year 1998)

Nomos	Number	GRT	HP	Crew
Achaia	193	213.07	1710.37	289
Argolida	428	525.67	4019.99	788
Arkadia	77	82.69	696.96	105
Chalkidiki	378	558.88	4028.03	550
Chania	274	383.1	2702.71	565
Chios	414	422.93	3918.81	509
Dodekanisos	641	878.86	6604.98	848
East Attiki	180	214.45	1913.64	312
Etolia and Akarnania	581	540.92	4901.88	815
Evia	858	910.16	7703.65	1172
Evros	133	171.98	1630.59	285
Fokida	129	116.44	1143.38	195
Fthiotida	380	390.34	3575.61	565
Ilia	157	170.94	1367.44	226
Iraklio	130	185.48	1603.74	338
Kavala	224	223.76	1925.44	359
Kefalinia	228	274.56	2118.28	409
Kerkyra	382	424.52	3489.85	719
Korinthia	108	111.26	954.04	149
Kyklades	761	957.34	7423.80	1152
Lakonia	372	358.02	3724.86	488
Larisa	38	17.4	240.14	64
Lasithi	82	107.5	968.51	166
Lefkada	330	344.45	3039.04	396
Lesvos	972	941.4	8905.39	1962
Magnisia	589	589.49	5067.94	851
Messinia	252	288.63	2746.83	412
Pieria	150	101.75	1626.54	213
Pireas	855	1483.09	8592.20	1368
Preveza	552	495.76	4433.69	786
Rethymno	54	49.51	565.91	80
Samos	414	471.88	3750.61	612
Thesaloniki	361	455.66	3929.01	575
Thesprotia	48	56.26	609.66	64
Viotia	63	69.71	701.50	101
West Attiki	128	178.9	1361.96	225
Xanthi	70	68.42	868.74	115
Zakynthos	147	149.71	1323.13	197
Total	**12133**	**13984.89**	**115888.82**	**19025**

Table 2. The characteristics of the total Greek fishing fleet by prefecture (Registry data, year 1998)

Prefecture	Number	GRT	HP	Crew
Achaia	385	2692.64	24884.44	843
Argolida	680	2805.04	23040.77	1540
Arkadia	96	129.75	1417.74	138
Chalkidiki	665	5315.07	42484.46	1509
Chania	441	2819.44	19612.99	1140
Chios	543	2026.56	15325.55	864
Dodekanisos	1264	5480.17	52823.88	2266
East Attiki	404	2108.7	21656.03	890
Etolia and Akarnania	724	1619.71	16974.79	1154
Evia	1440	6796.18	62270.71	2606
Evros	268	2419.13	16570.22	706
Fokida	167	310.02	4445.89	269
Fthiotida	539	1061.06	14245.93	841
Ilia	281	717.59	9131.80	447
Iraklio	231	806.83	8168.00	641
Kavala	410	3986.82	28153.64	1151
Kefalinia	316	635.02	6610.00	598
Kerkyra	560	1279.72	15132.25	1132
Korinthia	183	523.09	5786.15	301
Kyklades	1307	5714.15	49996.00	2485
Lakonia	521	1353.53	12774.55	800
Larisa	41	22.46	372.13	68
Lasithi	122	272	3458.50	267
Lefkada	502	1638.82	15093.56	789
Lesvos	1290	2794.7	30585.41	2890
Magnisia	926	4216.85	38075.03	1715
Messinia	410	1318.84	14244.36	757
Pieria	395	459.86	13806.96	645
Pireas	1740	32134.36	147929.11	5367
Preveza	637	987.86	10045.86	951
Rethymno	88	1204.85	2285.10	151
Samos	574	1719.13	15198.27	1043
Thesaloniki	1275	10051.9	104407.55	3042
Thesprotia	82	122.55	1932.12	125
Viotia	111	221.8	3369.18	187
West Attiki	233	585.12	8134.12	437
Xanthi	207	741.98	10549.39	380
Zakynthos	221	603.02	7409.49	372
Total	**20279**	**109696.32**	**878401.94**	**41507**

Table 3. Percentage contribution of magnitudes of the "under 20" segment of the fleet to the total fleet

Prefecture	Number	GRT	HP	Crew
Achaia	50.130	7.913	6.873	34.282
Argolida	62.941	18.740	17.447	51.169
Arkadia	80.208	63.730	49.160	76.087
Chalkidiki	56.842	10.515	9.481	36.448
Chania	62.132	13.588	13.780	49.561
Chios	76.243	20.869	25.570	58.912
Dodekanisos	50.712	16.037	12.504	37.423
East Attiki	44.554	10.170	8.837	35.056
Etolia and Akarnania	80.249	33.396	28.877	70.624
Evia	59.583	13.392	12.371	44.973
Evros	49.627	7.109	9.840	40.368
Fokida	77.246	37.559	25.718	72.491
Fthiotida	70.501	36.788	25.099	67.182
Ilia	55.872	23.821	14.974	50.559
Iraklio	56.277	22.989	19.634	52.730
Kavala	54.634	5.612	6.839	31.190
Kefalinia	72.152	43.236	32.047	68.395
Kerkyra	68.214	33.173	23.062	63.516
Korinthia	59.016	21.270	16.488	49.502
Kyklades	58.225	16.754	14.849	46.358
Lakonia	71.401	26.451	29.158	61.000
Larisa	92.683	77.471	64.530	94.118
Lasithi	67.213	39.522	28.004	62.172
Lefkada	65.737	21.018	20.135	50.190
Lesvos	75.349	33.685	29.116	67.889
Magnisia	63.607	13.979	13.310	49.621
Messinia	61.463	21.885	19.284	54.425
Pieria	37.975	22.126	11.781	33.023
Pireas	49.138	4.615	5.808	25.489
Preveza	86.656	50.185	44.134	82.650
Rethymno	61.364	4.109	24.765	52.980
Samos	72.125	27.449	24.678	58.677
Thesaloniki	28.314	4.533	3.763	18.902
Thesprotia	58.537	45.908	31.554	51.200
Viotia	56.757	31.429	20.821	54.011
West Attiki	54.936	30.575	16.744	51.487
Xanthi	33.816	9.221	8.235	30.263
Zakynthos	66.516	24.827	17.857	52.957
Total	**59.830**	**12.749**	**13.193**	**45.836**

3.2.2 Chronological trends in the number of fishing vessels

Fig. 4 shows the evolution of the "under 20 HP" segment of the professional marine fishing fleet from year 1984 to 1994 (1994 data have not yet been officially published and were provided to the program on an unofficial basis). The source of information is the 'Annual Agricultural – Livestock Survey' publications of the NSSG. The data refer to:

(a) the number of mechanised marine fishing vessels with inboard engines,

(b) the number of professional rowing marine fishing boats (including boats with outboard engines), and

(c) the number of mechanised and rowing boats operating in inland waters.

Fig. 4 also provides data for the "over 20 HP" segment of the marine fishing fleet for the same period (separately for the total Greek fishing fleet, and for the coastal fleet only). The source of information is the 'Sea Fisheries Survey by Motorised Vessels' bulletins published annually by NSSG.

The "under 20 HP" sector of the fleet has traditionally been greater –in absolute numbers- than the "over 20 HP" sector. The trends exhibited by each sector bear no similarities, reflecting –among others -the independent methods of work and different levels of accuracy of the two statistical systems of NSSG, from which the two sets of information are derived.

It is of interest to notice the sharp increase of the number of vessels "over 20 HP" from the year 1987 to the year 1988 and the stabilisation followed thereafter. The increase seems to reflect the combined effect of:

(a) Restrictions on recreational fisheries which were first introduced by law in the year 1985 (limitations on gear and on production). The introduction of these restrictions prompted many recreational fishermen to apply for a professional fisheries license in the following years in order to retain the right of using professional gear and to avoid limitations on total daily catch.

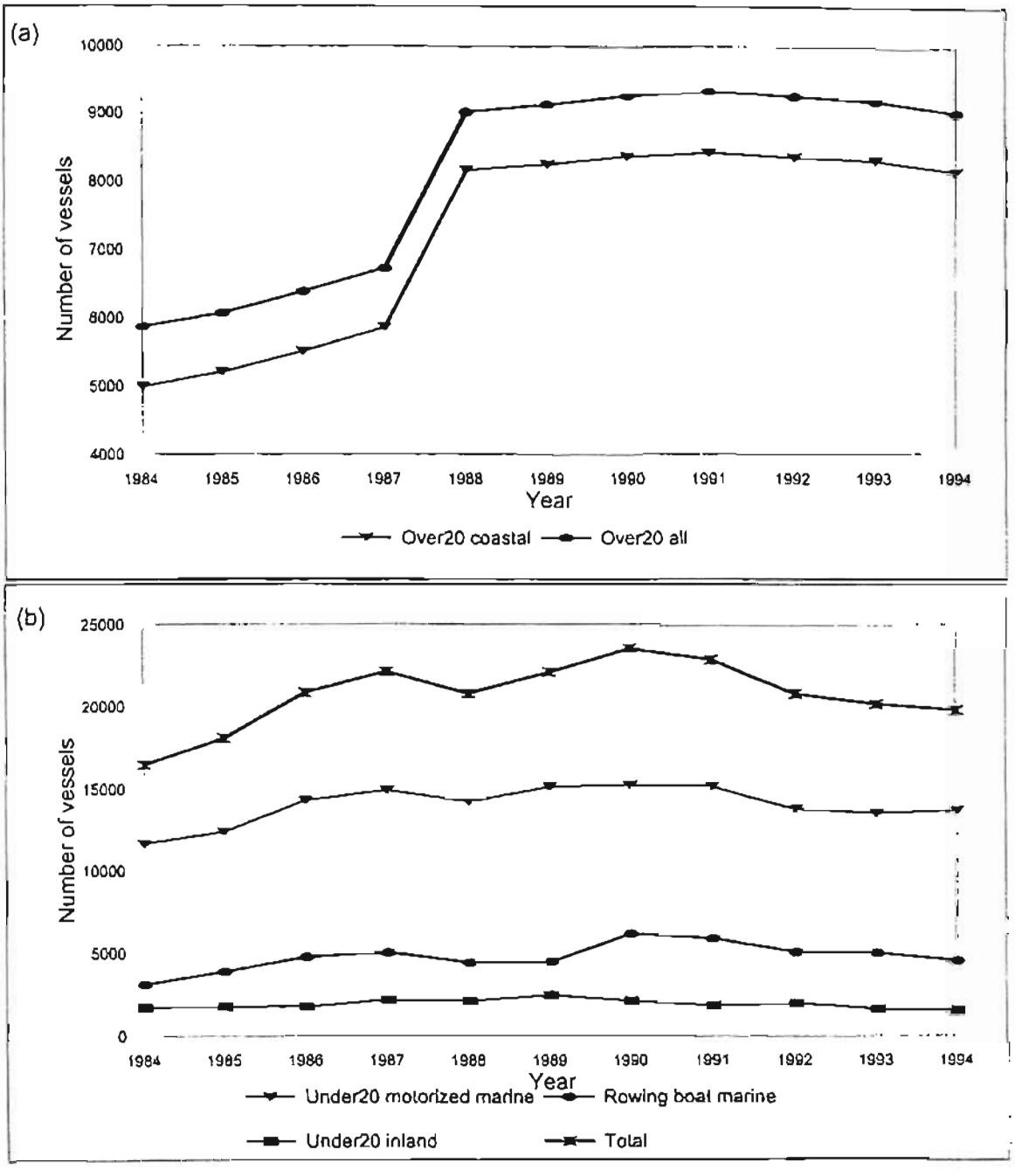
(b) The prohibition on the issue of new professional coastal fishing licenses, which was introduced in the year 1988. This prohibition accounts for the stability of the fleet after the year 1988.

Taking into account that the Sea Fisheries Survey by Motorised Vessels is based on data from the registry of fishing vessels, as well as the fact that there was an improvement of the registry following the execution of the 1988 census, this stability seems to be real, rather than an estimation product. It is notable that the number of vessels "under 20 HP" showed a slight decrease between 1987 and 1988 and some irregularities after 1988. It is possible that these inconsistencies with the data referring to the "over 20 HP" segment of the fleet reflect, at least up to a certain extent, the inadequacies of the survey system of

the Annual Agricultural – Livestock Survey, and also the fact that this system does not utilise data from the registry of fishing vessels.

Fig. 5 compares data on the evolution of the "under 20 HP" segment of the fleet from 1984 to 1997 provided from: (a) the Annual Agricultural – Livestock Survey of NSSG, and (b) the Registry of Fishing Vessels (which is based on the census 1988 survey, updated since then annually). The data of the Annual Agricultural – Livestock Survey show an increase from 1984 to 1987, some variation around this maximum number up to year 1991, and a decrease thereafter. There are only four years (1991-1994) for which comparable data are available from the Registry of Fishing Vessels. The comparison shows that the Registry provides a lower number of vessels, and also that the two data series follow a similarly decreasing trend. This decreasing trend may have resulted from the programme of withdrawals of fishing vessels, which has probably affected more the "under 20 HP" rather than the "over 20 HP" segment of the fleet.

Figure 4. The evolution of the Greek fishing fleet from 1984 to 1994. (a) vessels above 20 HP, (b) vessels bellow 20 HP. Source : NSSG



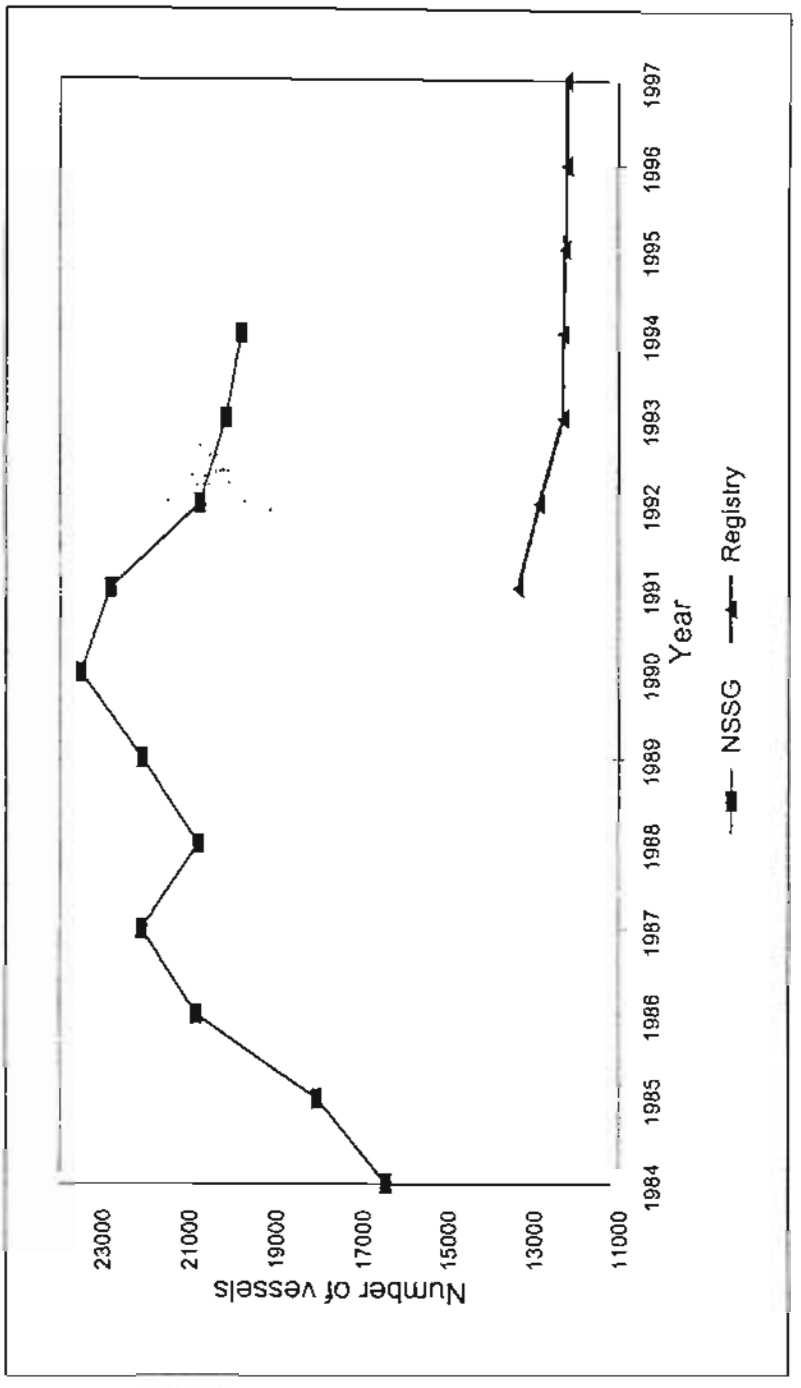


Figure 5. The evolution of the fleet of vessels bellow 20 HP according to the NSSG and to the Registry data

3.2.3 The structure of the fleet

Appendix V shows, for the year 1998, the proportions of the "under 20 HP" segment of the Greek fishing fleet by prefecture, separately for vessels of different typologies (total number, tonnage and engine power (HP) of vessels, total crew, and averages of tonnage, engine power, vessel length (m) and crew per vessel). Table 4, lists the compiled data for the total of the country's fleet, as taken from the registry of Fishing Vessels. From Table 4, it appears that the greatest part of the fleet comprises of vessels employing bottom nets and longlines, in total 9376 out of 12133 vessels. These two passive-gear methods, which target mainly the demersal species are suitable for the rocky bottoms of the Greek seas. Surface long-liners and liners, which target primarily to large pelagic fish, rank second with 1832 vessels. It should be noted, that drift (pelagic) nets are prohibited in Greece.

There is however, some difficulty in interpreting these data, especially due to the occurrence of two trawlers and two day purse-seiners within the group of vessels "under 20 HP". These are open sea large vessels which are normally equipped with strong engines. Either the engine power of these four vessels is mistakenly recorded in the Registry of Fishing Vessels, or these vessels are old and obsolete vessels and probably out of use anymore.

Table 4. The number, tonnage and engine power of vessels below 20 HP by vessel typology. The data refer to the whole country for the year 1998.

Trawlers	2	243.40	11.090	22
Beach seiners	46	125.03	573.14	112
Day purse-seiners	2	78.67	21.10	20
Garfish netters	390	640.90	4034.57	711
Liners	722	745.24	6492.69	1071
Surface longliners	1110	1510.47	11713.90	1969
Bottom longliners	5272	6011.87	52051.10	8657
Troll liners	366	360.78	3160.49	523
Bottom netters	4104	4113.04	36746.00	5670
Traps	43	56.62	434.55	67
Volkoi (traps)	19	13.61	179.69	27
Argalios (dredge)	14	14.84	133.94	21
Other gear	43	70.38	336.60	65
TOTAL	**12133**	**13985.00**	**115889.00**	**19025**

One fisheries sector with which small-scale fishermen are in direct competition with (for resources, fishing areas, mooring places or markets) is the sport (recreational) fisheries. According to a recent study conducted on behalf of the EU *(Sport fisheries in Eastern Mediterranean (Greece & Italy): parameter estimates, linkages and conflict with professional fisheries; EU Project 96/018, July 1999*), the average number of sport fishermen and vessels with authorised licenses for the period 1995-1996 are 96,075 and 71,144 respectively, and the total engine power of the recreational vessels is 1.454.739 HP. It is evident that the sport fishing fleet overwhelmingly exceeds the professional fleet, both in number of fishermen and fishing units, and in total engine power.

Many sport fishermen employ nets and longlines. Inevitably, conflicts with coastal fishermen employing similar gear are frequent. Although severe limitations on the types and amount of gear allowed to be used by sport fishermen are imposed by the legislation, the legislation is inadequately enforced due to inability of the patrol services to supervise the enormous number of fishing places.

As will be discussed in more detail in the main body of this report, small-scale fishermen are also in competition with fishermen using beach-seines. The beach-seines end in a bag of small mesh size, and are hauled with the boat fastened on the shore or close to the shore. However, as already mentioned, it is the scope of the Mediterranean CFP to abolish beach-seiners by the year 2001.

3.2.4 Chronological trends in production

Fig. 6 provides the trends of production of vessels with an engine power below 20 HP for the period 1984-1994, using data provided by the Annual Agricultural – Livestock Survey of the NSSG. Four separate lines have been drawn, accounting for:

(a) the annual production of professional mechanised marine fishing vessels with inboard engines,

(b) the annual production of professional rowing marine fishing boats (including boats with outboard engines),

(c) the annual production of mechanised and rowing boats operating in inland waters, and

(d) the total production of vessels with engines below 20 HP.

For the best interpretation of these data it must be noted that:

- The production of vessels of the first category, in tons, is estimated indirectly, and has been arrived at by multiplying the number of vessels by 2 (under the assumption made by the NSSG that the average annual production of each vessel of this category is 2 tons, see Appendix IV).
- The production of the vessels included in the second and third categories, as given by the NSSG, represent a gross assessment of the products landed both by professional and recreational fishing vessels. Although the numbers of professional and recreational vessels are provided, the data available do not allow the deduction of an estimate for the volume of production originating from professional vessels only. To derive to some indicative approximations of the production of professional vessels,

the values given in Fig. 6 were estimated under the 'gross' assumption that each professional vessel of category (b) lands 1 ton of fish annually, and each vessel of category (c) lands 2 tons of fish annually.

It remains widely acknowledged that the figures provided above may contain a serious degree of bias, inherent to the method used by the NSSG to arrive at production estimates. Nonetheless, the approximations made indicate a total annual amount of products landed by vessels below 20 HP and range between 30000 and 40000 tons over the period 1984-1993).

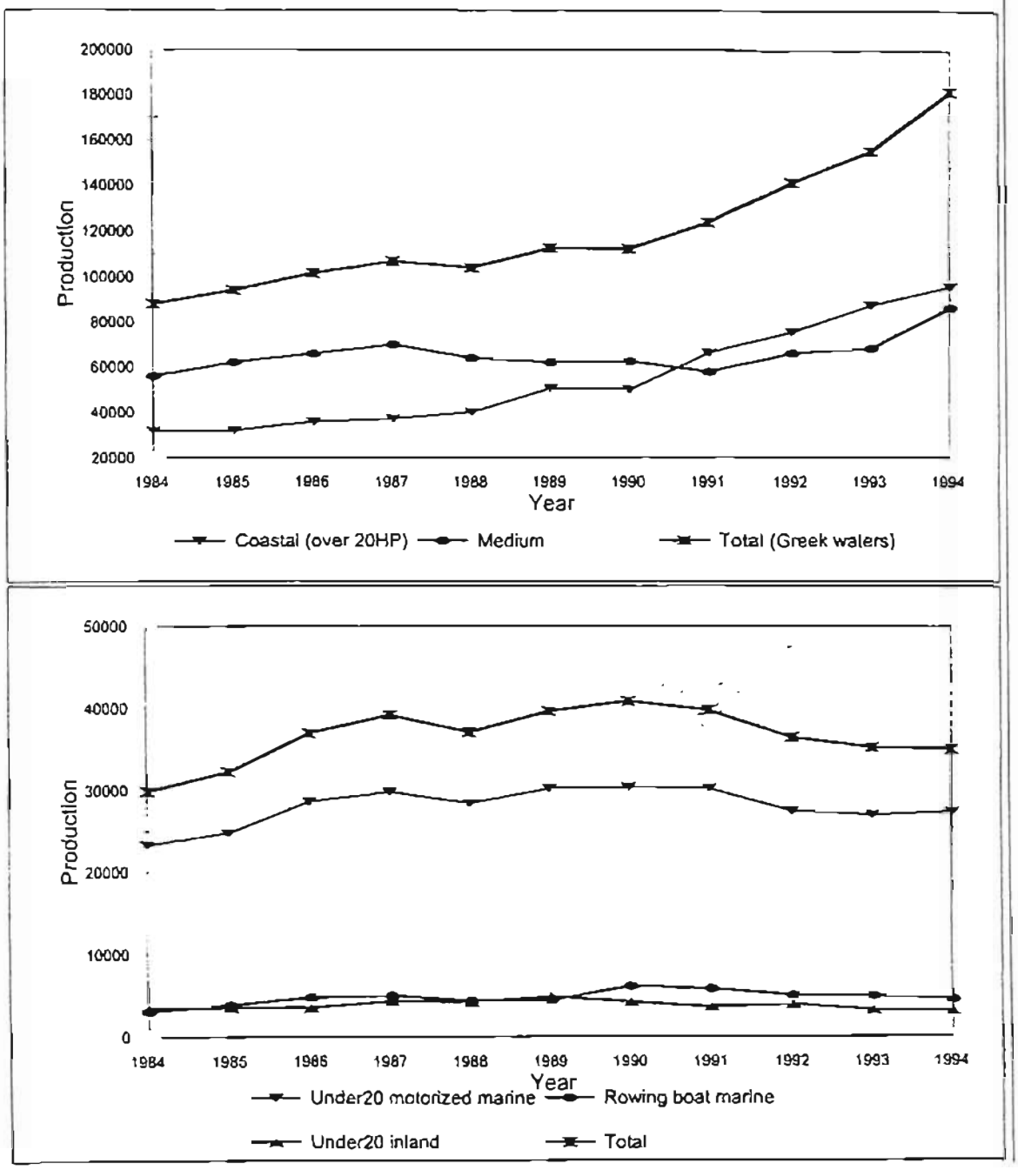
For comparative purposes, the production of vessels with engine power over 20 HP, operating in Greek waters is also presented in Fig. 6 (the production of vessels of the so-called Atlantic fisheries is excluded). The landings of coastal and medium fisheries, and the total landings, are given separately.

Through the field work undertaken during the present investigation, data were obtained and will be presented in a later section on the landings of a number of vessels with engine powers below 20 HP from the areas covered by the investigation. These data will be used to calculate average values of production per vessel.

3.2.5 The localisation pattern

The number of vessels with registered engines below 20 HP by port is provided in Appendix VI. Enumeration maps showing the locality of each port are also provided in the Appendix. More analytical data concerning the number of vessels of this category in each port by vessel typology are provided in Appendix VII.

Figure 6. The evolution of landings of fisheries products from Greek waters (a) products of vessels above 20 HP, (b) products of vessels bellow 20 HP. Source : NSSG



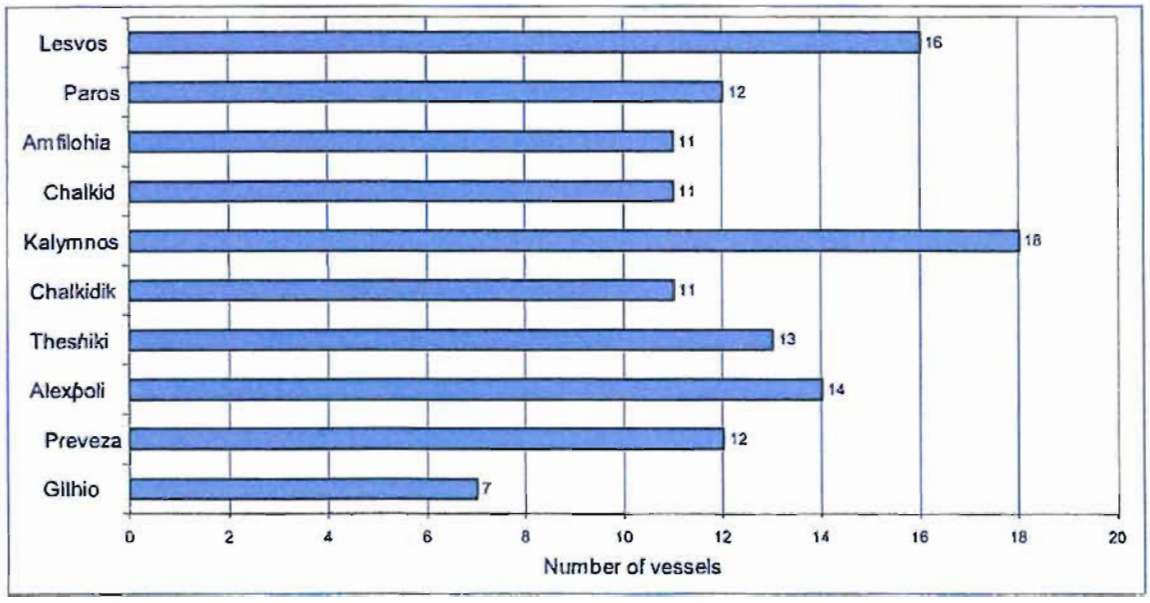
3.3. The Sample-Survey (SSBD) results

3.3.1 The sample

For the execution of the large scale sample survey, required for basic data collection, ten regions were finally surveyed, spatially covering important fishing ports of Greece with registered vessels 'under 20HP'. The sample size was raised to contain a total of 124 vessels, providing adequate statistical confidence.

In more detail, the number of fishermen (and their boats), which comprised the sample size of the current program, as distributed per surveyed region, is presented in Figure 7 below:

FIGURE 7: Number of sampled vessels per surveyed area.



3.3.2. The fleet surveyed

Upon examining the total surveyed sample of the vessels with registered power of less than 20 HP, it becomes apparent that 58% of the sampled fleet have engines from 15 to 20 HP. In fact the greatest part of vessels under the survey (41%) have engines of 15 HP. The distribution of the fishing vessels of the sample by engine power category is illustrated in Figure 9. From the latter is observed that the greatest majority of the vessels of the sampled fleet (82.3%) have engine power of less than 15 HP and 58% fall within the group of vessels with engine power from 10 to 15 HP. The fact of the relative low engine power does not satisfy the modern engine capacity requirements of the contemporary fisheries. Underpowered vessels have a distinct disadvantage when faced unfavorable weather conditions. Stronger vessels, on the other hand, can operate in open waters and great depths, can stay longer at sea and pull up catches with a minimum of manual effort.

As expected, low engine power correlates roughly with a small vessel size. Accordingly, as illustrated in Figure 8 , 60% of the sample consists of vessels from 5 to 7 meters long, (34% are from 6-7 m). If in the latter combined category (5-7m) the number of vessels from 7 to 8 meters is added, then the ¾ of the sample fall within that expanded category.

FIGURE 8: Vessel-length distribution of the fleet surveyed

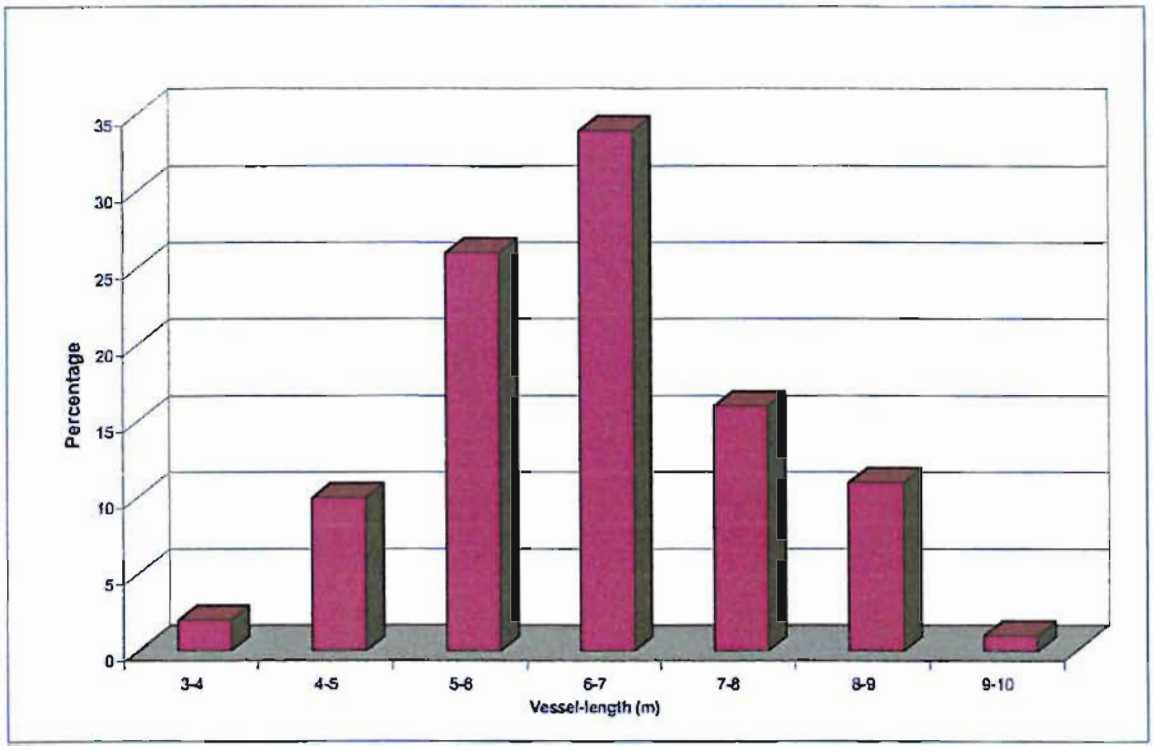


FIGURE 9: Vessel-engine power distribution of the fleet surveyed

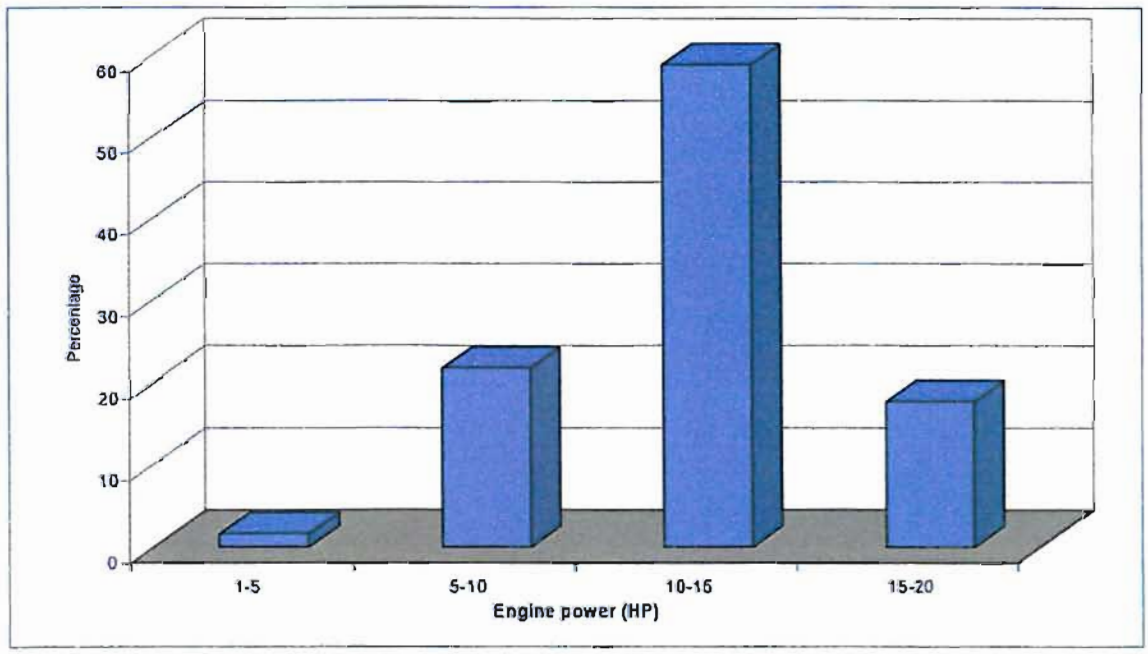
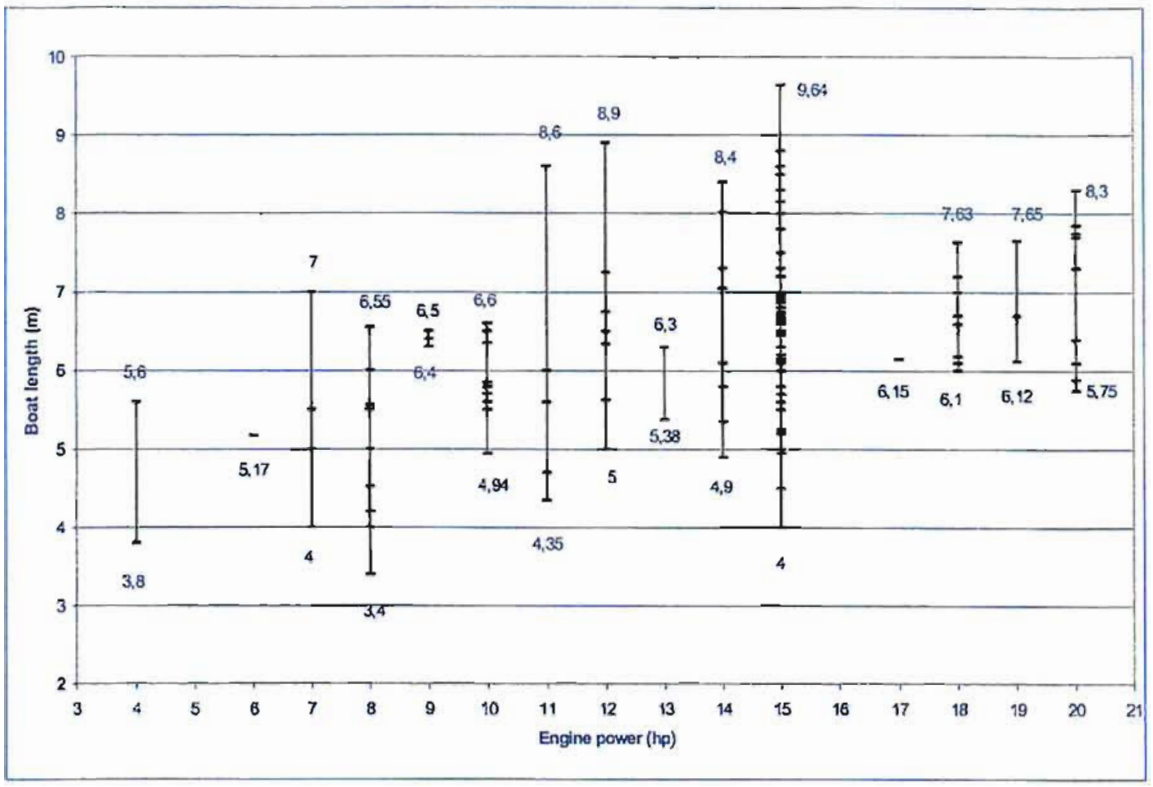


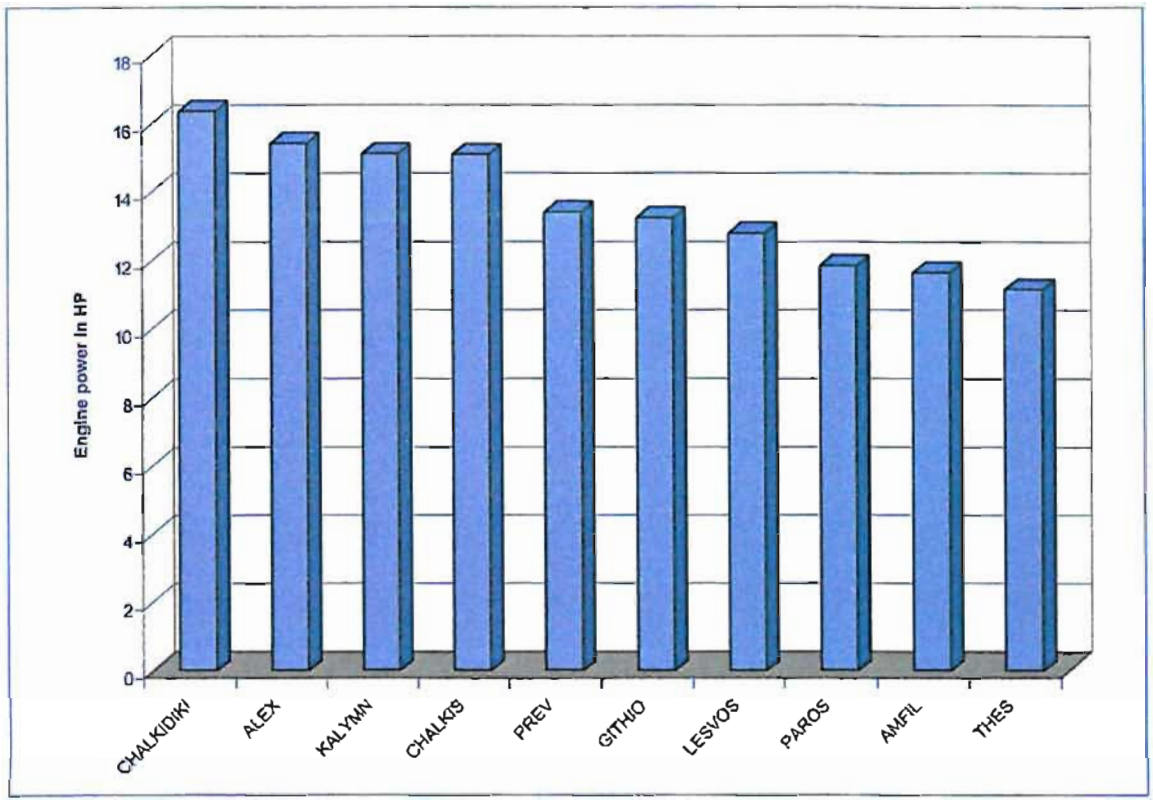
FIGURE 10: Engine power vs boat length of the fleet surveyed



By analysing the engine power separately by the vessel length group, a weak positive correlation between power and length may be observed, without however an evident and distinct pattern. It is nevertheless interesting to note that some vessels between 7 and 9 m in length have an engine of less than 15 HP, not sufficient enough to provide adequate propulsion capacity. More analytically, the vessels with engine power less than 15 HP exhibit high variation in terms of their length, as these range from 3.4 m to 8.9m. Vessels of 15 HP have the highest variation, from 4 to 9.6 m, while the group of vessels with engine power from 17 to 20 HP exhibit the lowest variation, ranging from 5.7m to 8.3 m (Figure 10).

As regards the regional differences recorded in relation to the average engine power (Figure 11), while the mean engine power for the sampled fleet is at 13.6 HP, the 'strongest' vessels are found in Chalkidiki (16.4 HP) and the 'weakest' ones in Thessaloniki (11.1 HP), a surprising finding considering the geographical proximity of the two regions. Unless this difference in average vessel engine power in the two regions reflects some sort of bias in the selection of the samples of fishermen, a probable explanation is that a strong engine is less demanding in the protected Thessaloniki gulf than in the exposed fishing grounds of Chalkidiki.

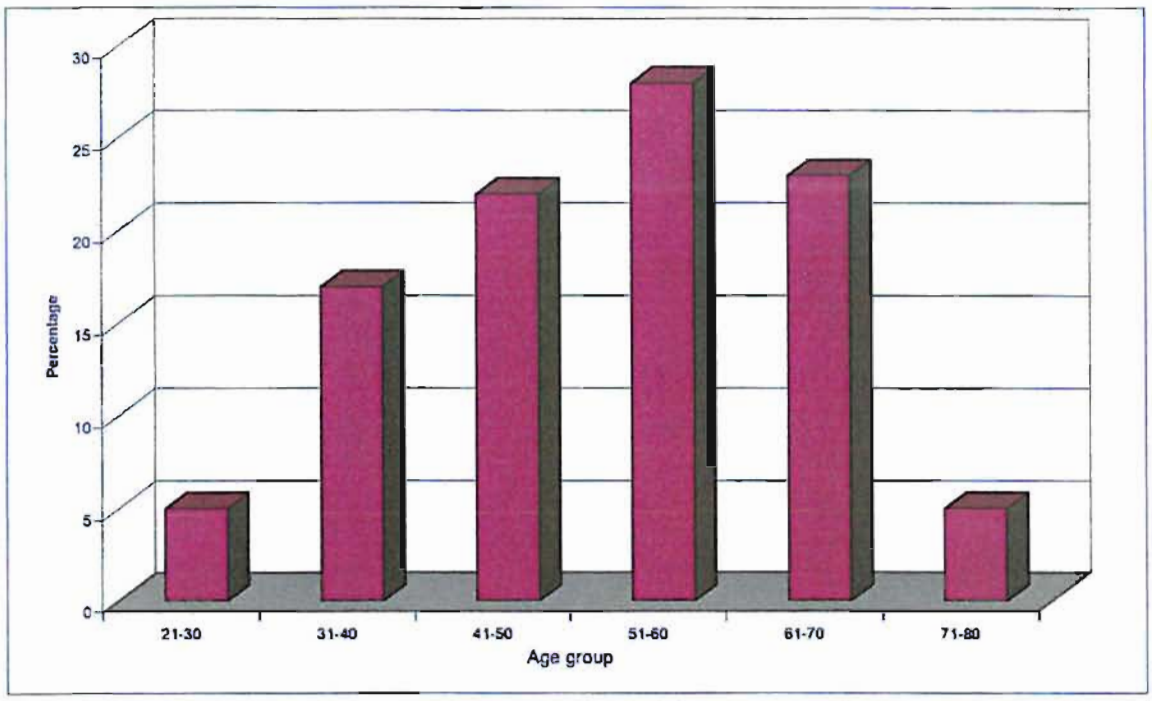
FIGURE 11: Average vessels engine power by region surveyed



3.3.3. Fishermen's age

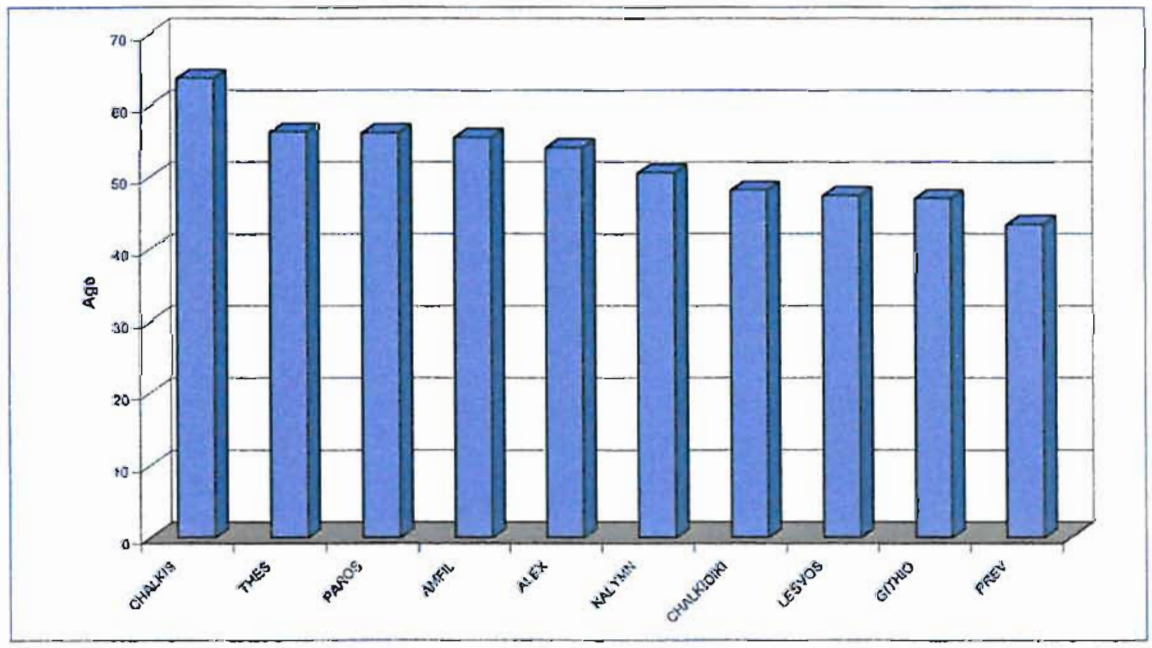
In examining certain socio-demographic characteristics of the fishermen included in the sample survey, a number of interesting aspects are being observed. To start with, upon examining the fishermen's 'age-structure' (Figure 12), it becomes apparent that the greatest majority (28% of the sampled population), is within the range of 51 to 60 years old. The two adjacent categories (41-50 and 61-70) have almost equal shares, 22 % and 23% respectively, raising the share of the three consecutive age groups to almost ¾ of the sample, incorporating two generations. At the same time, there seems to be an extremely low 'recruiting rate', as the youngest group (21-30 yrs old) accounts for just 5 % of the sampled population, while the total-sample average is 52 years old. As for the sudden drop observed after the age of 70, apart from the obvious biological parameter, the majority of the fishermen retire at that age, thence the low share of active fishermen observed at that age range accounts almost exclusively for fishermen who remain in the profession either for habitual or income-complementary reasons.

FIGURE 12: Age structure of the sampled fishermen



Concerning the regional differences in the age of the fishermen from the different areas sampled, as illustrated in Figure 13, the oldest fishermen are recorded in Chalkis (average age 64 yrs old) and the youngest ones in Preveza (average 43 yrs old).

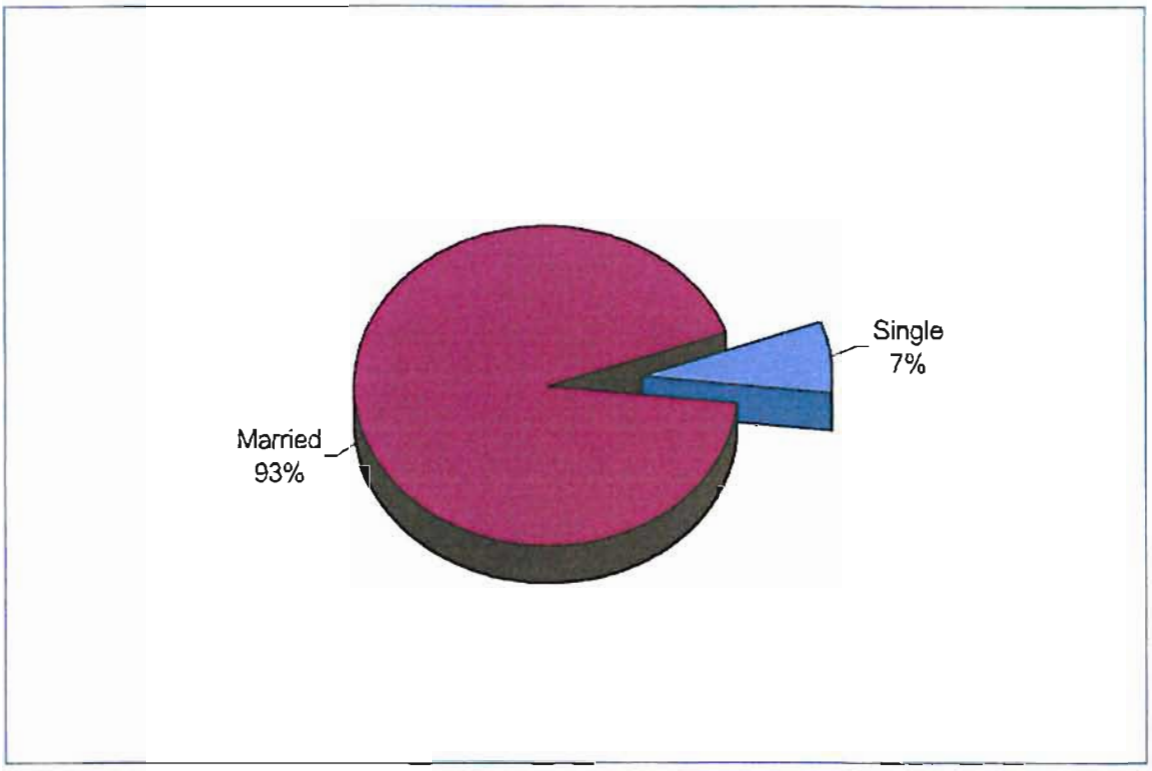
FIGURE 13: Average age of the fishermen by region



3.3.4. Marital status

Taking into account the average age and the age structure of the sampled population, it appears normal that the share of married to the single fishermen is over 90%, as illustrated in Figure 14.

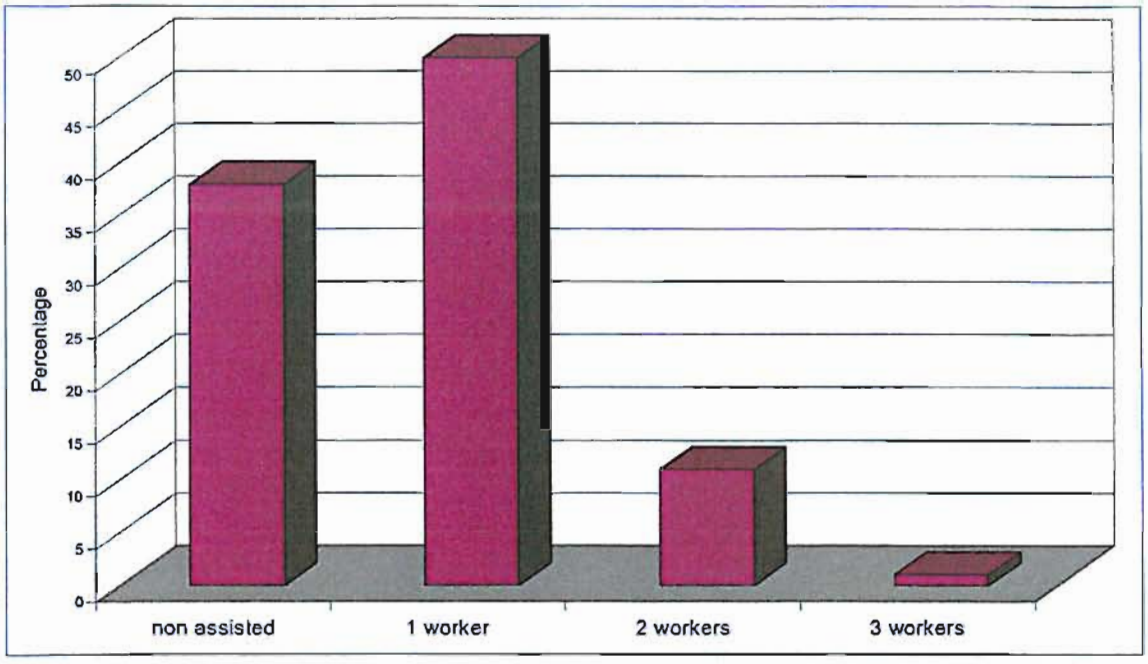
FIGURE 14: Marital status of the sampled fishermen



3.3.5 On-board assistance

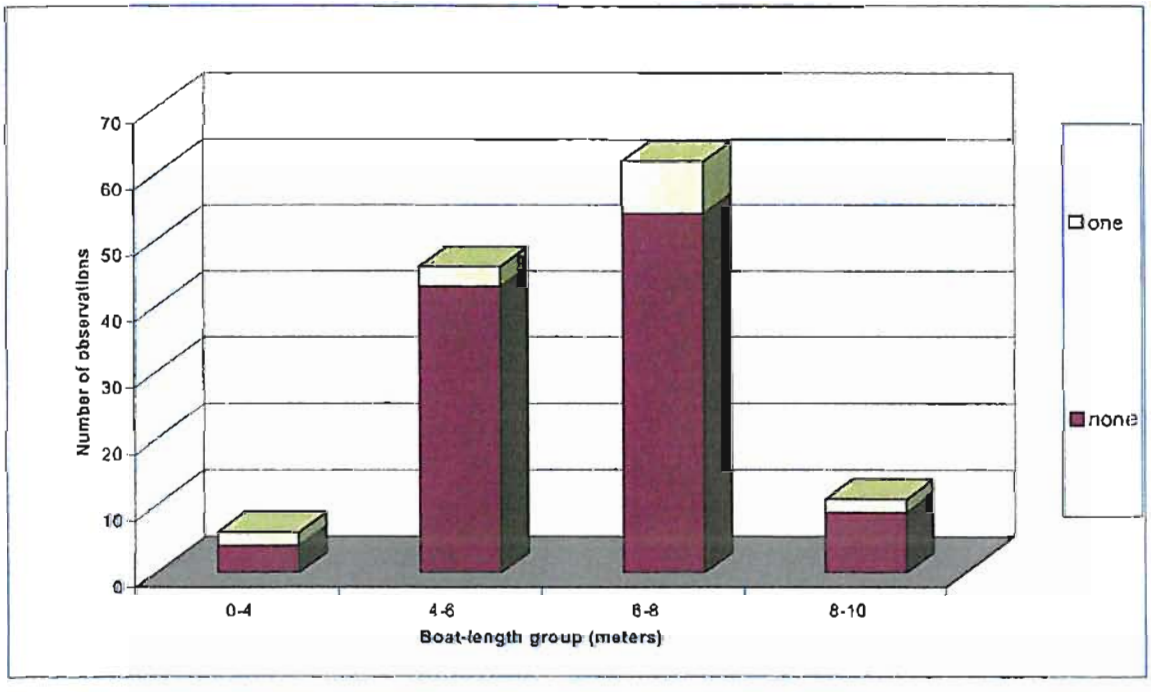
Another interesting aspect which emerged through the responses of the questionnaires is the proportion of the fishermen who require assistance for their operations. Almost 40% of the sampled fishermen work on their own, with no on-board assistance, while 50% of the sample require the assistance of one person, and only 12% need more than one person to assist on their fishing operations (Figure 15). The additional assistance required is normally limited to 2 persons as only one sampled fisherman declared that he employs a third person. This finding is of socio-economic importance as it reveals that fishing with these vessels is largely a solitary and a shelf-owned-business profession, while on the other hand, when the vessel is longer and stronger, assistance is required, thus increasing the cost and reducing the profit margin.

FIGURE 15: Share of assisted fishermen



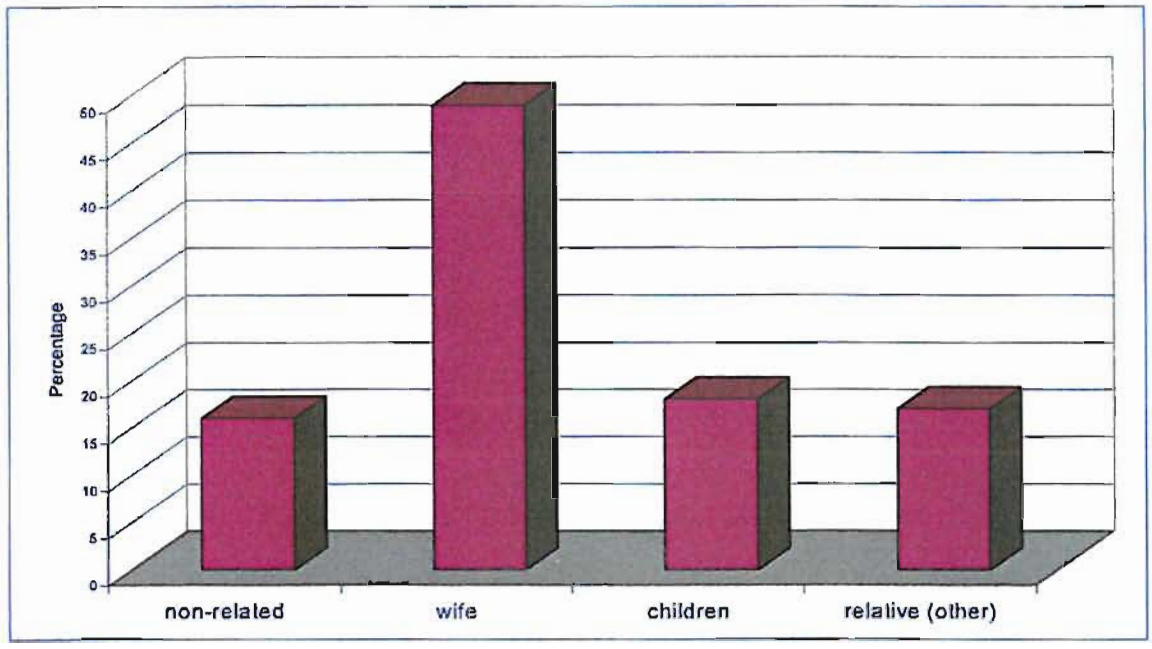
Another aspect revealed, when attempting to correlate the additional manpower required by the fishermen according to the fishing-boat length, is that the share of assistance required increases with the length of the boat. Figure 16, illustrates the latter relationship, though only the case were one assistant required was tabulated in the figure, due to the minimal share of two and three workers required by the sample.

FIGURE 16: Number of fishermen's assistants per boat length



Further elaborating on the previous information, dealing with the 'manpower' assistance requirements of the small-scale fishermen, the relationship between the fisherman and the assistant is examined, revealing sociological information of further interest. Figure 17, illustrates the share per type of relationship of the assistant (when present) to the fisherman, for the surveyed population.

FIGURE 17: Share of type of relationship of assistant to the fisherman

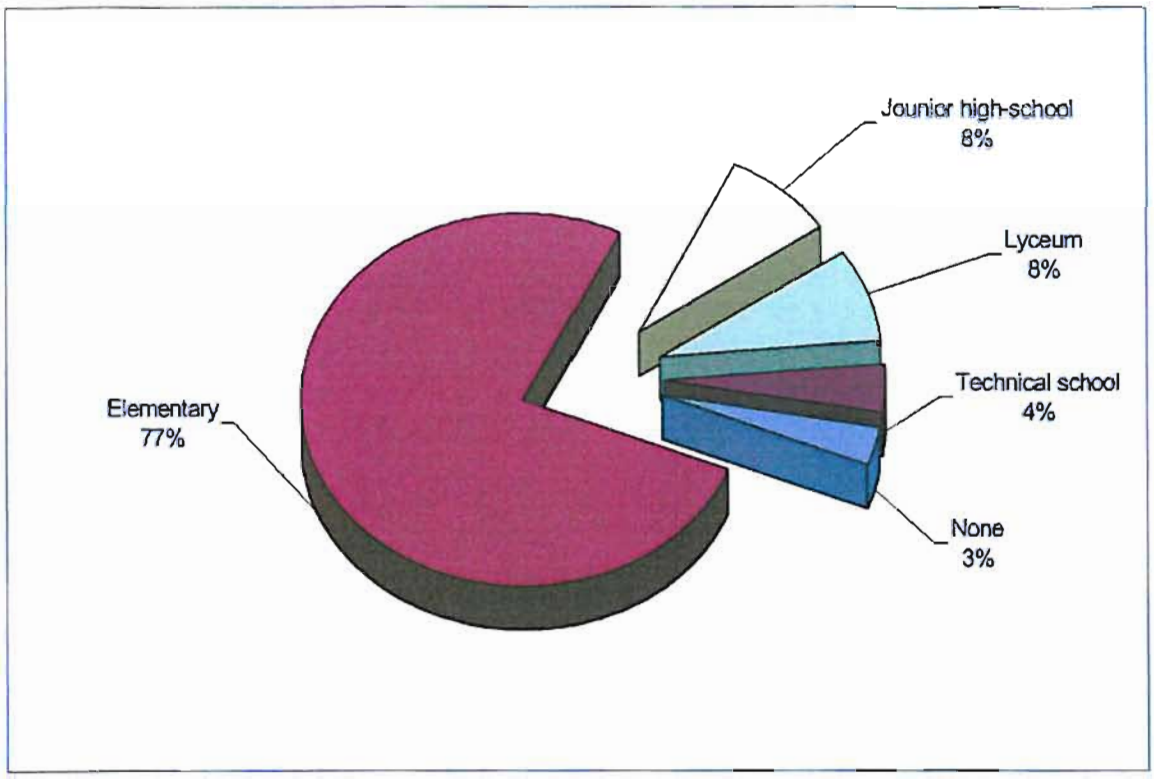


From Figure 17, it becomes apparent that small-scale fishing is largely a family business, where first degree relatives (wife, children) constitute integral parts of the operation. In fact, 67% of the fishermen of the surveyed sample require the assistance of their wives and/or children, followed by another share of 17 % who employ some other relative. Within this context, it is only 16% of the fishermen who seek assistance from a non-relative, further supporting the notion that this type of fishery is still in the traditional trail of rural family-enterprises, though the relatively low involvement of off-springs, particular of the younger generations, indicate low recruitment rates and a tradition which seems to be in decline, in an already shrinking sector.

3.3.6. Level of education

On examining the educational level of the sampled population, it becomes apparent that the greatest –and absolute majority- is 'Elementary'(Junior) school graduates. Their level of education is, therefore, lower than the current national 'compulsory' population requirements (ie: Junior-High- School level). Only 20% seem to be –at least- the required level, with 12 % having gone higher than that. It seems that fishermen operating with vessels of under 20 HP, do not proceed to higher education, while a share of 3 % have not gone though any sort of formal educational processes.

FIGURE 18: Level of education of the sampled fishermen



3.3.7. Income by fishing

As regards the fishermen's income share generated by the practice of fishing, over the total household income, it seems that for 40% of the sampled population fishing complements their income by 20% to 60%. An equal proportion of the fishermen included in the sample stated that fishing provides 80-100% of their income (Figure 19). It is however, interesting to note that through the same questionnaire it is being revealed that only about 30% consider fishing as a complementary activity, while the remaining 70% regard it as their main professional activity.

Further analysing the share of total income by fishing for the particular age groups examined (Figure 20), it appears that for the fishermen of 31 to 60 years old, fishing is their main professional activity accounting for the highest share of their income. For the over 61 year old fishermen, the income generated by fishing is complementary, of the range 21-40%, further supporting the notion that older-aged fishermen, many of them pensioners (specially the age group of 71-80 yrs), continue fishing on a part-time habitual basis. Of interest is also the situation on the low end of the age groups examined, as it could be claimed that younger fishermen tend to work on fishing on an availability basis, complementing their income through additional professional activities.

FIGURE 19: Share of income by fishing of the sampled fishermen

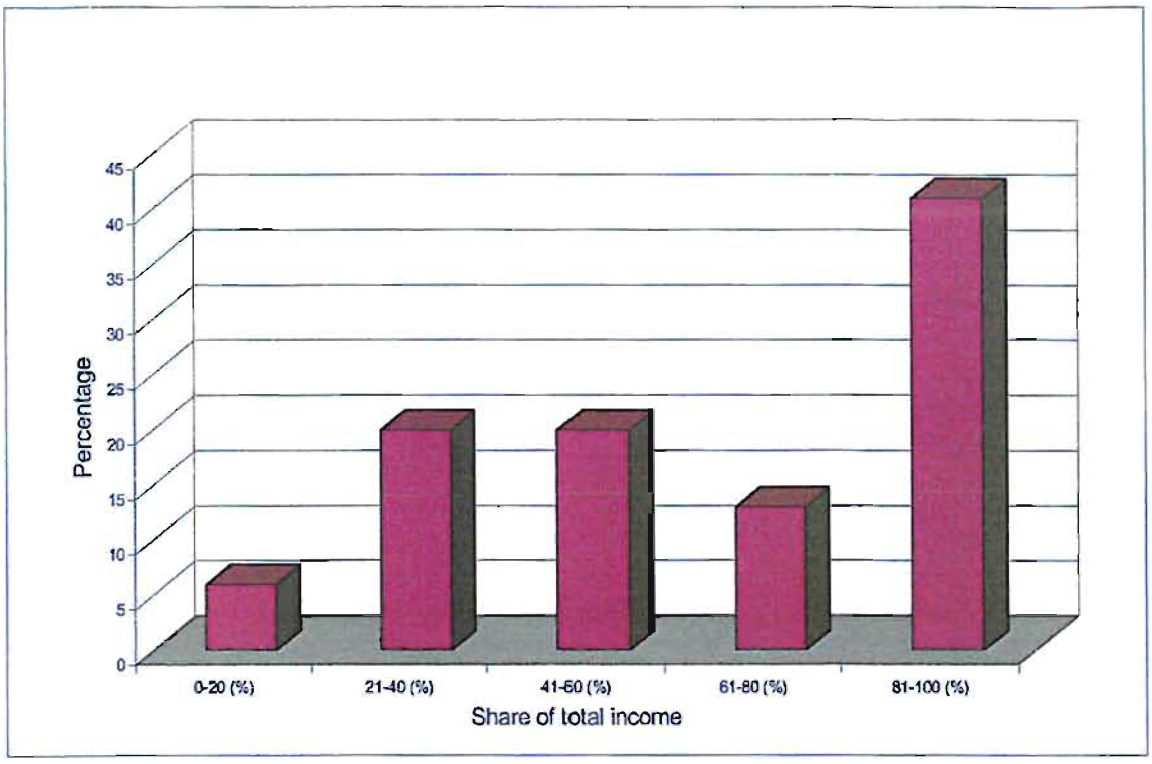
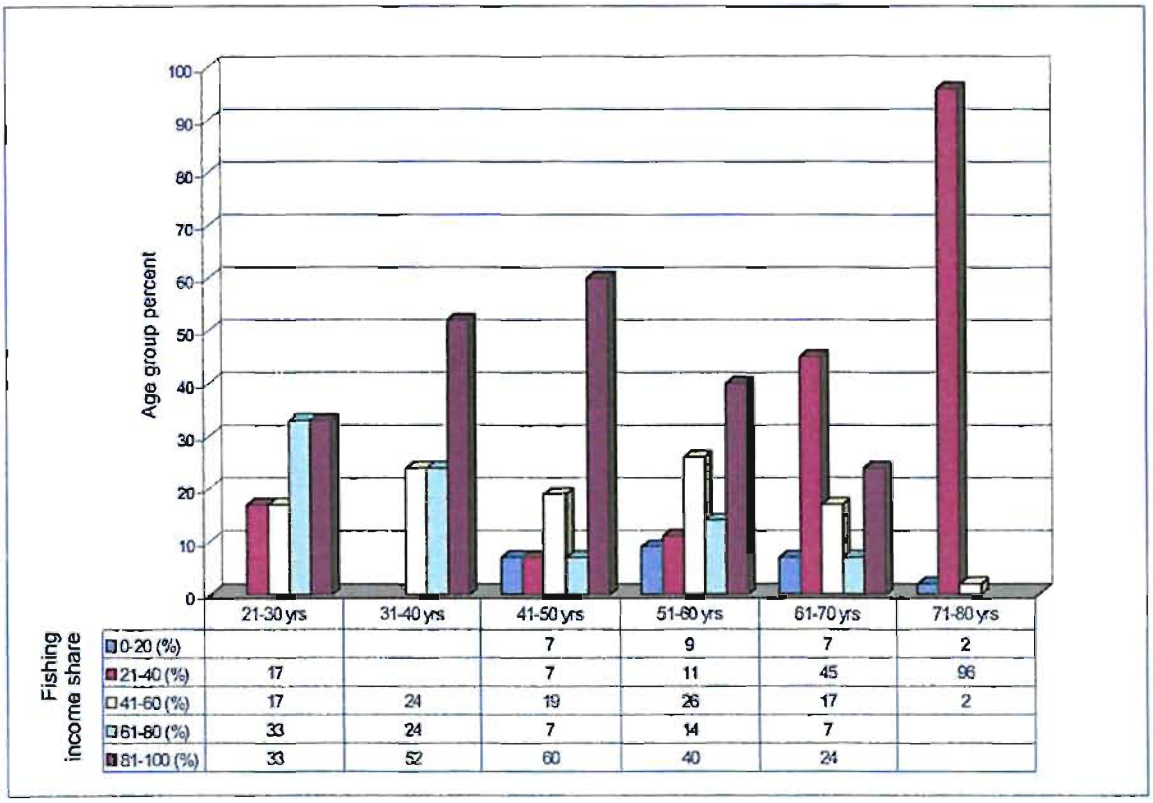


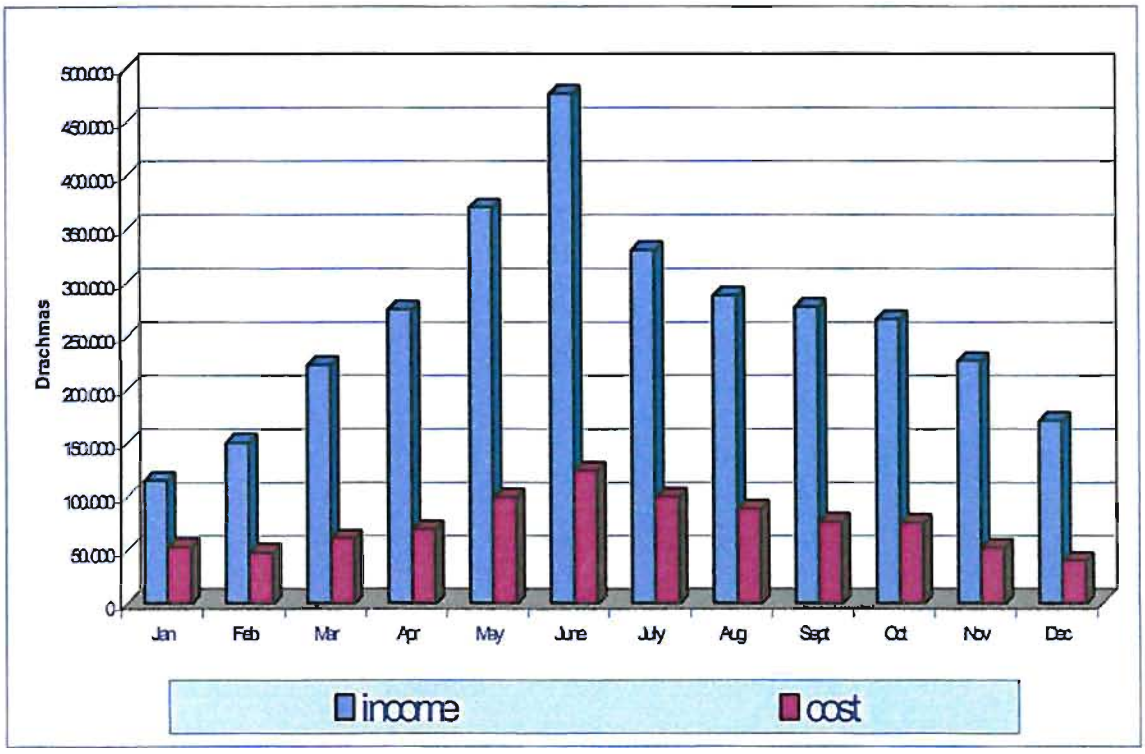
FIGURE 20: Share of income from fishing by age group of sampled fishermen



Fishing income share	21-30 yrs	31-40 yrs	41-50 yrs	51-60 yrs	61-70 yrs	71-80 yrs
0-20 (%)			7	9	7	2
21-40 (%)	17		7	11	45	98
41-60 (%)	17	24	19	26	17	2
61-80 (%)	33	24	7	14	7	
81-100 (%)	33	52	60	40	24	

Upon evaluating the seasonal fluctuations of the income generated by fishing, it becomes apparent that it exhibits a clear 'pyramid' shape throughout the year, reaching its maximum in June with a total-sample average of about 476 thousand drachmas. (Figure 21). Consequently, the monthly operating cost follow a mirror pattern to the income, reaching its maximum in June, at about 125 thousand drachmas. It is however interesting to observe that the annual range of cost fluctuation is lower in comparison to the income fluctuation. More specifically, the lowest monthly average cost is recorded in December, with 40.236 drachmas, ie: three times lower than the maximum, and over half of the annual average (74,000). On the other hand, the lowest recorded average monthly income is in January with 115 thousand drachmas, more than four times lower than the maximum in June, and slightly less than the annual average of 264 thousand drachmas. This way, while cost increases threefold in the most intense month of fishing, revenues accordingly, increase four-fold, therefore increasing the profit margin.

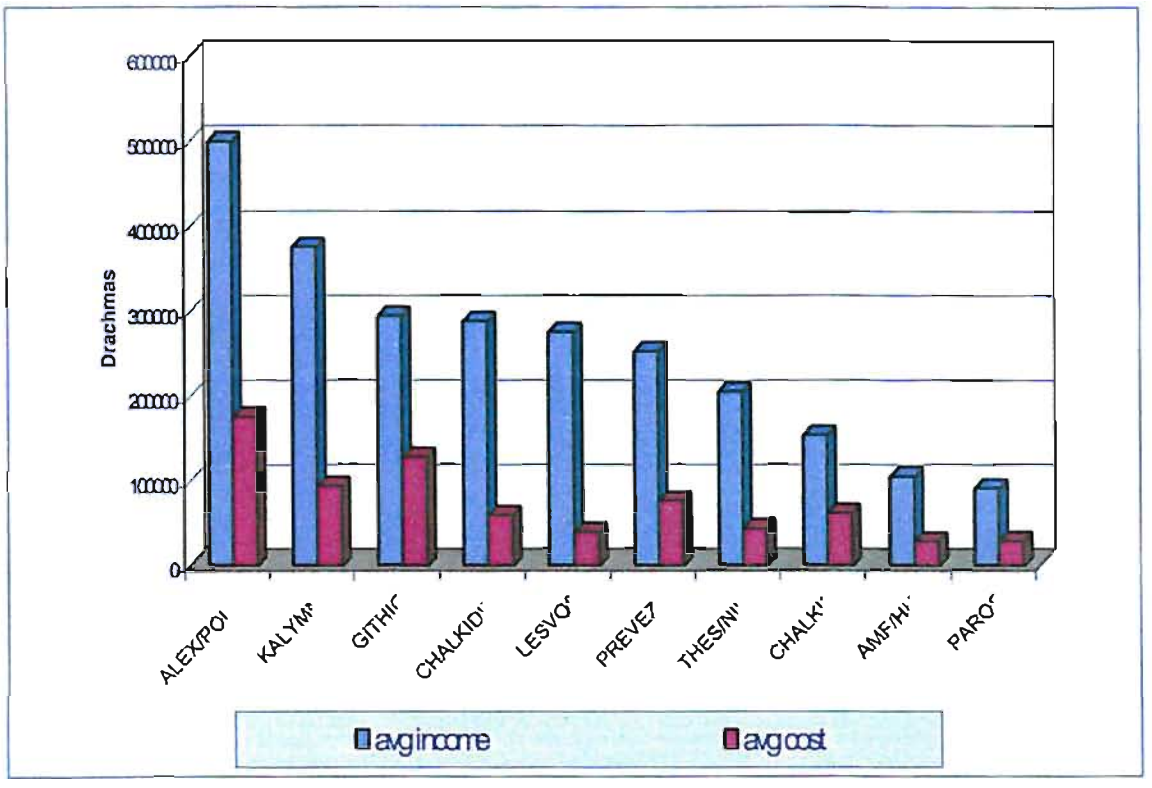
FIGURE 21: Average monthly income and operating costs of the surveyed fleet



As regards the spatial variations of the annual average income and operational costs, it is interesting to observe that the fishermen of Alexandroupolis hold the pole position, with 500 thousand drachmas (due to the highest annual average catch), almost double the annual average of all the sampled areas, which is calculated at 255 thousand drachmas. Similarly, operational costs, on average, are highest for the fishermen of Alexandroupolis (175 thousand drachmas), more than double of the average operational cost of all the sampled areas (73 thousand drachmas). Second in terms of highest operational cost come the fishermen of Kalymnos. A possible underlying reason for this could well be the fact that fishing in these areas is usually practised in greater distances from the ports than in other areas, thus increasing the cost of fuel required. The lowest operating cost was calculated for the fishermen of Amfilohia, who nevertheless, are

second to the lowest engine power, with an average of 11.6 HP per vessel, meaning not only that running cost are lower in comparison to the 'stronger' vessels but that the available days of fishing –due to weather conditions- also become limited. The latter is further confirmed by Figure 25, indicating that the average days of fishing per year for the fishermen of Amfilohia is second to last, with slightly less than 12 days per month, on average.

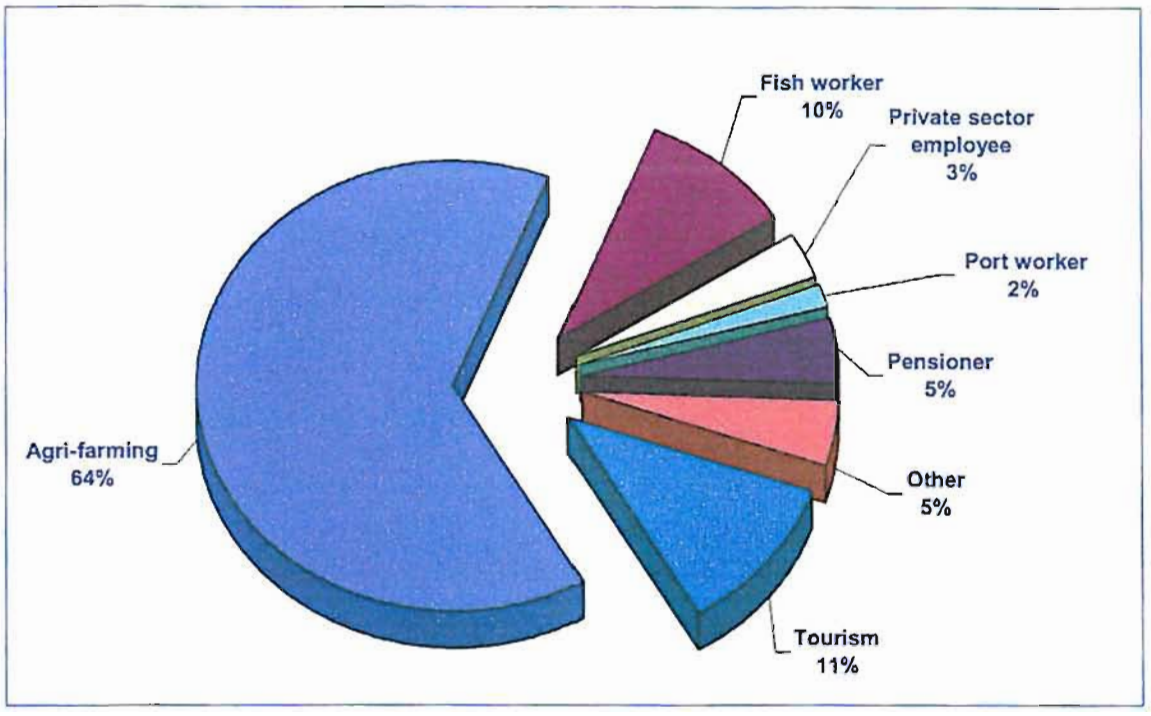
FIGURE 22: Regional annual average of income and operating costs of the surveyed fleet



3.3.8. Reasons of inactivity

For a large portion of the sampled fishermen fishing seems to be a part-time activity. This is generally to be expected for the coastal fisheries, which is sensitive to adverse meteorological conditions. Moreover, in certain areas an almost exclusive involvement in fisheries cannot ensure a reasonable income and must therefore be supplemented by earnings from other professional activities, such as agriculture and tourism, as illustrated in Figure 23. It should be stressed however that the level of involvement in alternative professions differs amongst the areas sampled, depending on the availability of alternative employment opportunities and the prevailing socio-economic structures.

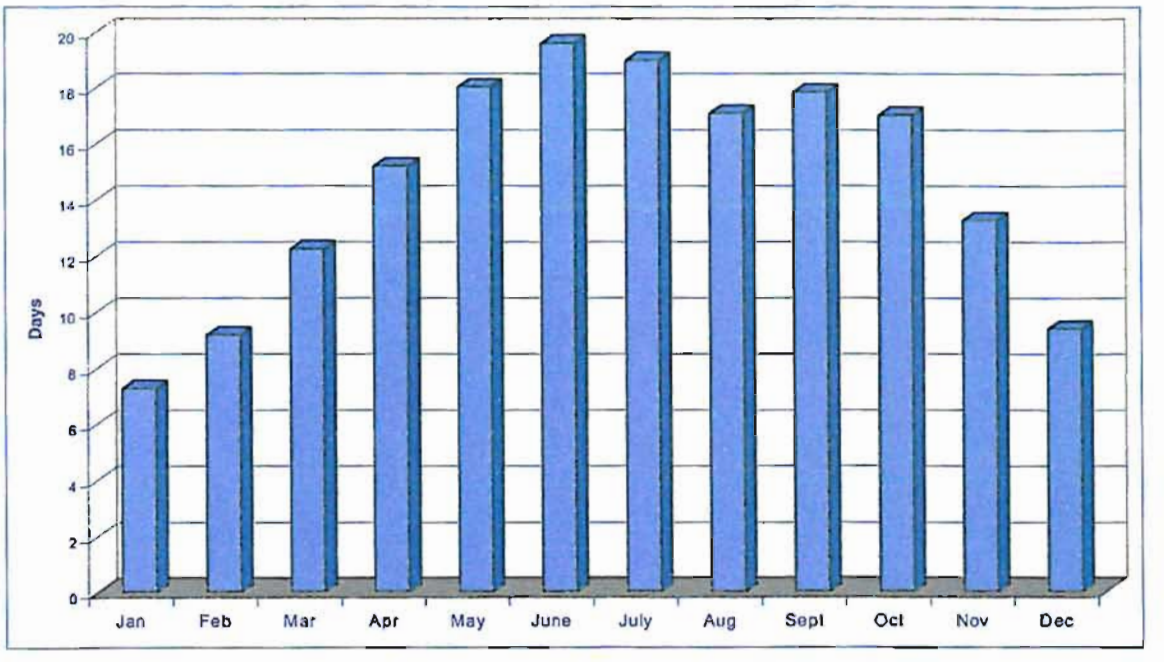
FIGURE 23: Type of complementary activities of the sampled fishermen.



3.3.9. Days fishing

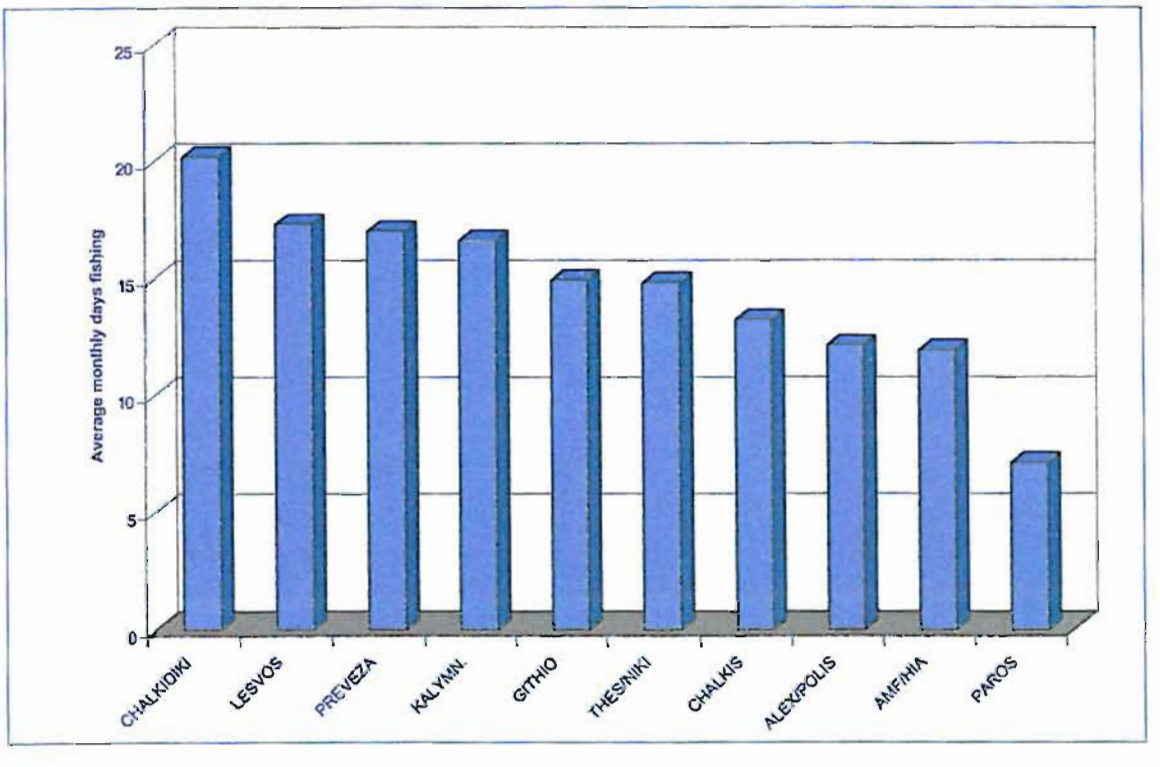
In direct relationship to the information presented in the previous sections, it comes of no surprise that the fishing activity with vessels of under-20HP engine power, is lower in the winter months and peaks in the summer. More specifically, the average days spent fishing during the winter months is 8.6 per month, rising to almost double of that value in the spring with 15.1 days fishing per month. It reaches its peak in the summer months with an average of 18.6 days and seems to slow down in the Autumn months with 16 days per month on average. Fishing activity seems to start in the spring and the first two summer months are the most active. It is interesting to observe that fishing continues to be intense during the spring months and only towards November does fishing ceases. (Figure 24). The lower activity in the winter months could be attributed, not only to the adverse meteorological and climatological conditions but also to the agricultural activities that need attending towards the late autumn as well as the vessel maintenance requirements

FIGURE 24: Monthly average of days fishing, for the sampled fishermen



The database analysis indicates that the sampled fishermen, of all the regions examined, go fishing, on average, 14.5 days per month, or 174 days per year. In fact, in eight out of the ten areas sampled, the average number of days fishing ranges from 11.9 to 17.3 days per month.

FIGURE 25: Monthly average of days fishing per region sampled



The highest average of days fishing is recorded in Chalkidiki with 20.2 days per month, while the lowest activity is observed in Paros island with an annual average of 7.1 days per month. (Figure 25). The latter is not in agreement with the values obtained for other island regions, such as Lesvos and Kalymnos, which have values over the total average, with 17.3 and 16.6 days of fishing per month respectively. One possible explanation could be the existence of alternative occupational activities, mainly related to tourism. Paros is considered a world-wide favourable resort and receives a high rate of visitors every year, particularly during the summer period when fishing activities intensify in other areas. The latter is supported by the fact that the average days fishing during August - the peak of the tourist season- is 3.8 days, while for July that figure is almost triple. Moreover, fishing seems to be picking-up in September, as tourism slows down, reaching on average 7.3 days of fishing. It should be stressed however, that in addition to the tourism increase, during August, the weather conditions are not favourable for fishing in the Aegean sea for small vessels, due to the seasonal strong northerly winds (*meltemia*).

Another interesting aspect observed when evaluating the regional average of the days spent fishing per month, was noted in Kalymnos (Figure 27), where the fishing activity gradually increases from June to October, in contrast to the other areas where fishing activity peaks at the beginning or middle of the summer and then declines.

FIGURE 26: Monthly average of days fishing in Paros

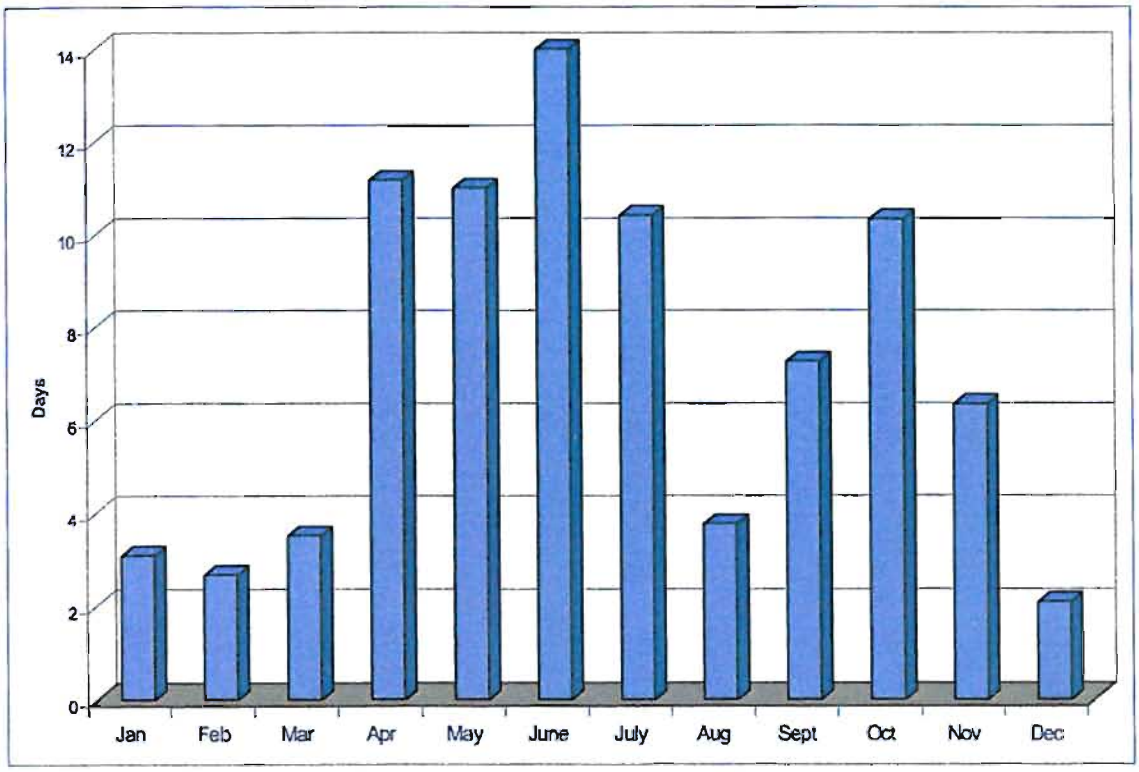
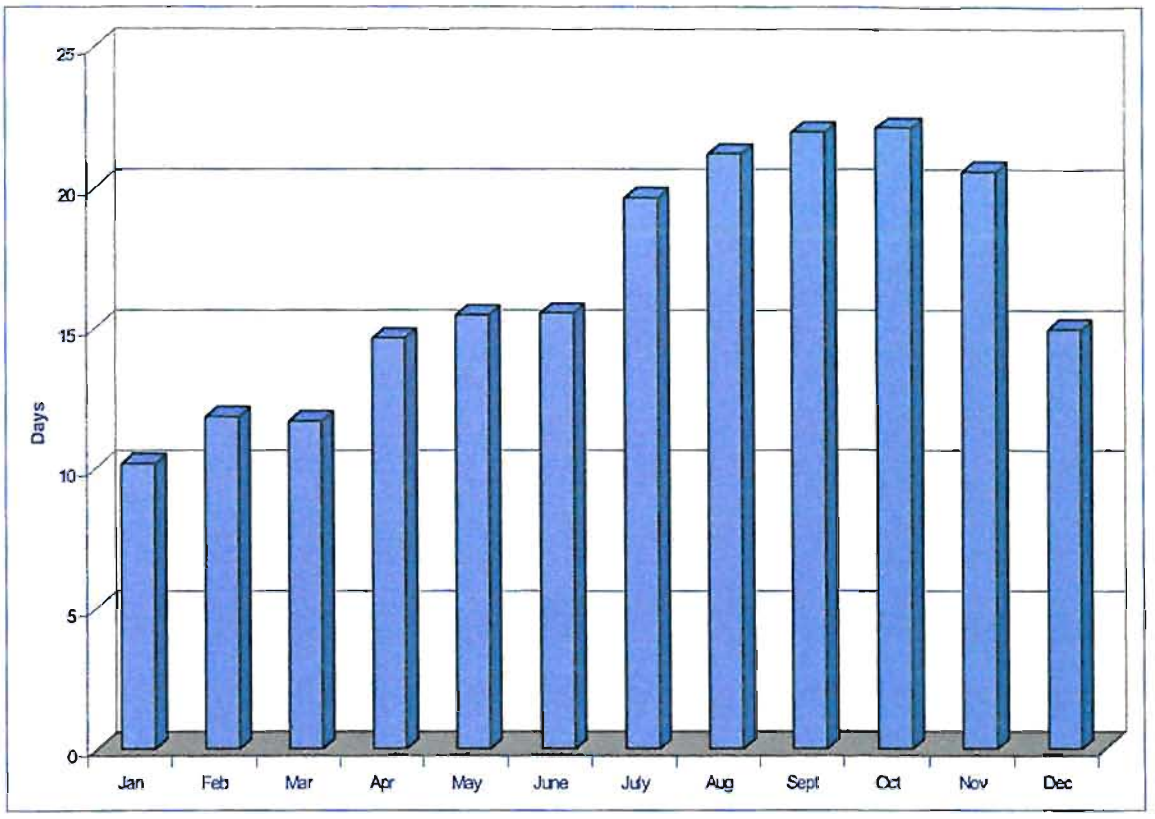


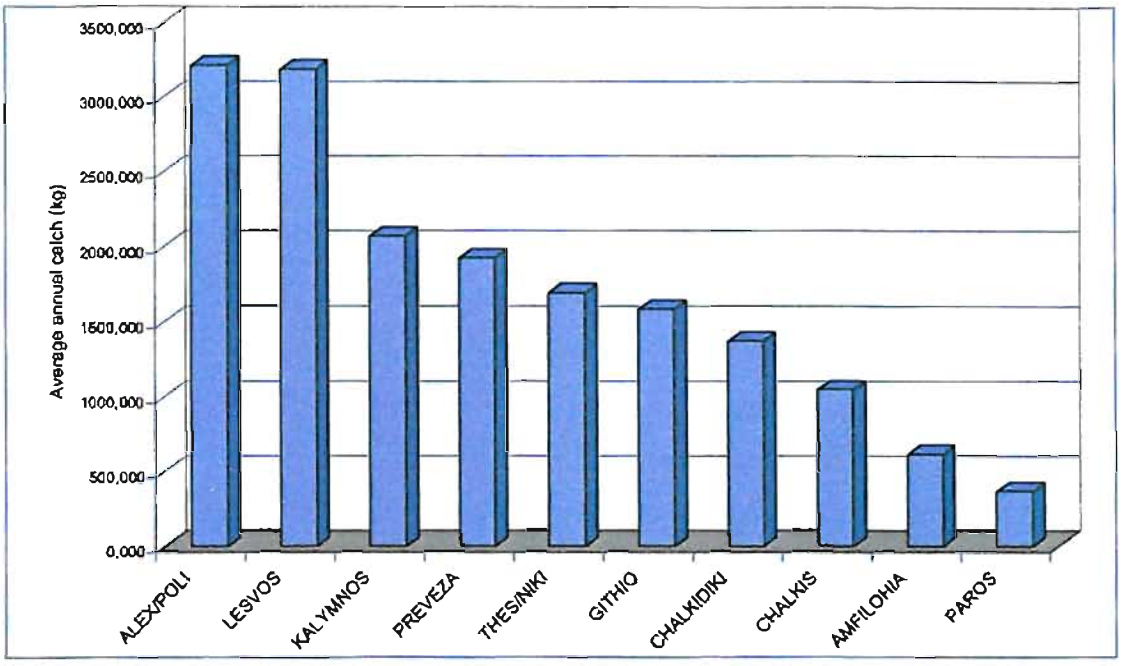
FIGURE 27: Monthly average of days fishing in Kalymnos



3.3.10. The catch: quantities and composition

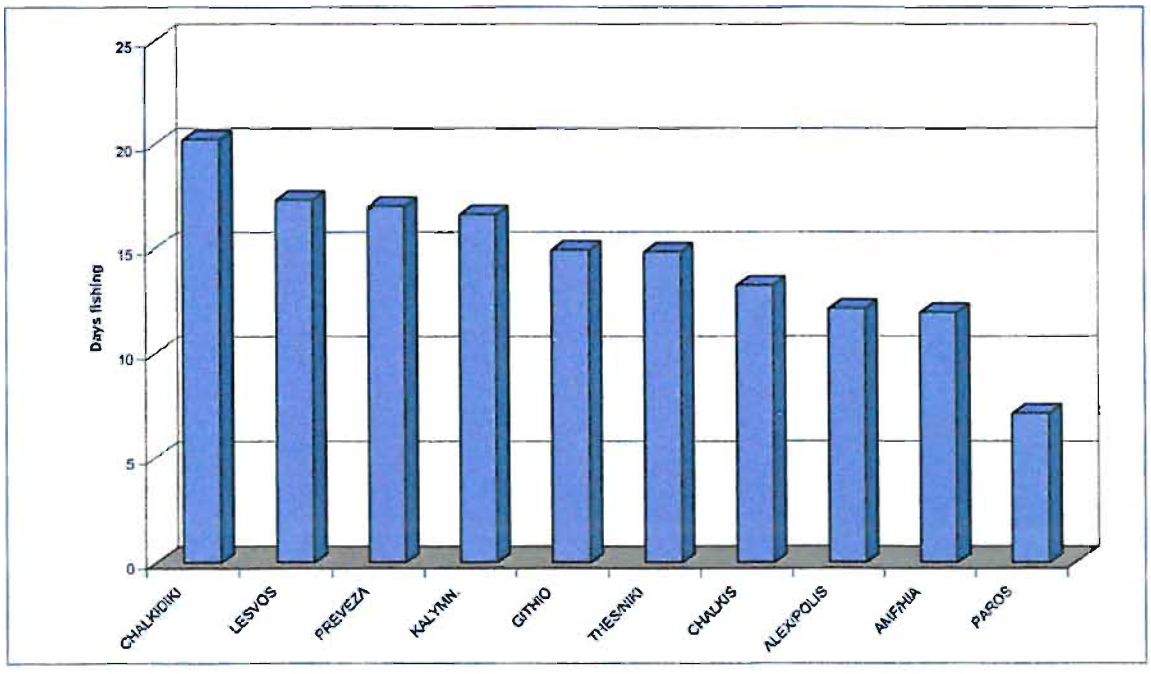
In terms of the quantities caught, the annual monthly average is 151 kilograms. The highest monthly catch is recorded in June, with an average of 250 kilograms for all the sampled areas (Figure 28). It is interesting to note that while the highest average catch is recorded for June, in agreement with the average monthly days of fishing, there seems to be a decline in the average monthly catch for the proceeding months, at a rate greater than the one expected according to the average days fishing per month. In particular while there is a decline in the average monthly fishing days from June to August, of almost 13% the average catch is halved between the first and the last of the summer months. On a seasonal basis, the average monthly catch is 193 kilograms in the Spring, increases to 173 kilograms in the Summer, stabilising at 141 kilograms in Autumn (with hardly any monthly differences), and reaching its lowest during the winter months with 99 kilograms per month.

FIGURE 28: Annual average catch of the surveyed fleet



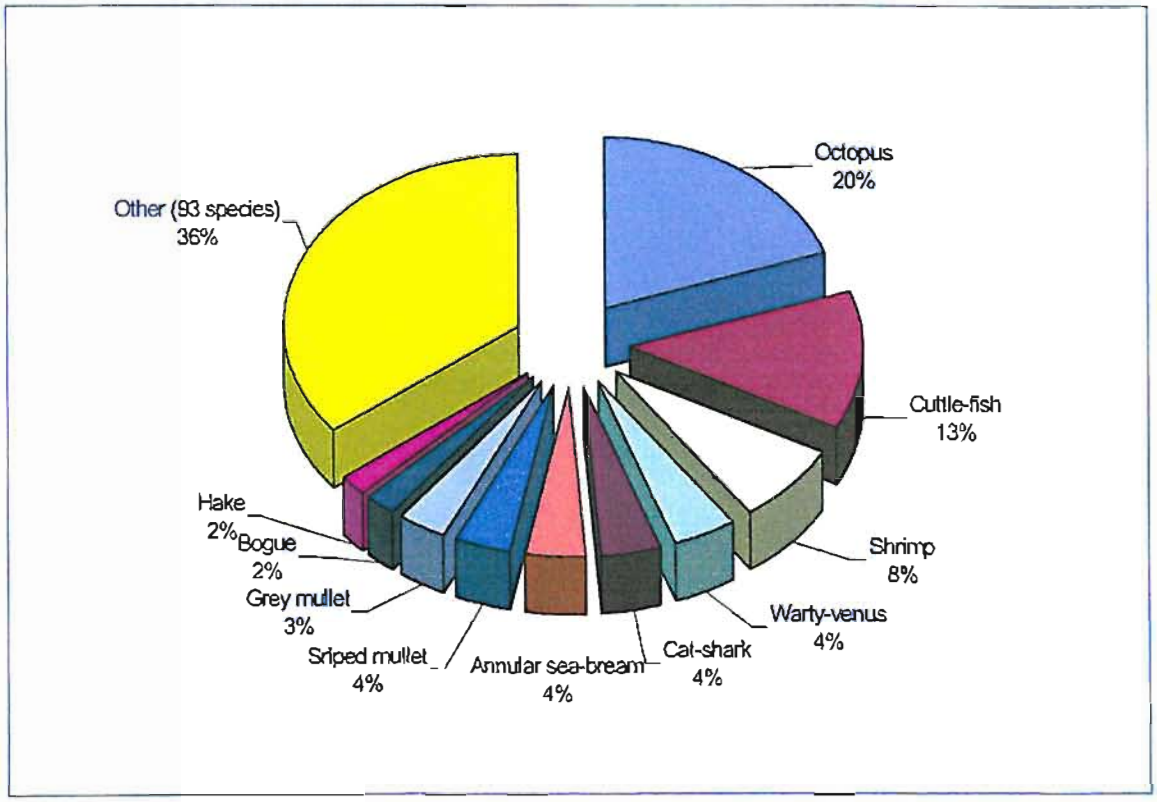
As regards the regional variations on the average annual catch, the fishermen of Alexandroupolis rank first with 3,212 kg followed closely by the fishermen of Lesvos with 3,186 kg. It should be noted that the vessels of Alexandroupolis rank second highest by average engine power, while the fishermen of Lesvos rank second highest to the average days spend fishing annually. Similarly, the lowest average annual catch is recorded for the fishermen of Paros island (365.5 kg), a finding which directly correlates to lowest average number of days spent fishing in comparison to the other areas (Figure 29).

FIGURE 29: Monthly average of days fishing per region



As regards the composition of the catch, 45% of the recorded volume of landings accounts for non-fish species. The share of the octopus is the highest one amongst the catch accounting for 20% of it, followed by cuttle-fish (13%), shrimps and warty-venus. Six fish species rank among the top-ten species landed by volume, accounting for 19% of the catch, with the remaining 36% consisting of a variety of 93 species (Figure 30).

FIGURE 30: Catch composition by major species landed by surveyed fleet



3.3.11. Marketing of the catch

As illustrated in (Figure 31), none –but one- of the species included in the top-10 list of the species composition by volume is included in the top-10 list of the most lucrative species. The latter fact should be of no surprise as in most cases, the high demand for the most 'tasty' and in many cases scarce species cannot be satisfied by the supply, thence rendering the species a delicacy rather than a commodity. However, all the afore-mentioned do not apply for shrimps which rank third in the volume of landings and sixth in the highest price fetched.

FIGURE 31: Top-10 most lucrative species landed by surveyed fleet.

Upon examining the marketing channels used for the selling of the recorded landings it becomes evident that no safe conclusion can be drawn from the information obtained, due to the high variability observed on a regional level. For example, the sampled fishermen of Alexandroupolis sell their landings in the local fishing port only through their cooperative, while the ones from Amphilohia sell their catch directly to the consumers, but individually, while the ones from Lesvos prefer the large wholesale dealers. In the remaining seven sampled areas, a combination of the alternative marketing channels is recorded, without however providing any significant grounds for particular trends and distinctions. Nonetheless, an attempt to group the information recorded from all regions the regions sampled (Figure 32) indicate that about a third of the catch marketed is directly sold upon landing to the final consumers. This way higher profit is made as no intermediaries intervene in the process. Of the remaining landings the highest share is sold directly to fish shops (22%) and large wholesale dealers account for 14%. Restaurants claim 12% of the total landings and the remaining account for fishing-port wholesalers, the sales to the fishing port co-operative and the personal consumption of the fishermen and their families.

There are, of course, seasonal variations on the distribution pattern of the catch to the various users, these being the final consumers, final retailers or wholesalers. As Figure 33 illustrates, while early in the spring the market share of the retail sales reaches its annual maximum, retail sales decline during the summer, staring to increase early in autumn. A contrasting annual pattern is followed for the sales made to restaurants indicating the high seasonal demand for fish products, from the out-of-home catering sector. Of similar pattern is the share accounted to the large wholesale dealers further indicating the strong seasonal demand as it is this very group which generally supplies markets away from the local ones. Of marginal importance is the increase of sales to the fishing port wholesalers which exhibit a low but marked increase during August and September.

FIGURE 32: Average share of marketing channels used for the landings recorded

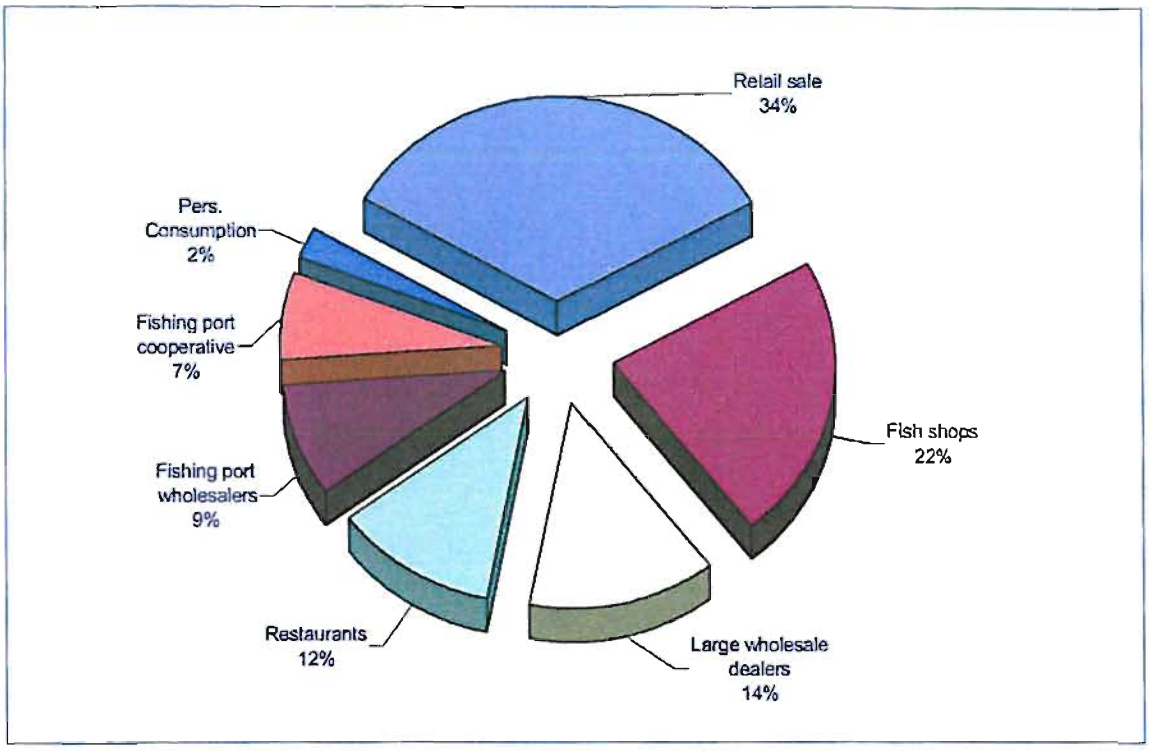
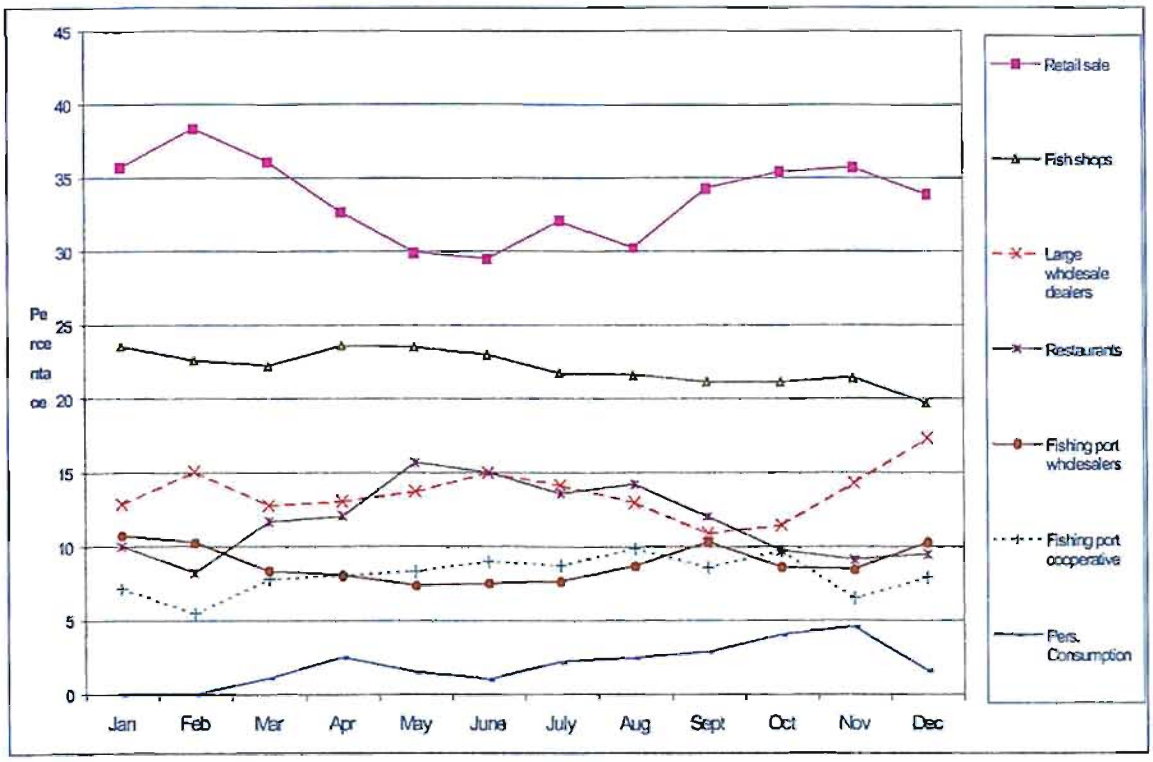


FIGURE 33: Annual variation marketing channel used by the sampled fishermen.



3.4. National production estimates from vessels under '20 HP'

During the planning stage of the current project, the initial intention was to extrapolate the sample estimates on landings from vessels under 20 HP to the National Registry data, in order to arrive at an assessment of the national landings for this fleet segment. This assessment could subsequently be used to validate the existing administrative data series of landings available from the National Statistical Service of Greece (NSSG).

This task however, faced two kinds of difficulties. The first was the finding the data on landings provided by the NSSG are not the product of sampling and statistical procedures, but rather the by-product of the assessment of fleet size. In fact, the NSSG does not perform any measurements on landings. As described in section Appendix IV, the NSSG evaluates the number of operating fishing vessels below 20 HP, from which an indication of landings is dderived, under the assumption that each vessel catches a fixed amount of fish each year. Hence, it is pointless to attempt validation of the existing data series. More specifically, it is not possible to make appraisals of errors and biases introduced during the processes of data collection and treatment, simply because the NSSG data are out of any statistical control.

The second difficulty relates to the inaccuracy of the registry data concerning the number of "under 20 HP" vessels, one of the two parameters required for the evaluation of the 'national production' from these vessels. At the current project design stage, it was logically assumed that the national registry data on the number of vessels for this fleet segment and our landings data from the "Sample Survey for Basic Data" would be sufficient for the successful evaluation of the national production. However, while the data concerning the catches of vessels below 20 HP obtained during the course of the project were considered quite 'accurate', the national registry data concerning the size of the fleet under examination were evaluated and considered as biased and unreliable. The main biasing reason lies in the fact that the official registry data refers to the recorded 'nominal engine power' which, as was found during the course of the project, could be far different than the 'actual'.

In other words, it became strongly apparent that a significant part of the examined fleet has stronger engines than the ones registered. As has been explained in previous sections of this report, this is partly due to the fact that some fishermen fitted an engine stronger than the one recorded in their license, and partly to that during the census of the Greek fishing fleet that took place between 1988 and 1991 (and which formed the basis of the subsequently established registry of fishing vessels), the engine power of many vessels was misreported. Under such circumstances, it is impossible, under the means available, to reach at an assessment of the actual size of the examined fleet, in order to proceed with the estimations required to arrive at national landings data. As indicated in other parts of the report, the fishermen were reluctant to speak openly on this issue, because the replacement of the registered engine with one of higher power is illegal and strictly punished.

These difficulties prevent an assessment of the landings of vessels with an actual engine power below 20 HP, and also prevent to proceed with a validation of the existing data series. However, the collected data could possibly be extrapolated to the registry data in order to make assessments of the landings of the vessels that are administratively classified – for statistical purposes - in the fleet category "under 20 HP", and which actually refers to vessels with a nominal engine power below 20 HP. An important assumption, and in fact a prerequisite, for such an extrpolation is that our sample of vessels is representative of this fleet category. There is no direct method to support or refute this assumption. The engine power and other information recorded in the licenses of the vessels of the sample could only be checked with the registry data to affirm consistency. Agreement with the registry data was confirmed in all cases. Moreover, it was noticed that in some vessels the nominal engine power was clearly labelled on the engine. Despite these facts, the accuracy of the information provided in the registry and recorded in the licenses could not be tested independently.

Another possible approach was to re-interview selected fishermen in the hope that they would accept to comment on the actual engine power of their vessels. During contacts made at the final stages of the project, fishermen were given a full explanation about the aims of the project and were prompted to state the actual engine power of their vessels, under the promise that this information would be strictly confidential and their names would not be made known to the authorities. Although the fishermen were very collaborative in commenting on general issues of the engine power problem, their suspicious did not disappear and they avoided to give a clear reply.

However, some fishermen provided indirect evidence confirming that, at least in most areas covered by the investigation, the "actual" engine power was far different than the "nominal" one. One fisherman stated: "*There are almost one thousand vessels in our prefecture, of which more than half have a nominal engine power under 20 HP. However, you will hardly find today professional vessels with an actual engine power under 20. I know few such vessels, and these are owned by retired fishermen*". According to another fisherman: "*Don't ask the fishermen to reveal to you their engine power, some colleagues have been severely fined for replacing their engines. If you want my opinion, a boat with an engine below 20 HP is not a professional boat*".

The general impression left during the interviews is that not many active fishing vessels with an actual engine power "under 20 HP" exist in the studied areas. Exceptions may exist, as seems to be the case with the area Vonitsa, where it was ascertained during interviews and discussion that an engine stronger than the recorded one is unnecessary for the local conditions and the type of fisheries practiced there. Another possible exception is the area Gytheio, where the sample of vessels was established on the basis of the experience of the local enumarator, who is very familiar with the local fishing conditions and the fishing capacities of all local individual vessels.

In line with this general tendency, the researchers consider that a perhaps significant – but non quantifiable - portion of the vessels comprising the project's sample have engines with a power over 20 HP. Since, however, all sampled vessels are administratively classified as "under 20 HP", one could suggest that the sample is

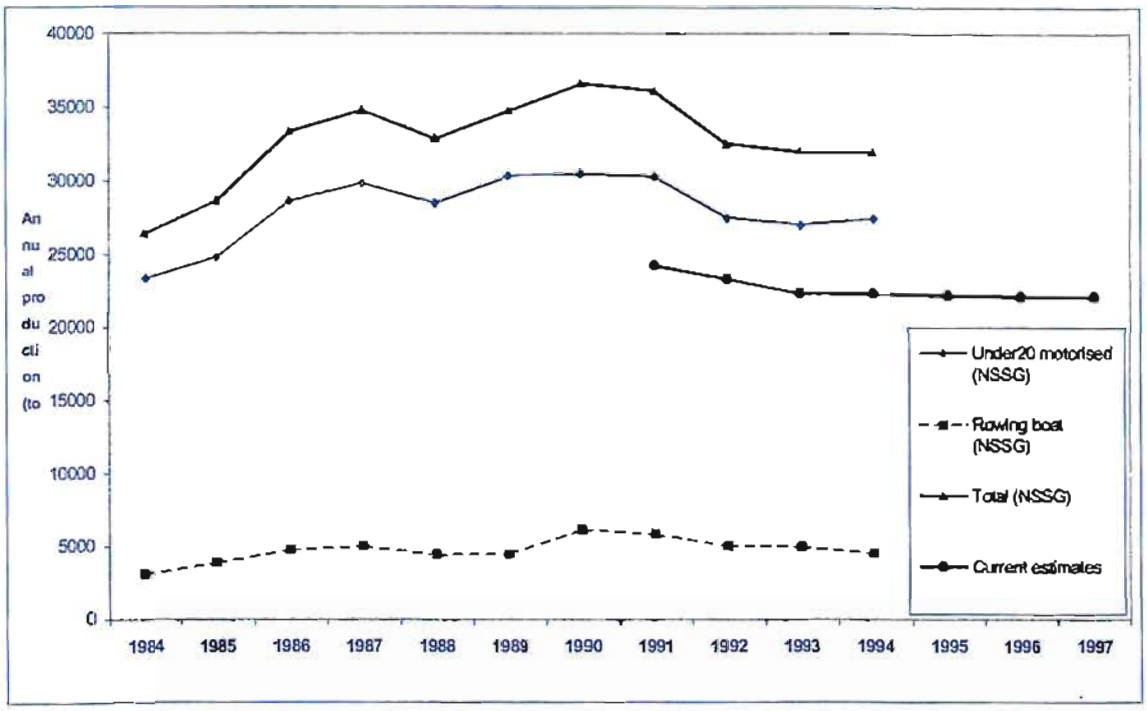
representative of the fleet segment that is administratively referred to as "under 20 HP". However, the rsearchers acknowledge that the representation is not statistically viable, because it could not employ a stratified random sampling scheme to select among engine power classes. Nonetheless, the landings data could be used to obtain an at least rough approximation of the productive capacity of this fleet segment, for which which the official statistical data are neither complete nor reliable.

Figure 34. illustrates the chronological trends of production, of vessels with a nominal power "under 20 HP". These trends were established by multiplying the total number of fishing vessels of this fishing category (registry data) by the estimated in the present study annual average production of an individual vessel (1812 kg). For comparison, the Figure 34 also shows the trends of production of the portion of this fleet segment that were derived using the NSSG fleet data (marine vessels only) and the assumptions that (a) each mechanised vessel catches 2 tons of fish annually, and (b) each rowing boat catches 1 ton of fish annually. The two trends are not easlily comparable, because they are based on different estimates of the number of fishing vessels. In fact, the curve A is based on the registry fleet data for vessels with an engine power below 20 HP, while the curve B is based on annual assessments of the number of vessels below 20 HP according to the surveys conducted by the NSSG.

The amount of landings assessed in the present study is lower than the ammount assessed by the NSSG. This is partly because the registry gives a lower number of vessels below 20 HP than the NSSG, and partly because the estimated, in the present study. average annual production per vessel is lower than the average annual production assumed by the NSSG. Nonetheless, interpretation of these data should be made with extreme caution. The only practical utility of the estimated production figures is to arrive at a gross evaluation of the annual amount of landings originating from the fleet category "under 20 HP", which is a fleet segment insufficiently covered by the current statistical investigations. However, no inference should be made to the amount of landings that come from vessels actually having an engine below 20 HP.

Similarly, no inference should be made about the productive capacity of individual vessels in different time periods. It may appear, on the first sight, that the present estimate of the average production of a vessel (1812 kg/year) is close to the estimate provided by the NSSG for the period 1964-1970 (2000 kg/year), but these figures do not provide an absolute basis for comparisons. The present estimate refers to the production of vessels with a "nominal engine power" below 20 HP, while the NSSG estimate, calculated over a period that no engine power limitations had been put in force, probably refers to the production of vessels with an "actual engine power" below 20 HP. Taking into account (a) the lower engine power of vessels upon which the NSSG estimates were based than the engine power of vessels upon which the current estimates were based and (b) that since 1970 many technological imporovenets have occurred that modified the fishing effort, we can deduce that the slight decrease of the average annual production observed since 1970 has been accompanied by a high increase of the fishing effort and consequently by a significant decrease of the catches per unit of effort. This evidence may be taken to suggest the consequences of overfishing.

FIGURE 34: Chronological trends of the national production of vessels with a nominal engine power under 20 HP.



3.5. Socio-economic, operational, environmental and technical aspects of the coastal fisheries

Despite the fact that the program had been originally designed to collect and evaluate 'quantitative' information about the 'under-20 HP' fisheries sector, it was decided through the course of the program that such information, in order to be further validated and justified, should be associated with qualitative information, particularly as it regards issues of socioeconomic interest of the sector. For the collection of such information a significant number of fishing ports was visited (Fig. 2) and numerous interviews held with fishermen and/or their representatives and with administrative authorities. The geographic dispersion of the areas examined was designed to cover, in its greatest part, the small-scale coastal fishery sector within the Hellenic state, in order to define common problems and perceptions, as well as any potential regional differences that may exist.

As stated at an earlier section, fishermen with vessels below 20 HP cannot be considered as a well defined and recognisable professional group. Rather they comprise an almost indistinguishable component of the group of coastal fishermen. Under such circumstances it was difficult during the interviews to confine the discussion only to issues related to the fisheries operated by vessels below 20 HP. It was more meaningful to target all aspects concerning the coastal fisheries practiced with relatively small and/or underpowered vessels, focusing to the analysis of problems associated with small engine power, and particularly on the impact of the limitations on the engine power imposed by the State.

The findings of these meetings and interviews are organised in two parts. In the first one, the material collected is given by fishing area examined, with special emphasis on issues of local importance. In the second part, the common issues of concern are presented, in a somewhat integrated manner, according to a basis of common problems, trends and perceptions. Each set of information is referenced in terms of actor and location, further supporting the issues raised. These issues have been compiled in such a manner as to facilitate the reader towards a n integrated comprehension of the sector.

The first part, containing the information collected, is provided in Annex I and describes the main characteristics of the examined sector by area. All organisations contacted are engaged in coastal fisheries. In order to facilitate comparisons, effort was devoted to present the information for the different areas in a compatible way. The results of the investigation should be treated with caution. The descriptions provided are based on information provided by coastal fisheries organisations or individual fishermen, and therefore illustrate the conditions and problems of the study fisheries from the fishermen's point of view. There was no way to confirm or dispute the fishermen's statements and claims, except in some of the areas visited, where the local fisheries inspectorates were asked to comment on the fishermen's statements. The attitudes of the fisheries officers are presented separately. Unfortunately, it was not possible to investigate the opinions and attitudes of other 'users' of the marine environment, such as medium fishermen and fish farmers.

The analysis that follows largely summarises the results of the meetings and interviews that were held. The views of the General Directorate of Fisheries of Greece (Ministry of Agriculture) on some issues raised by the fishermen are also provided. The analysis also compares, to the degree possible the views of the fishermen and of the local and central administrative authorities and points to similarities and differences of opinions.

3.5.1 Social and economic aspects

In comparison to landings, the coastal fisheries sector contributes more to employment than other sectors of the fishing industry and employs more workers per capital investment. The vessels are relatively small, family-owned, and low-cost units, which rarely employ crew other than the owner, and perform short trips close to the home port.

There has been a limited amount of research aiming to explore the socio-economic framework of the coastal fisheries, particularly the small-cale one. Coastal fisheries acquires a greater relative importance in poor and remote areas where alternative activities are limited or highly seasonal. The fisheries income differs from place to place and it is generally low in comparison to the income from other professional activities. The educational level of fishermen is low. There is lack of harmonization at a national level of the medical, pensioning and security systems. Fishermen are covered under different social regimes regarding illness, medical care, accidents and pensioning, depending on previous or other associated occupations, and on working status (employer or employee). Pensions are generally low and are usually granted at an age of 65.

The products are sold fresh. Due to low volumes and high commercial value, the predominant way of marketing is the direct selling to the consumers or to restaurants. This is particularly true during the tourist season or when the landing takes place in or near towns, where market demand is high. In some remote areas and island with infrequent connection with the mainland the fish are sold to retailers or are marketed through middlemen. The middlemen undertake transport and all subsequent steps of marketing, and also provide equipment and several services to the fishermen, such as fish-boxes.

It seems that the role of middlemen in some areas is declining in comparison to the previous years, and a possible reason is that now fish are caught in such low quantities that this particular marketing channel is no longer necessary. *"We used to sell the fish to retailers but now we sell to consumers or to restaurants because the quantities are small. Even the beach-seine fishermen, who made large catches in the past, now sell with the balance scale in the pier"* (fisherman from Mantineia).

Direct selling to the consumers increases the profit of fisheries, but the gains are often outweighed by the decrease of catches. *"In the past the prices of fish were low, and the*

profit went to the retailers and middlemen. Now we sell the fish in the port, but the profit we make is low, because we catch less" (fisherman from Glyfada).

In remote areas or out of the tourist season, lack of public infrastructure (e.g. cool rooms) and bad professional organisation sustain the economic dependence of many fishermen on middlemen, who often act as bankers. *"Regulations today demand the fish to be transported in cool chambers or refrigerators. A small scale fisherman who catches one box of fish at maximum cannot create this infrastructure, neither to deal with boxes, licenses, ice, etc. In addition, transportation to the Pireus port takes 24 hours, much more if the weather is bad and the navigation is interrupted. Islanders are at a disadvantage in comparison to fishermen from the mainland and they have higher expenses for package and transport. The creation of cooperatives is a solution, now they have to depend on middlemen"* (fisherman from Mytilini).

Family tradition or love for fishing were frequently stated as the main reasons for becoming fishers. *"If somebody will enter in a fishing boat when he is young he will become a fisherman for life"* (fisherman from Zea). However, the catches are decreasing, and it is only because of lack of alternative job opportunities that many fishermen remain in the profession as full-timers. *"It is only myself and my son who continue to fish on a daily basis, all others have land property and go fishing during the good fishing seasons only. If I owned land I would do the same"* (fisherman from Amphilochia). It seems that an increasing proportion of fishermen become part-timers and these are seasonally engaged in other professional activities, including agricultural works, tourism and various services, in order to complement their income. Sometimes the reverse is true, i.e. people mainly occupied in other professional activities are temporary involved in small-scale fishing, usually during the tourist season. *"There are 25 professional fishermen here, only three of us work all the year round. The others have land or rent rooms to tourists. There are also 30 sport fishermen who fish regularly and sell the fish"* (fisherman from Lygia).

While older people tend to remain in the fisheries, even as part-timers, the recruitment of young people to the fisheries is declining. One reason is unprofitability. *"In Paros fishing is a family activity, it goes from father to son. Now the succession will be interrupted, youngsters do not want to become fishermen"* (fisherman from Paroikia, Paros). *"The fishing expenses have increased. In 1980 I used 500 fathoms of net and now I need 4,000 fathoms. The price of the net has increased, the damages from dolphins are more frequent, the diesel is more expensive and I need more. A family hardly lives only on fishing"* (fisherman from Mytilini). Another reason is difficulty to obtain a fishing license due to limitations in entry. *"According to a recent statistics, only 10 % of the fishermen in Mytilini are between 27 and 40 years of age. There are many pensioners, farmers, owners of hotels, and other people with little relevance to the fishing profession that have fishing licenses. These licenses should be taken away and be given to real fishermen and their sons"* (fishermen from Mytilini). Of course, there are exceptions to the rule *"Our island is rocky and our main activity is fishing. Tourism lasts only three months. There are many young people in our fleet, 60 % of the fishermen are below 45 years old"* (fisherman from Kalymnos).

Judging from the demographic characteristics of the fishing populations and the replies of fishermen in the areas visited, it is suspected that the implementation of the policy measures that accompany the restructuring operations (e.g. redeployment operations) will be met with difficulties. The main problem relates to poor adaptability to activities outside the fisheries sector, especially of the older and of poor educational status fishermen, and arises from the independence, individualism and strong tradition that characterises the profession. *"The fisherman is a lonely character, he spends many hours at sea and has little contact with the society. Those who want to help the fishermen do not know how to do it. Training and other measures aiming to encourage the switch of fishermen to aquaculture and other professions will fail. The fisherman is like the seagull: Neither of the two can live in a cage"* (fisherman from Mytilini). However, coastal fisheries is compatible, and sometimes overlaps, with lagoon aquaculture. A longstanding demand of the coastal fishermen of Messolongi is to be granted the management and exploitation of the local lagoons.

There is evidence from independent sources (fisheries organisations, Fisheries Inspectorates, General Directory of Fisheries) that the catches are decreasing (see below). It is only the advantage of disposing the products at high prices that still confers some profitability in fishing. In the view of many fishermen, the decline of production started about 20 years ago. Initially the impact on the fisheries income was not severe, because the prices of fish were rising and this rise mediated the drop of production. In the '90s, however, the yields decreased so dramatically that the advantage of disposing the products at higher prices did not compensate for low catches. Another major impact on income has resulted from the increase of the fishing expenses due to the need for more gear and extension of the fishing operations to distant fishing grounds. Showing a 2 kg dentex, a longline fisherman from Korinthos stated: *"This is the only fish I caught today, I shall sell it about 10,000 drachmas, but I spent 4,000 drachmas for fuel and bait. I was luckier than other colleagues who caught nothing. Once there were many such fish in our area, now they are scarce. Up to 1990 I lived only on fishing. Today I spend more days on other jobs".*

It seems that the situation has deteriorated in the last three years due to the stagnation or even decrease of the prices of fish caused by massive imports of fresh fishery products. The fishermen claim that most fish now sold in the market come from abroad and blame the administration for ineffective controls in the market. *"This is unfair competition. Our fish are expensive because we spend much on gear, damages, etc. The consumers are prepared to pay much for a local fish, but many shops and taverns cheat them, offering imported fish as of local origin"* (fisherman from Nea Kios). *"Fish imported from Italy or Morocco are 4 times cheaper than our fish. To make a good catch, a longline fisherman must put in the sea 3,000 hooks, but how can he now sell his fish at a reasonable price?"* (fisherman from Mytilini).

3.5.1.A Professional organisation

Fisheries associations seem to be the prevailing organisation scheme. Usually, there were more than one associations of coastal fishermen in the areas investigated. The main activity of the associations is to represent the fishermen in the administrative authorities and to protect their interests from competing fishing sectors.

With few exceptions (e.g. the fisheries cooperative of Stylida and Alexandroupolis, or cooperatives hiring State lagoons), there are no many active cooperative organisations in the fisheries sector. Most other cooperatives in the areas visited do not fulfil the scopes of their existence. The active cooperatives have managed, without appropriate support and incentives, to organize the provision of supplies to their members (nets, other equipment), to construct storing rooms and to create marketing infrastructure. Some of them intervene in environmental and management aspects and implement to their members discipline to the conservation rules.

The associations and the cooperatives include members only from the coastal fisheries sector and rarely they have a mixed structure. Only the fisheries association of Githio of those conducted includes in their members fishermen from the medium fisheries sector.

Greek fishermen have not adopted the Community producer-organisations schemes. One reason seems to be the lack of appropriate incentives, reflecting the particular marketing and socio-economic conditions in coastal fisheries. Given the local and extremely scattered nature of coastal fisheries, the other reason might be the difficulty to attain the production level set by the Community rules for establishing such organizations. Taking into account the strong local character of coastal fisheries, the great variety of fishing methods, the numerous landing places, and the low economic, educational and social status of fishermen, this sector should be organized according to standards different than those applied to the fisheries of other European countries.

Nevertheless, many of the interviewed organisations and fishermen do feel the need of organisation and acknowledge the advantages of the effective professional organisation, both at a local and at a central scale.

3.5.1.B Investments

Before 1990, the coastal fishing vessels, and especially the smaller ones, were excluded from the community structural policy, as vessels of length lower than 9 m were not considered for community aid. On the contrary, the medium fisheries vessels have benefited largely from Community financial assistance. The full applicability of the community structural policy to the medium fisheries reflected to a significant number of constructions and modernizations of vessels.

Coastal fishermen have also little support from national support programmes (aids and loans), because they are economically weak, of low educational level and inexperienced in administrative procedures.

Subsequent structural policies included a more satisfactory reference to the coastal fisheries, especially as regards restructuring operations. This report did not investigate

quantitative aspects of the various support schemes and their impact on the study fisheries sector. It was noted, however, during the interviews, that only few fishermen were satisfied with the conditions of financing or the achievable outputs. Even fewer were those who have benefited from grants. Some representative replies are cited below.

"I have never taken a loan. I feel insecure" (fisherman from Amphilochia). *"The bank sent me the red card for seizure. I own 1,200,00 drs. I have a boat 9 m long, it is uneconomic"* (fisherman from Naupaktos). *"I had 2,000,000 drs, I invested this sum to the boat. Now I do not have money for my family. I have applied for withdrawal and I shall use part of the money to buy a smaller boat. However, the procedures of withdrawal have been suspended"* (fisherman from Naupaktos). *"I owe to the bank 1,200,000 drs for the boat and another 300,000 for the nets. If dolphins will come I shall have a real problem"* (fisherman from Preveza). *"There are programmes supporting new agriculturists with 7,500,000 drs, plus their equipment. Why new fishermen are not subsidised?* (fisherman from Mytilini). *"Most of those who got loans from banks have not been able to pay back the loan and have lost their vessels"* (fisherman from Mytilini). *"Very few coastal fishermen have benefited from grants. In the past only vessels larger than 12 m were eligible for grants, and these vessels are unsuitable for our fishing conditions"* (fisherman from Zea). *"In the past, it was difficult for a coastal fisherman to get a grant from the EU for vessel construction or modernisation. Most fishermen took loans from the Agricultural Bank of Greece. These loans were very expensive, due to high interest rates. Many fishermen are not in a position to pay back the loans and have applied for a withdrawal, in order to get money for settling their dept. Things are better now due to that the EU grants have been accessible to coastal fishermen and the interest rates have decreased"* (fisherman from Kalymnos).

On the contrary, the General Inspectorate of Fisheries considers that the application of the support systems has been satisfactory and that the coastal fisheries has absorbed adequate funds, especially for restructuring operations. Probably most of these funds have been used for withdrawals, reflecting the desire of the administration to see a rapid decomposition of the coastal fisheries sector.

It is tempting to suggest that while there were not always definitely positive effects from the support schemes to the study fisheries sector, there were some negative effects:

(a) The favourable financing opportunities attracted several businessmen in the sector, leaving aside people with a fisheries tradition in the claims of fishing licenses.

(b) Accessibility to grants has contributed to the significance expansion of the capacity of the fleets, especially of the medium fisheries sector, and perhaps has played a part in the generation of overfishing. Given their limited access to grants, and also that the fishing environment became more severe and competitive, the economic condition of small-scale fishermen deteriorated. and

(c) Eligibility criteria and the stronger incentives for large boats led to overinvestments, since many fishermen constructed large and uneconomic boats.

3.5.2. Operational aspects

3.5.2 A .Management framework

The primary goal of the EEC common fisheries policy is to sustain the abundance of resources at sustainable levels and to maintain the employment opportunities in the fisheries sector. In line with this policy framework, the focus of the Greek fisheries management/conservation system has been to adjust the fleet capacities to the availability of resources and to regulate the fishing mortality, especially of juvenile fish, through a package of technical measures.

The adjustment of fleet capacities is pursued through a licensing system and limitations on technology. The fishing mortality is regulated by technical measures aiming primarily at restricting the catches of undersized fish, especially in the coastal zone and certain gulfs and estuaries. Such measures may concern the seasonality of certain fishing activities, gear specification or deployment, rules on mesh size, minimum landing sizes, etc.

The conservation policy is accompanied by structural measures providing assistance for the restructuring of the fisheries sector (modernization or withdrawals of vessels, reorientation of fishing activities), measures for the organisation of the markets and measures for the strengthening of the organisations of fishermen.

How effective has this policy in preserving the resources and maintaining employment? How the changes that have occurred in the exploitation patterns or the restrictions that have been imposed in fisheries have affected the study fisheries sector? An analysis of the views of the coastal fishermen and the administration on the effectiveness and usefulness of these policy measures is provided in the section describing the state of the stocks and the problem of overfishing.

3.5.2.B . Law-violation detection and prosecution policy.

In most areas, the problem of implementation of the legislation seems to be more important than the problem of legislation per se. The great length of the coastline, the enormous number of small boats and the existence of numerous landing places make difficult to monitor fishing activities and perform inspections of the landings.

"Despite the prohibition, the trawlers enter the gulf, sometimes reach the port and damage the resources and our gear. The purse-seiners work in the estuaries of Mornos. Fishing with small meshes, dynamite and chemicals in the estuaries is a daily phenomenon. The local coast guard is trying to control illegal fishing but they do not have a vessel. Only the vessel of the coast guard of Patra comes occasionally to perform

inspections" (fisherman from Naupaktos). *"The coast guard is chasing us while the trawlers are fishing 500 m from the coast"* (fisherman from Mytilini). *"There are three patrol vessels here, their main concern is to chase illegal immigrants. They find no time to deal with the "dynamite" fishermen or the sport fishermen, who work without controls. The area Mastichari is prohibited for trawling by a Ministerial Decision, but the decision is only "in the papers". When the trawlers enter the area, all patrol vessels are out of order"* (fisherman from Kalymnos). *"The patrol guard either cannot or does not want to control illegal fishing. We understand their problems, but why are they chasing only us?" (fisherman from Glyfada). "The trawlers have almost eliminated the hake, the red pandora and the red porgy, the patrol guard cannot control the situation. To catch them in action, we organised a sudden raid along with the patrol officers during a storm"* (fisherman from Mantineia). *"The patrol inspects us for formalities, like flares and life-vestss, instead of prosecuting the illegal sport fishing"* (fishermen from Korinthos and Lygia).

Considering the heterogeneity of the fishing activities, the great number of fishermen and the vast extent of areas to be supervised, the problem of implementation is difficult indeed. One possible solution to the problem is to get the fisheries organisations actively involved in management. Such a management scheme requires the establishment of effective fisheries organisations and is preferable if it will be seen from the side of the cost of management (administrative, patrolling, inspection costs, etc).

3.5.3 Technical aspects

On the basis of inventory data, the study fleet (vessels below 20 HP) is comprised of 12,133 vessels, more than half of the Greek fishing fleet, of which almost all belong to the coastal fishery category. A high proportion of vessels is underpowered, poorly equipped with navigational and electronic equipment, and lack cool and storing places.

The boat characteristic and fishing practices reflect the Mediterranean fishery situation and clearly fits the characteristics of the small scale fisheries, as defined in Council Regulation 3944/90. The majority of vessels are less than 9 meters in length between perpendiculars, are worked by one person, and rarely two, their fishing expeditions usually last less than 24 hours, and they operate mostly within the one-mile zone. It should be mentioned that one mile from the coast determines the boundary between coastal fishery and the fishery conducted by trawlers (under the Mediterranean common fisheries policy, the prohibition for trawlers has been extended to three miles from the shore). Nursery grounds of many commercially important species are to be found in this narrow zone, especially in enclosed gulfs and river estuaries.

With the exception of some specialised fisheries (traps, dredges), the study fleet is comprised of netters and longliners. Fishermen frequently change from one type of fishing to the other another, depending on the area and the season and on the availability of local resources. In the mainland the most commonly used fishing gears are nets. In the past the longlines were used more commonly, but now this activity has become uneconomic in many areas. Fishermen try to explain why: *"Longline catch good quality*

fish like red pandora, dentex, white sea bream and red porgy. Now big fish of these species are rare. In addition, the markets are full of such fish which are imported fresh from abroad. We cannot compete the imported fish, they are very cheap. Few days ago I put a longline with 700 hooks and I caught 2 kg of red pandora, and these were small fish" (fisherman from Mantineia). *"Here all fishermen use nets, only three of us still use longlines. All fish caught with longlines are rare, the sea bream and the white sea bream have disappeared. Also, I hardly find a place to set my gear, the sea is full of sport fishermen. Since they use expensive bait I must also buy expensive bait*" (fisherman from Korinthos). *"Fishing with longlines is expensive and takes much time to mend the gear, to put the bait, etc., you need to have assistance, but workers cost much. I occasionally use this gear, but it because my wife provides assistance*" (fisherman from Preveza). In some islands, however, longline is the most important fishing gear, due to tradition and because the rocky nature of the bottoms favours this particular manner of resource exploitation.

According to the collected data, the optimal vessel size is between 7 and 10 or 11 m. Smaller vessels have difficulty to make distant trips, handle bulky gear or perform exits with bad weather. *"A 6 m long vessel is uneconomic. You cannot use more than 1,500 m nets"* (fisherman from Lygia, near Preveza). However, it seems that small vessels are suitable for part-time fishermen, who fish only in favourable fishing periods, due to low operational costs. Larger vessels too become uneconomic due to high maintenance and operational costs and the need for at least one worker in addition to the owner. *"My vessel is 13 m long, I have applied for withdrawal. It is uneconomic, I need 600,000 drs in a year for maintenance plus a worker"* (fisherman from Mantineia). However, by no means this is a general rule. In exposed areas or when fishing is practiced away from the fishing port, a large vessel size provides an advantage. A fisherman from Kalymnos justifies this position: "*We must fish all the year round, to travel long distances and to withstand bad weather conditions. The ideal vessel size is between 8 and 13 m. For profitable fishing, a bottom longliner must be able to switch to nets, thus room for the nets must be available, and seasonally to fish swordfish with drift longlines, which means that a trip may last up to 20 days*".

On the basis of evidence from the restructuring programme, two fisheries inspectorates have assessed that there is a strong tendency for withdrawals of vessels 4-6 m and 11-13 m. The former are unprofitable, and the latter uneconomic due to high operational and maintenance costs and/or inability of the owners to pay back the loans obtained for their construction.

3.5.3.A . The problem of engine power

While decommissioning is one way of decreasing the number of fishing boats operating in a particular area and relieving the stocks from overfishing, control of the engine power of vessels is another way of bringing the fishing capacity of the fleet in line with the availability of resources. To prevent the increase of the engine power of the fleet beyond the limits set by the MAGP, a *status quo* has been introduced with reference period the year 1989, when the census of the fishing fleet took place and the engine

power of all vessels was registered. This means that vessel owners are not allowed to replace their engine with another of higher power, neither to replace their boat with another boat of a higher engine power (note, however, that under certain circumstances they can replace their boat with a larger one while keeping the engine power unaltered). An exception was granted to vessels with engines below 15 HP, in which case the owner can buy an engine up to 15 HP.

The engine power influences the fishing capacity in a number of ways (distance travelled, trip duration, depth of fishing, kind of gear, amount of gear, etc.) and also provides safety during adverse conditions. With the reduction of fish stocks through intense exploitation the need for a stronger engine increases, because more distant and less fished fishing grounds should be reached, new species should be targeted, new fishing techniques should be employed and more bulky gear should be handled.

During our investigation we found only two areas where the fishermen do not feel the need for stronger engines. The one is the island Paros, where during the census registration all but 5 fishing vessels out of about 100 were refitted with engines of stronger power. In the town Amphilochia too there is no need for stronger engines than the registered ones, but for different reasons. Although most vessels are underpowered (usually below 15 HP), the fishing conditions and the socio-economic structures do not generate the necessity for increasing engine power (the enclosed Amvrakikos gulf is protected from winds, almost all fishermen are part-timers, and fishing is a very local activity).

In the other areas visited, the fleets are underpowered. According to the local organisations, more than half of vessels of the fleet of Volos, about 80 % of the fleet of Kalymnos and almost all in Mytilini have nominal engine power much below the one needed for operation. Similar figures were provided by all other organisations.

The limitation imposed on engine powers is a matter of major concern and constitutes an issue of debate with the administration. *"There was a seminar in Preveza, we asked the fisheries officers what is going on with the matter of engine power. The replied that they are going to put the matter to the EU and we shall be informed. We are still waiting"* (fisherman from Preveza).

Fishermen strongly oppose these limitations on two grounds: they are unfair and they are irrational and illogical. On the first issue, they stress primarily that a small engine makes fishing an extremely dangerous operation, because the boat cannot be safely navigated under adverse conditions. Several fishermen have lost their lives when a sudden change in weather occurred when they were away from the port, while others have lost their vessels and their gear. In addition, low engine power does not permit to use proper gear, reduces the number of fishing days and prolongs the trips.

On the second issue, fishermen point out that the rules do not take into account vessel size, activity and professionalism. Those who are particularly affected are the fishermen

whose vessel engines were either accidentally or erroneously misreported during the census. It may have happened, for example, the engine power of one vessel to be reported much lower than the engine power of another but otherwise similar vessels (e.g. in typology, size or tonnage). The second vessel has the advantage of having a stronger engine than the former, even if it is not required. On the contrary, fishing might be impossible with the nominal engine power. The fishermen also stated that sport fishing vessels, many of which fish in an entirely professional fashion, are not subject to engine power limitations.

Most fishermen accept that engine power is a factor having a strong effect on fishing effort, and do not disagree with putting a maximum allowed limit on power. However, they argue convincingly that the limits should be set by engineers and should be related to the vessel typology and size. A relatively small proportion of fishermen consider the restrictions on engine power are unnecessary for the purpose of sustaining the fisheries. In their view, the limits on engine power do not reduce fishing effort, but rather result in high concentration of effort in areas close to the fishing ports.

It is interesting at this point to investigate the origin of problem and to examine more closely the conditions and misunderstandings under which the census of 1989 took place. During discussions with fishermen and administrative officers, four reasons were identified to be responsible for the problem. Usually, in each area there was a combination of more than one reasons.

During the census the fishermen were asked to present their fishing licenses. If the license included a record of the engine power, this record was fixed in the registry and was taken to be the nominal engine power of the vessel. Due to that many licenses were old, a much lower than the real engine power was registered for many vessels. *"Many licenses were old, even from the year 1950, and the actual engine power at the time of census was different than the one recorded in the license"* (fishermen from Mytilini). *"They did not inspect the engines, they just asked to see our licenses. Some licenses were 20 or 30 years old"* (fishermen from Stylida and Zea).

About 30 years ago several Greek firms (e.g. *Papageorgiou, Markoutsi, Roditi, Axelou, Papathanasis,* etc.) were manufacturing marine engines, commonly known in Greece as "heavy type engines". These were low speed but particularly strong and reliable engines, and some of them are still in operation. The units by which the power of these engines was measured did not correspond to the international units. Actually, one unit was slightly less than four units of the engines manufactured abroad (according to other information, one unit was equal to 4.5 international units). During the census, the power of vessels equipped with such engines was recorded in the registry as nominal, even though the actual power was higher. *"The real problem emerged later, when the old engine had to be replaced but a new "heavy type" engine giving the same power could not be found"* (fishermen from Volos and Zea).

"When the census was taking place in our prefecture, nobody knew what exactly was happening. We, the administrative officers, had not been properly informed about the

scopes and the consequences of the census. Some officers advised the fishermen to declare a lower engine power than the actual, especially in cases when the power was not recorded in the license. In the fear that a high engine power could have some negative consequences, e.g. on taxation, the fishermen followed their advise" (fisheries officer).

Permission was granted by the State to replace old small vessels with larger ones that satisfied the modern need for hygiene, marketing and working conditions. Many fishermen responded and constructed larger vessels. However, no permission for a stronger engine was granted, with a result that the new vessel has an improper engine in relation to its size. Although the fishermen were aware that the restrictions on engine power were maintained, they undertook the cost of replacing their vessel on the anticipation that the restrictions would be raised at a latter time.

Regardless on whether the restrictions on power are correct or necessary, these restrictions have serious socio-economic implications. Fishermen were indignant with the restrictions on power and blamed both the administration and the EU for being entirely ignorant of the fishing situation and the problems imposed to them. They characterised the rules, "silly", "ridiculous" "destructive", etc., and accused the fisheries officers for being unable to understand the problems of fisheries. Expressions like these "*The central administration never came to discuss with us the problem*" "*Have they ever been on a boat?*" "*Do they know what engine is needed for a 10 m long boat*" were quite common.

It seems that an unclarified proportion of fishermen have changed the nominal engine power of their vessels. The normal practice is to replace the engine with one of higher capacity. In some but relatively few cases, an outboard engine is added. This is also an illegal practice. The discussions on this issue stroke a sensitive chord, because this change is strictly forbidden and heavily penalised. Therefore, most fishermen were unwilling to discuss on this issue.

Although most fishermen did not spoke openly on the issue of engine power, our feeling was that in at least some areas, the extent of violations is not insignificant. Some of the fishermen interviewed were involved in the discussion and clarified their arguments. *"In my village, all vessels except two have a registered engine much below the one needed to practice fishing. If one wants to continue fishing he must put a stronger engine, otherwise he must look for another profession". "There would be no professional fishing in the gulf if the rules on engine power were enforced". "If a fisherman fully respects the rules on engine power he must abandon the profession, because with the permitted engine it is almost impossible to reach suitable fishing grounds or to use proper gear". "My nominal engine is 20 HP, the real is 65 HP. Before I put the new engine I could not manage. Now I go to Corfu, stay there for 1-2 months and come back with some money". "The bay is heavily polluted. Should I had kept the initial engine I could not go out". "My boat is 10 m long, the nominal engine is 18 HP, with this engine the boat could not move. I have put a 45 HP engine, but 90 HP would be required". "I live only from fishing. I have to move continuously. Each species has its own season, its own area and needs a particular net. In winter I fish with*

16-18 mm gill nets for picarel in Aegina, in April I go to Methana for cuttlefish with 36 mm trammel nets, in October I use "karteria" with 26 mm for mullets, sometimes I go to Astros for hake with 26 mm trammel nets. My license says that my engine must be 24 HP. Tell me, how I could do this fishing with 24 HP?". "I have to move to Kefalonia, Astakos and Zakynthos, because there are no fish left here". "Yes, pensioners and farmers do not need a strong engine, they fish for red mullet in the gulf only when the weather is good. I am a professional, what will happen if the wind start and I am out?". "I work with a bonito net, when it is wet it weighs 1.5 tons. With the 25 HP allowed for my boat it cannot be pulled up". "The real fishermen need a strong engine to go to Kyparissia and Tainaro, there are no fish left in the gulf. Outside are the trawlers, inside are the dolphins and the beach-seiners. If you go fishing in the gulf you will hardly cover your fishing expenses".

Such statements were frequent in all areas visited. Although fishermen may exaggerate things, the research group was left with the impression that the restrictions on engine power is a matter of major concern. First, it has a significantly negative effect on income, safety and working conditions. Even if the fisherman decides to violate the rules, he must pay much for acquiring an engine of specific design and the accompanying documents. He must also be prepared to pay for various other associated costs. Last, he must accept the risk of being severely fined and his license suspended in case he is detected. The penalties are really severe: a fine of 500,000 drs, suspension of the fishing licence until the re-instalment of the proper engine for up to one year, and then another six months subversive notice. Second, it generates unfair discriminations among fishermen that usually act against the more active and more professional fishermen, and thereby prevents to achieve economic and social cohesion within the fisheries sector. And third, it provides a strong motive for breaking the rules, either by replacing the engine or by being practicing illegal fishing, and thus makes difficult to attain consensus in the implementation of the management policy and the conservation measures. Since the coastal fisheries bears a strong social character, the fisheries policy must have adequate flexibility to take into account the features and problems of the fishery.

During a meeting with officers of the General Directorate of Fisheries, the research team of this study transferred to the administration the views and claims of fishermen and described the scale of the problem. The officers were aware of the situation and problems and justified their policy as following:

"In 1986-1987, when we were asked by the Community to provide data on the fleet, there were only assessments. Unfortunately, the figures we sent on magnitudes of the fleet were underestimations, but these figures fixed us in someway. The census of 1989 revealed higher figures, but these again turned to be underestimations, due to various methodological errors and misunderstandings. Regarding the engine power, lower figures were derived due to inexperience and failure to take into account the actual power of the "heavy type" engines. Anyway, the total engine power of the fleet was recorded on behalf of the Community in 1 June 1991 on the basis of data available to us at that time. Since then we have pressed the Community for revisions but so far we have not been successful in our requests. To strengthen our arguments we asked the

Polytechnics School to conduct a study on the engine power of the European fleets. The data show that Greece has the most underpowered vessels of all EU States. These data have been presented to the EU. Unless the EU will agree for a reform we can do nothing for the problem. Meanwhile, we have the obligation to enforce strictly the current rules, prosecuting those who violate the limits on engine power".

3.5.4 Environmental aspects

In addition to protecting the fisheries resources from overfishing, their protection from pollution is important for the development of fisheries. Among the environmental problem pointed by fisheries organizations is pollution, mainly in river estuaries, which is attributed mainly to the drainage of organic and chemical pollutants through the rivers. Other sources of pollution are the sewage of nearby towns and the effluents of aquaculture units.

"*Perama was one of the most favourable fishing grounds. Now it is a dead zone, Faliro too. However, there is evidence for recovery after the operation of the sewage treatment plant.. Parrot fish, that prefers clean waters, has reappeared* " (fisherman from Zea). "*Just eight years ago I used to catch many stripped mullet and red mullet in Kitries. Now there is only grey mud from the wastes of town Kalamata and coal tar from the merchant ships*" (fisherman from Mantineia).

Another environmental problem stated is the abandonment of used or damaged nylon nets, which do not decompose, on the bottom. One fisherman made an interesting suggestion: *"to subsidise the construction of cotton nets, because the currently used nylon nets remain at sea and do not decompose"* (fisherman from Mytilini).

3.5.4.A State of stocks – the overfishing problem

Almost without exceptions, the coastal fisheries organisations and the individual fishermen contacted argued rigorously that the yields are decreasing. The decrease is due to the decline of the abundance of the stocks, and the reason is strongly attributed to overfishing. Just only in the enclosed Amvrakikos gulf and few other areas (e.g. Mesiniakos gulf, bay of Elefsis) the environmental deterioration has been claimed to be an important reason of the decline of the resources.

One may argue that fishermen always complain about poor catches and reduction of the fishing opportunities. However, hearing so many unrelated fishermen from different areas to emphasise how significant has been the decline of resources, it makes difficult to avoid thinking that the fisheries sector is suffering a crisis.

From the analysis of views obtained during the interviews, it appears that the overwhelming majority of coastal Greek fishermen consider that the major cause of the crisis to the sector is the increase of fishing effort. This increase is the combined result

of the uncontrolled expansion of the fleets and technological improvements. Nonetheless, many fishermen also believe that the source of the crisis should be sought in inefficiencies of the technical conservation measures and/or to the difficulty to implement the measures.

Adjustment of fleet capacities

The increase of the number of fishing vessels and the improvement of their fishing capacity as a result of mechanisation and introduction of sophisticated fishing technology comprise one set of factors which were claimed to be responsible for overfishing.

Within the framework of the 'Multiannual Guidance Programmes', strict measures have been applied on the issue of new licences. The fishermen do not disagree with this limitations on entries. They stress that the criteria for newcomers are neither fair nor transparent. As a result, people who have high incomes from other activities and do not satisfy the professional criteria for becoming fishermen can obtain a license, while real fishermen are excluded.

During this investigation, numerous fishermen were contacted and there was hardly a single one that did not complain for declining catches. Older fishermen made comparisons of the present with the past fisheries situation. An 84-year old retired fishermen from Zea remembers: *"After the war there were only 10-20 fishing boats in our area. We fished with cotton lines and could catch 100 kg of fish just outside the port. At that time the problem was not to catch fish, but to sell the catch. Today the prices are good but there are no fish"*. Similar comparisons with the good old days were made in most areas visited. *"I now use 5,000 m of nets, but I catch less fish than I used to catch 20 years ago with 500 m nets. Even the trawlers now catch less fish. When I was young I worked in a trawler that had only 50 HP. Today the trawlers have 1,000 HP but they do not catch more fish. Same with the purse-seiners, in the past their net was 250 fathoms and was pulled manually, that is why they employed 25 to 50 people as crew. Today the purse-seine net is 700 fathoms and the work is done by engines"* (fisherman from Glyfada). *"In 1950 there were no VHF, winches and depth sonars. We fished 1 mile away from the coast and made good catches with 200-300 fathoms of net. Now we need 4,000 nets and a long trip to catch the same fish"* (fisherman from Mytilini). *"My father managed his day's wage with a net 200 fathoms. I use 2,000 fathoms and I can hardly survive"* (fisherman from Korinthos).

Although such comparisons may have a strong element of exaggeration, they reflect the widely spread view among fishermen that part of the overfishing problem is generated by the high fishing capacity of the modern vessels. The vessels mostly blamed for overfishing are the trawlers, at least in the areas where trawling is permitted. *"15 years ago there were four small wooden trawlers in our area, now there are only two, but these are large iron vessels 20 and 29 m in length respectively. In one day, each vessel catches as many fish as I catch in six months"* (fisherman from Githio). Purse-seiners are also blamed for overcapacity. *"When the decree regulating the purse-seine fishery in*

the gulf was issued there were only two small purse-seiners and used nets 15 m high and only one light source. Today there are eight large vessels, using nets 120 m high and six light sources. The net reaches the bottom and scraps the rocks, operating like a beach-seine" (fisherman from Nea Kios). In Mantineia, the gear mostly blamed for overcapacity is the beach-seine. *"They do great damage. There are five beach-seiners here, and another two are in Koroni. They are not like the old gear, each has a net 800-900 fathoms".*

In the view of many coastal fishermen, coastal gear are also causing overfishing, and this in turn results into the deployment of even more gear. A fisherman from Stylida expressed as following this egg and chicken question: *"Every year the fish become fewer and I am obliged to use more gear, and because of more gear, there are even less fish in the next year".* A fisherman from Mytilini compares the present fishing conditions with the conditions of the past *"It took about eight hours for an 8 HP vessel to go from Kaloni to Sygri. Now the same distance is covered in one hour. The number of professional vessels has increased, there are also numerous sport fishermen. There is no empty space, one vessel works next to the other. All coasts are intensively fished. 20 years ago there were only 500 km of road in the island, now there are 5,000 km, and sport fishermen can drag their boats to the more remote parts of the island".*

Therefore, in the view of many fishermen, the capacity of the fleets is constantly increasing, due to mechanisation and technological innovations, even if the number of vessels is not. A modern trawler or a purse-seiner, even a beach-seiner and a netter, have little similarity in capacity and fishing potentialities with the respective vessels 30 years ago. Their number has also changed, partly because of the favourable financing opportunities. When these changes were taking place, at least up to the end of the '80s, there was no serious awareness of the overfishing problem. The administration and the financing bodies continued to encourage the construction of larger and more powerful vessels on the erroneous assumptions that the stocks were underexploited, and that the increase of fleet capacities would lead to higher catches.

Now, it is generally agreed that the fleet suffers from overcapacity, which generates overfishing that in turn results to the decline of the resources. The fishing environment becomes increasingly more competitive and the fishing expenses rise. In the face of escalating competition the necessity for increased activity and modernisation of the vessels and fishing techniques is generated. Fishermen who fail to modernise their vessels and fishing methods are at a competitive disadvantage.

The fishermen mostly suffering from the consequences of overfishing are the coastal ones, especially those with small boats/small engines, who are competitively more weak and have limited ability to switch to new fishing methods and grounds. *"The nearest fishing grounds where fishing is allowed have been overexploited, the more distant ones are not accessible by small and underpowered boats"* (fisherman from Zea). *"Year by year we travel longer distances and use more gear but we catch less fish"* (fisherman from Stylida). *"The catch with a net of 1 km in the past corresponds to the catch with a net of 4 km at present"* (fisherman from Alexandroupolis). *"Small vessels cannot employ many gear, neither to go out of the gulf"* (President of the fisheries association

of Volos). *"Here, vessels around 5 m have few only fishing days, because of bad weather. Larger vessels can stay out longer, they have room for more nets, ice, etc."* (fisherman from Mytilini). *"Ten years ago I could make a good day's wage. Later, many large vessels were constructed, many sport fishermen came in and now it is not worth to go fishing. Other fishermen go out but my engine is only 15 HP. I fish shrimp in the gulf. My daily catch is 2-3 kg, whereas ten years ago I caught 40 kg"* (fisherman from Neohori, near Preveza). *"Today I need at least 2,000 m nets in order to make a modest catch, but my boat is only 5.5 m long"* (fisherman from Naupaktos).

One last issue to be considered is whether or not the *withdrawal programme* had any positive effect in reducing fishing effort. An investigation of the trends of effort presents acute difficulties at different levels, for instance there are no reliable data from inventory statistics on fishing days. In addition, the geographical distribution of effort is not known, because the fleet is not registered on a home port basis, nor the effects of the withdrawals on the local effort can be precisely evaluated, because no zonal plans in the decommissioning programme were applied. However, there is some information from fisheries inspectorates that the fishermen who apply for withdrawal are the less active ones, while the active fishermen tend to remain in fisheries. If it is so, the effects of the decommissioning programme on effort are not proportional to the number or capacity of withdrawn vessels. Perhaps alternative techniques, including the control of sport fisheries or establishment of eligibility criteria for being a fisherman (social, professional) would be required. The representative of the fishermen of Mytilini proposed that an identification of professional fishermen could be made on the basis of sales, should the fishermen be requested to use invoices when selling their products.

Many local fisheries inspectorate supported the claims of fishermen. *"During the last 20 years the landings have declined considerably. Twenty years ago there were only 100-150 fishermen, now there are 800 professional fishermen and about 3,000 sport fishermen"* (fisheries inspectorate of Preveza). *"There is serious overfishing in the Messiniakos gulf, the coastal fishermen catch almost nothing. The problem became acute after 1989, when many fishing licenses were issued. At some time the number of vessels in Messinia became 600. Now some vessels have been withdrawn but the situation did not improve. Those who withdrew were not active fishermen. At the same time we had a high increase of the number of sport fishermen. Few years ago, a coastal fisherman working intensively and under adverse conditions could stay in the profession as a full time fisherman. Now, particularly this year, the decline of catches was such high that it is hard even for the most active fishermen to live exclusively on fishing"* (fisheries inspectorate of Kalamata). Similar conclusions were reached by the fisheries inspectorates of Chania *"Both the catches and the fisheries income have declined to such an extent that some fishermen cannot even cover the fishing expenses. Our records show that the smaller vessels, below 7 m, tend to withdraw from the fisheries"* and of Lamia *"The fisheries income has decreased by half over the past 7 years. Most of the problem was generated by the uncontrolled increase of the sport fisheries. Now, we see a strong tendency for withdrawals of professional fishing vessels below 6 m"*.

The General Directorate of Fisheries agreed on the existence of the problem of overfishing. According to officials *"We have reports from various inspectorates that the production goes down and we believe that there is overfishing. We attribute the*

problem partly to the technological advancements and modernisations and partly to the increase of the number of fishing vessels, both the professional and the sport. The increase of professional vessels occurred around 1986, when in view of the forthcoming application of a sport fisheries legislation and the implementation of a licensing system in professional fisheries, many sport fishermen applied for a professional fishing license". It was also stated that: *"we agree with some of the claims of coastal fishermen. The medium fisheries sector is indeed in an imbalance with the availability of resources, but there is a decommissioning programme in progress. Unfortunately, the progress is low, the objectives for the MAGP of 1992-1996 were not fulfilled and have been transferred to the current MAGP (1997-2001). On the contrary, the restructuring programme for the coastal fisheries has achieved its objectives and there is no need for a further reduction of this fleet"*. Concerning the beach-seines: *"this gear must be abolished by the end of 2001, according to the provisions of the EU fisheries policy for the Mediterranean. However, our opinion is that some beach-seiners should be maintained, because it is traditional gear in some areas and because it catches some valuable small-bodied, short-lived species, like picarel, which cannot be caught with other gear."*

Technical measures

In addition to the problem generated by the large number or high capacity of vessels in relation to the productive capacity of the waters, fishermen consider that the destructive or illegal fishing practices is another important factor causing overfishing. Technical measures apply mostly to the medium fisheries sector. Apart from limitations on entry and on technology, the conservation system of coastal fisheries is based on few nationwide restrictions on gear and fishing practices, such as rules on maximum landing size. However, local rules are applied in some areas.

In general, the coastal fishermen consider that the longlines and nets are selective gear, because they can be directed towards particular species and size groups. Therefore, in the view of most coastal fisheries organisations, the existing technical measures are adequate, and there is no need for additional ones. Some, however, feel the necessity for a better technical management of the local fisheries, either on the grounds that the existing technical measures do not have a sound biological basis, or because overfishing has generated new fishing conditions. The first option was invoked mostly by fishermen operating close to river estuaries, where nurseries of many species are to be found seasonally, both in the brackish and the freshwater sections of the river. For instance, the fishermen's association of Naupaktos and Gytheio, and the cooperative of Stylida, ask for an increase of mesh size of nets to be implemented and other protective measures to be introduced. However, because some exploitable small-bodied species are seasonally or locally abundant, the rules on minimum mesh sizes to be applied by area and season.

The second option was invoked in areas where fishing mortality is so intense or starts at such small size that fishes are given little chance to survive to a commercial size. *"The fishing conditions have changed during the last 10-15 years, but the legislation remains the same. In order the stocks to recover, fishing should be prohibited in April-May and*

October" (fishermen from Antiparos). *"We used to catch red mullet with 18 mm meshes. Now this species is scarce. To make a catch, some fishermen use 14 mm meshes. We have asked the minimum mesh size to be 17 mm"* (fishermen from Nea Kios). "We now use gillnets with 14 mm meshes to catch red mullet and stripped mullet. This way we catch small fish, but if we use larger meshes very few fish will be left to us by the sport fishermen. We agree to use larger meshes but only if sport fishermen stop fish illegally. They force me to be illegal too" (fisherman from Korinthos). On a similar argument, other fishermen oppose to suggestions for stricter technical conservation measures. *"I do not agree with the idea of increasing the minimum mesh size from 17 mm, which is currently applied, to 18 mm. I shall catch half the quantity of red mullet I catch today, the beach seines will catch the rest".*

With regard to the technical conservation measures applied to other gear, most issues of debate concern the trawlers. *"Our main problem is trawling. 15 trawlers fish regularly in our coasts, too many for such a limited area. Most overfishing is caused by the Turkish trawlers. These are very big, bought second hand from Italy, in the frame of agreements of the EU with third countries"* (Fishermen from Chios). *"There are 9 trawlers in the island and some others come from Chios. In the past, they worked three miles away from the shore and beyond. Under the new rules trawling is prohibited only one or two miles from the shore, depending on depth. What has been left for the coastal fishermen? Not only they destroy the fry, but they also damage our gear"* (fishermen from Mytilini). *"The trawler is the most destructive of all gear, it destroys the fry. In a catch of 500 kg there are no more than 50 kg marketable fish. If you visit the fish port of Keratsini you will see tiny red mullets and red pandora. Why do we not undertake a research to see what the catch is composed of? I do not mean the kind of research your Institute is doing with hired trawlers. We shall appear suddenly, at the time they are pulling up the net"* (fisherman from Glyfada). *"15 trawlers fish here on a regular basis. Most come from Patra, some from Thessaloniki. They come in shallow waters, they damage our gear. There are no controls. The only solution is to construct artificial reefs"* (fisherman from Lygia, near Preveza). *"The fish disappear for us after the beginning of the trawling period. The trawl fishermen do not respect the geographical bans. They operate 500 m away from the shore, they destroy the fry, they damage our nets. They work at night with the lights switched off, and start towing from the port's lighthouse, that is immediately after their exit from the port"* (fisherman from Zea).

Similar views were expressed on purse-seining. When one thinks about purse-seiners, his mind goes to the traditional gear with light sources that fished sardine, anchovy and other pelagic species. Hearing the fishermen, his impression changes. *"Purse-seiners are very powerful vessels and have expensive fish-detecting electronic equipment. They utilise enormous quantities of circling nets, 800 m, that go from the surface to the bottom and trap all fish. There is no resemblance with the old purse-seiners that had a limited fishing capability and caught only pelagic species. Today the purse-seines operate in a fashion that does not differ much from beach-seining and actually work as towed gear. They have vanished all demersal species"* (fishermen from Naupaktos). *"Purse-seines catch thousands of small bonito, 7 mm long. I catch only fish weighing over 1 kg"* (fisherman from Nea Kios). *"They operate in shallow waters, 20 fathoms deep, no fish is left from the surface to the bottom. They catch ten boxes of fish, keep three for the market, the rest is fry and is discarded"* (fisherman from Antiparos).

Beach-seiners operate near to the coast and their catches include a large proportion of juvenile fish. Due to various restrictive measures on beach-seining and the application of decommissioning programmes, the number of beach-seiners is declining all over the country. However, there are still many active vessels, especially in the Cyclades islands, where beach-seining has a long tradition. Only in the island Paros there are 35 operating beach-seiners, and another 8 are in the nearby island Antiparos. Because beach-seiners fish non-selectively, coastal fishermen consider them as a particularly destructive gear.

As is to be expected, the fishermen of Cyclades are those who mostly oppose the operation of this gear. *"It is the most destructive gear, they cause great damage to the fry. They should be using nets 150-170 m long, they use 300-400 m nets, and in addition they use very fine meshes. Few years a go a prohibition beach-seining and purse-seining in April and May was imposed by a Prefectural Decree for only one year, and next year the sea was full of fish"* (fisherman from Paroikia, Paros). *"It is prohibited to land breams below 18 cm in length. The longline fishermen are checked for violations but the beach-seiners catch enormous quantities of such fish measuring 9-10 cm. If they are arrested, they are fined with 100-400,000 drachmas. It is ridiculous, this is just their income from one day's fishing. The administration claims that if the gear will be prohibited 2,500 Greek fishermen will loose their jobs. That's a lie, 2,000 of them are Egyptians employed as crew; the rest can switch to other coastal gear"* (fisherman from Antiparos).

Similar claims were presented in many other areas *"Beach-seiners from Koulouri enter the gulf and occupy all bays. They leave nothing for us"* (fisherman from Elefsis). *"There are six beach-seiners, they catch boxes of tiny red mullets and stripped mullets. From each of them 3-4 people make a living, but the damage is great. We want this gear to be abolished"* (fishermen from Githio). Most fishermen are anxious to see the prohibition of beach-seining to be implemented at the end of year 2001, in accordance with one of the provisions of Council Regulation 1624/94. The fishermen of Paros, Antiparos, Mantineia and Glyfada, in particular, seem to be prepared to celebrate this event.

It is noteworthy that the fishermen did not put forwards suggestions for modifications of the rules concerning the minimum landing size. On theoretical grounds, restrictions on landing size do not prevent the capture of undersized fish directly, they just discourage the use of unselective gear or fishing in areas where large concentrations of juvenile fish are likely to be found. In all areas, the fishermen complained that the restrictions are not respected and undersized fish are freely sold in the markets. On these grounds, they find the rules on minimum landing size meaningless, because they hardly ever been put into practice. "All fish shops sell undersized fish without been afraid of controls" (fishermen from Korinthos).

For many organisations of fishermen, the central administration is very slow in reacting to their requests for local legislation. A major reason for this inefficiency seems to be the lengthy administrative procedures required for modifications of legislation. Both the

fisheries organisations and most local fisheries inspectorates would like to see a decentralisation of the procedures and a more flexible decision making. Essentially, they ask for the legislation-forming power, for local rules and measures to be transferred to the local authorities. Another reason seems to be the reluctance of the central administration to transfer the decision-making process about towed gear to the local authorities, as demanded by the coastal fishermen. *"We have presented our views to the General Directorate of Fisheries and they replied that they have not data upon which to make a decision, and research is required"* (President of the fisheries association of Nea Kios).

As a conclusion, most coastal fishermen have a negative attitude on the technical conservation system, especially as regards the rules on trawling, purse-seining and beach-seining. A common request is to increase the seasonal or geographical bans for the gear of medium fisheries and the beach-seines or even to forbid entirely these gear. One of the Inspectorates of Fisheries conducted agrees with this claim *"We have asked for more extended prohibitions of the towed gear but the Ministry persistently refuses, stating that no research data are available to support our claim"* (a fisheries officer).

Many fishermen also consider that the policy planning on a country-wide basis is inflexible and ineffective. It is important to recall that the Greek fisheries legislation concerning technical measures is very old. Most rules were created in the decades of '50s and '60s and since then there have been very few modifications and improvements. These rules were surprisingly good for the time they were first implemented. The rules are now out of date, especially if one considers the enormous changes that occurred in the structure and size of the fleet and the important technological developments since then. This opinion is shared by some Fisheries Inspectorates. A careful re-analysis of the legislation and research in collaboration with professionals is now required, particularly in the field of fishing technologies, in order to suggest conservation measures that limit excess or unnecessary mortality, especially of juvenile fish.

However, although a rationalisation of the exploitation patterns is both desirable and biologically justified, extremely high expectations should not be assigned on them. The gains from the improvement of the technical conservation system may be lost by excessive fishing effort, should the fishing capacity of the fleet continue to remain high. For the same reason, no high expectations should be placed on the development of deep water fisheries that has been encouraged on the assumption that the switch of vessels to deep waters will reduce competition relieve traditional fishing grounds from the high fishing pressure currently exerted on them. It is likely that the fishing effort in shallow waters will not be reduced significantly, because there is excess capacity in the remaining fleet. In addition, deep water fisheries may deplete deep water spawning stocks that sustain recruitment to the shore fisheries.

On the issue of the technical conservation measures, the General Directorate of Fisheries realises that the fisheries legislation is very old and out of date, and several aspects need modernisation. *"However, extremes should be avoided. Trawlers are already subject to severe geographical and seasonal restrictions and additional measures will be implemented next October, in line with the provision of Council*

Regulation 1624/94 for trawling prohibition in the coastal zone. Imposing additional restrictions, as requested by the coastal fishermen, such as closures of gulfs to the trawl fishery, will make this gear uneconomic, and this must be avoided. It is better to reduce the number of trawlers than to put more restrictions, and these can be done under the running decommissioning programme. The problem with the trawling violations. and especially the operation in shallow waters, will be resolved with the satellite surveillance system". In addition, *"On the issue of purse-seiners, we are worried, it has become towed gear".* However, the General Directorate of Fisheries did not put in the discussion any specific idea. As regards the issue of transferring the law drafting responsibility to the local authorities *"we do not think that the procedures of decision making are slow, ineffective or inflexible. On financing aspects the responsibility for delays that have been observed is in the prefectural services that do not collect or record the data properly. On decision-making aspects, Presidential Decrees on conservation rules can be issued quite fast, should the necessity arises. If the responsibility is be transferred to the prefectures, various problems and conflicts over competence will arise. In the past, an attempt to decentralised the system by providing jurisdiction to the prefectures over local measures failed, because the measures issued by the prefects excluded the trawl fishery from the local resources. This situation generated many conflicts and violent reactions. More recently, a decentralisation of the procedures regarding fishing licenses failed again, and the responsibility is in the regional administration".*

[Note: a suggestion of the research team of this study is that jurisdiction over conservation rules may be granted only over measures applicable in the 1-3 mile coastal zone where trawling is prohibited anyway.]

3.5.4.B The impact of sport fisheries

The overfishing problem has intensified by the presence of numerous sport fishermen. In all fishing areas, their number is greater than the number of professional fishermen and seems to be increasing. *"In the port of my village there are 175 boats but only 8 have a professional fishing license. In the whole island there are 7,500 boats, but only 1800 belong to professional fishermen"* (fisherman from Mytilini). In some areas, the sport fishing sector is considered to be responsible for a great, if not for the greatest, part of the overfishing problem. Only in Githio serious conflicts with sport fishermen were not reported.

There are no conflicts with sport fishermen who employ lines and rods. The problem is with those who use nets and longlines, because they are numerous and because they often violate the rules. In the view of many fishermen, sport fishing takes place in such a non-regular and unmanaged manner that renders any attempt for a regional fishery management plan inefficient. *"Sport fishermen have destroyed all fish. They have speedboats, they have large nets, they can buy expensive bait for their longlines, they use dynamite. Those with the spear-guns fish at night with lights and chlorine, not a single white grouper has been left. Once, I could catch 80-100 kg red pandora in a day*

in the reef of Petalies. The white sea breams were grazing on the reefs like sheeps. Then the sport fishermen with the speedboats came and started to blow up the reefs with dynamite. If you were there you would think there is a war going on. Now, the reefs are like a desert" (fisherman from Mantineia).

In most areas the main source of conflict seems to be competition for favourable fishing grounds, but in some areas competition for resources and markets is considered as an equally important source of conflict. Other frequently stated sources of conflict are that sport fishermen violate the rules on nets and longlines, they steel or damage the professional gear, they steel the catches of professionals and they occupy mooring places, leaving no room for professionals. Their detection and prosecution is difficult because they are too many and because they have high-speed boats, that can move away very quickly upon sighting the coast guard. *"Every night numerous boats enter the lagoon and fish illegally, and next day they sell the products freely in the market. Most of the fish sold are very small, there is not any control in the market. Our catches are so low that we cannot cover the fishing expenses. I have applied to the Prefect, to the General Directory of Fisheries, to the Ministry of Commerce, I have asked for protection from the State, but nobody seems to bother"* (President of the fisheries association of Messolongi). *"In our area the number of professional fishing vessels remains unaltered, but the sport fishing vessels increase from year to year. We have estimated their number to be about 1,000, of which 500 fish illegally. They employ nets, longlines and dynamite, they steel our nets, they take up our space in the port. Their boats have strong engines, they are faster then the boat of the patrol guard, nobody is arrested"* (President of the fisheries association of Naupaktos). *"The yachts put thousands of nets all over the Saronikos gulf. Spare gun fishermen fish at night with light and scuba-diving systems and massacre the spawners, they also take the fish out of our nets"* (fisherman from Zea). *"There are thousands of sport fishermen, they have strong engines and high-tech equipment, GPS, radar, sonar, which we only know by name. They steel our gear, they make high catches, and these are often sold. During weekends we cannot go fishing because they occupy all spaces. The situation is out of control"* (Fishermen from Glyfada). *"Each house has a sport fishing boat and there are many more who come from other areas. The professional fishermen are 110, the sport fishermen exceed 1,000. They have perfect fishing gear, they sell the fish in the open without controls. I pay taxes, and I also pay 30-40,000 VAT each month. I have to pay for my right to sell fish. They are making unfair competition because they are not required to pay taxes on their catch"* (fisherman from Elefsis). *"In windy days professional fishermen cannot go out, the sport fishermen can, they have very strong engines or they transport their boats with cars in protected bays"* (fisherman from Antiparos).

Note that a considerable proportion of sport fishermen practice fishing as a profession, and live by selling their products. By social criteria, they should be considered as part-time professional fishermen. Such a "concealed professionalism" is particularly evident in some parts of Greece where unemployment has raised. *"We find no room to place our gear, sport fishermen have occupied all places. They leave their nets permanently in the sea, they go daily to collect the fish and put them again in the same place. They are inexperienced, they know little about fishing and they are always in danger. Their number is increasing, because after the closure of many local industries, many people*

cannot find a job in the land" (fishermen from Chalkis). Some Fisheries Inspectorates (Chania, Tripoli and Volos) have proposed that the administrative classification of the fleet should be modified by the addition of a new fishing category to the existing ones (professional and sport fishermen): semi-professionals. This category should include the part-time professional fishermen and those sport fishermen who, in the absence of permanent alternative job, fish in a more or less professional fashion and sell their products. The semi-professionals should not have access to the various grants and subsidies and should be subject to restrictions on gear and fishing areas/seasons additional to the ones applied to the professional fisheries.

Unanimously, all fishermen and all Fisheries Inspectorates ask for a revision of the legislation concerning sport fisheries and insist particularly on that nets and longlines should be prohibited. Such a prohibition not only will reduce fishing effort, but will also facilitate controls, because it is easier to detect the presence of nets on a boat rather than to inspect if they are of the correct length and specification.

The officers of the General Inspectorate of Fisheries have a similar attitude on the problem of sport fisheries. They stated: *"The number of sport fishing vessels increases constantly since 1980, but this is not the important point. The critical issue is that many sport fishermen fish illegally and use larger amount of gear than those specified by the legislation. Our position is that professional gear, such as nets and longlines, should be prohibited for sport fishermen, as happens in most other European countries. However, we are not in a position to enforce legislation, we can only make suggestions to the Minister. It is up to the politicians to decide"*.

During our discussion with the representative of the General Directorate of Fisheries, we were left with the impression that the problem is political, rather than technical or biological. The leadership of the Ministry of Agriculture is reluctant in taking restrictive measures against sport fishermen, who have a political influence because of their large number and social status.

3.5.5. Other issues of importance to the small-scale coastal fishery

3.5.5.A Competition for space with aquaculture

Conflicts with aquaculture occur in only few areas and these take mainly the form of competition for space. *"The best fishing ground in our area was Agrilia. Despite the objection of the Fisheries Inspectorate, the area was given to a firm to establish an aquaculture unit*" (Fishermen from Mytilini). *"There are 17 fish farming units in the island, mostly in gulfs. These gulfs were good fishing places, particularly during days with bad weather. Now, when the weather is bad, the boats, and especially the smaller ones, remain in port"* (fishermen from Chios). However, according to information provided by the local administration, the owners of some units have granted permission

to fishermen to work close to their units. This permission has helped to reduce, though not to resolve the conflict.

Since fish from aquaculture are sold at lower prices than the wild ones, competition for the markets is not infrequent. Another source of conflict is that the owners of cage units allegedly perform illegal fishing in the cage area, and catch wild fish that are attracted by the smell of food *"There are six farming units in our island, they have been placed in the best gulfs. These gulfs used to be traditional fishing places, now we are not allowed to fish there. During windy days the small boats have nowhere else to go. The fish concentrate in these gulfs and the owners of the units catch them with seines and sell them. I filed a charge against them and they were caught while operating the seine. Nothing happened, not even the gear was distained"* (President of the association of coastal fisherman of Kalymnos). Similar allegation for illegal fishing and selling of fish by owners of fish farming units were made by the fishermen of Chios and Naupaktos.

3.5.5.B Dolphins and other marine animals

Dolphins, seals and turtles are causing serious damage to the coastal gear. The situation is getting worse, and ecologists working for the protection of threatened species are often blamed for this problem. The complaint of fishermen is why they do not get any compensation for loss of gear and production, as happens in other fields of agricultural activity, when the damage is from natural causes. *"The other day a pair of dolphins completely destroyed 1000 fathoms of nets within five minutes. We see these animals destroy our gear and there is nothing we can do. My wife keeps on mending the nets throughout the day. Why don't they give us some sort of compensation? If my gear is destroyed at the beginning of the season then I have serious problems"* (fisherman from Glyfada). *"Damages by dolphins become increasingly more frequent. We think that this is because the fish in the sea have become scarce, and so the dolphins are attracted by the fish caught by our nets. Last year the dolphins made a 500,000 drachmas damage to my nets in one night. We should either get compensation or be provided with ultrasound devices The number of seals too is increasing, probably they were brought to our area by ecological organisations. The day before yesterday some colleagues went fishing with longlines and they got no more than one kg of fish. There was a seal ahead the boat, and as they pulled up the longline, the seal was picking up the fish, one after the other"* (fishermen from Paros). *"One of our colleagues took 1,000,000 loan from the National Bank to buy nets and soon the nets were ruined by dolphins. He cannot pay back the loan, he might be loosing his boat"* (fisherman from Mytilini). *"Damage from dolphins is the most serious of my expenses. To reduce the damage I use nets with 36 meshes for dentex and lobster. Smaller meshes are more advantageous in catching fish, but they are more easily damaged by dolphins and turtles"* (fisherman from Lygia).

The President of the association of coastal fisherman of Kalymnos attempts to explain how the problem originated and puts forward specific suggestions: *"In the past, the beach-seines had a low height, now the seine goes up to the surface and catches pelagic fish. The dolphins cannot find food and concentrate around our nets. There is a Danish*

net that is thin and very resistant, but we are not allowed to use this net. We were offered some ultrasound devices to keep the dolphins away, these worked properly for only one day, the other day they were out of order. We have asked compensation to be granted for damaged nets and they say that it is not possible to make assessments of damage for each fishermen individually, and that some fisherman may cheat. There is a solution to this problem, they can provide a gross annual compensation to the association on the basis of number of boats and previous records of damage. The association will arrange the distribution of this compensation among its members".

The claims of fishermen were transferred by our team to the General Directorate of Fisheries. The Directorate replied that indeed there is legislation under which compensation for damages by dolphins, seals etc. can be granted to fishermen (Law decree 1650/86), but this legislation remains ineffective. The reason is that a Presidential Decree that is required for the implementation of the legislation has not yet been issued by the Ministry and Environment and Public Works, which is the competent authority.

3.5.5.C 'Transit' diesel

Delivery of transit diesel (state tax-subsidised) in appropriate quantities is not a problem for Paros (except that fishermen have to wait about five months to get reimbursed), but it seems to be a problem in many other areas. *"Thought we are entitled to transit fuel, we pay its regular price (210 drs instead of 58 drs / litre), because oil companies and /or petrol stations are not willing to dispatch the fuel to the coastal fishermen due to their low profit margin"* (fishermen from Glyfada). *"The Kalymnian fishermen travel great distances, and the quantity of transit diesel provided is well below the minimum required to cover their needs"* (Fishermen from Kalymnos). *"The bureaucratic channels through which the transit diesel is obtained is very time consuming and in more than often requires 3-4 days to be received, resulting in the reduction of the available days for fishing. The actual cost is about 4,000 drs per day for an 80 HP vessel* (Fishermen from Zea).

It seems that one of the main problems with the transit diesel is that the monthly quantity entitled to a fisherman is delivered only once in a month in one lot. Most coastal fishing vessels have small tank capacities and cannot accept the monthly quantity. In the absence of public or cooperative storing infrastructure, fishermen cannot take fully the advantage of transit diesel. This kind of problem was reported by many fishermen in many of the areas visited.

Another problem relates, though indirectly, to the engine power. The transit diesel offered to fishermen is proportional to the regitered power of their engine. Thus, the fishermen who have replaced illegally their engines by ones of higher capacity do not take the quantities needed. *"The transit fuel given by the State corresponds to 21 litres per HP. This way a fisherman with a boat of 20 HP receives 420 litres, and in the case*

that the actual engine power is greater than the registered one, the quantity is not enough; on the contrary someone with an engine of 46 HP receives actually more than the required and sells the rest making a profit" (Fishermen from Alexandroupolis).

On the above issues, the suggestion of many fishermen was the transit diesel to be delivered more frequently and the delivered quantities to be disassociated from the nominal engine power.

3.5.5.D Mooring

In some of the areas visited (e.g. Elefsis, Glyfada) there is no mooring problem, because the local administration, municipality or other authority has provided space. In many other areas (e.g. Mytilini, Naupaktos, Paros, etc.), fishermen complain for lack of adequate mooring places and shelters. *"Our port is small and crowded, and we have to pay for mooring. Also, there are no enough shelters in the island. The existing ones provide mooring only to yachts and recreational vessels"* (fisherman from Paros). *"Our area is very windy but fishermen have to go out daily, because they have no alternative jobs. Lack of shelters puts them in danger"* (fisherman from Kalymnos).

4. DISCUSSION & CONCLUSIONS

The present study was designed to investigate the fisheries conducted by vessels below 20 HP, for which there is absence of reliable statistical information, and to examine its relations with other fisheries and other economic activities. The study was undertaken with the overall objective to provide a detailed description of this fisheries sector with respect to its size, landing volumes, socio-economic aspects, legal issues, environmental implications and relationships with other sectors of production, with emphasis given to aspects of employment.

The investigation encountered a number of problems, including confusing links to the coastal fisheries and the suspicion of fishermen, who strongly oppose the administrative rules on engine power. The above constrains have prevented for a very precise picture of the fishing environment of the study fleet and its socio-economic importance to be obtained. Nevertheless, the synthesis and evaluation of the information collected allows the identification of certain important points and characteristics.

From the policy point of view, the management of the "under 20 HP" segment of the fleet requires quantifiable criteria presupposing relevant and largely reliable statistics. During the execution of field surveys it was soon realised that the fishery segment under investigation does not exist as a well defined group within the coastal fisheries sector. On the one hand, the limitations on engine power introduced as conservational management measures have led to misleading practices that conceal the actual relationship between boat size and engine power. On the other hand, the owners of such vessels could be considered as a more or less homogeneous group within the coastal fisheries sector. Their gear, fishing methods, activity patterns and problems are similar to those of other coastal fishermen from which they are indistinguishable apart from the fact that they have a lower operational and fishing capacity. In general, they have relatively small, family-owned, and usually low capital and low operational cost vessels, rarely employ crew, and perform short trips close to the home port.

Owing probably to a significant but non-quantified number of fishermen who have replaced their engines with ones of higher capacity, the role of the 'under 20HP' fisheries sector in employment and production is quantitatively less important than it appears on the basis of inventory data. For all these reasons it was decided to broaden the scopes of the investigation and to deal with the entire coastal fisheries sector, with emphasis to the analysis of conditions and problems encountered by small/underpowered vessels. So far, there has been only a limited amount of research attempting to study the biological, technological and economic factors involved in the coastal fisheries from a common base.

The worrying conclusion drawn from the interviews with fishermen and administrators is that the fishing conditions in the Greek coastal zones deteriorate and this has adverse

effects on the resources, the economic performance of the fleets and the social conditions. Despite the elaboration of scientifically-based management and conservation systems and the integration of structural and grant support policies, it seems that the fisheries resources have been far than conserved and protected. The main problem seems to be that fishing mortality increased considerably, mainly due to the inadequacies of the monitoring system of assessments of fishing effort. As a consequence, the abundance of fisheries resources declined below to levels that provide in the a sustainable and adequate yield. About ten years ago the problem was realised and a limited entry system to the fisheries was applied, which, however, was only moderately effective in restricting access to the stocks.

In the view of many Greek fisheries-scientists, there is now a need for a reform of the fisheries legislation. The legislation is mainly concerned with technical conservation measures, controls on fishing, authorised bodies and administrative procedures, and has not been designed to tackle the problem of fleet capacities, which is been dealt with by subsequently introducing a limited entry scheme and structural elements of the EU common fisheries policy. This legislation has essentially remained unaltered for about 40 years, and though it have been adequate and complete for the time it was introduced, it would seem that the change of fishing conditions and the new economic, social and environmental situations, strongly (and inevitably), necessitate new approaches in technical management to be promptly adopted.

The position of the current-project research team, is that technical conservation measures and effective surveillance, structural, financial support and market or professional organisation policies are essential, though it is believed that they should not be ascribed overriding importance in the context of the Greek fisheries. On the one hand, the structure and size of the fleet makes enforcement of the management measures difficult. Indeed, it is practically impossible to monitor the fishing activities of the numerous small vessels of which the fleet is composed. On the other hand, the benefits of improved legislation and management may be outweighed by the increase of fishing effort generated by the previously uncontrolled expansion of the fleet, as well as the mechanical and technological improvements of it. This a clear case of the "technological paradox". Up to a certain limit the fishing technology helps to increase the yields, the economic performance of fleets and the living standards of fishermen, but beyond that limit investments become irrational and the biological efficiency of the ecosystem decreases.

To get an insight into the conditions that led to the generation, of the overfishing problem, one must look more closely how the fishery has developed in the post-war years. The Greek fishing fleet was destroyed during the war and a reconstruction programme started immediately afterwards. According to inventory data, in the middle of the '60s, the fisheries was practised by about 7,000 mechanised vessels of which 5.500 were coastal (with an average engine power 7.3 HP), 820 were beach-seines (with an average engine power 13 HP) and the rest belonged to the medium fishery (average engine power 92 HP). There was also an unclarified number of rowing coastal boats. Fishing was conducted in shallow waters, mostly in gulfs, and the catches were limited by lack of efficient fishing technology and preservation or transportation facilities. Due to the sensitivity of fisheries products, a large proportion of the production was being

spoiled by the lack of ice and the difficulty to be transported away from the fish-producing places. The products were consumed mostly in coastal areas, while the needs of the inland areas were satisfied by freshwater fishes and salted fish imported from other countries.

The Greek conservation system, developed around that time, took into account more the need to protect juvenile fish, rather than to restrict catches. Therefore, the system was based mainly on seasonal and geographical bans of towed gear, especially in gulfs, estuaries and a strip of the coastal zone where high concentration of juvenile fish are likely to be found. That system was also based on the controlling of other fisheries conducted with fine meshes. Judging that system by solely by biological criteria, this was surprisingly good. Noteworthy, it was developed at a time that no biological research data were available, and the fisheries administrative authority was composed of less than 10 officers all around the country. Basically, the system had been based on international experience and empirical data obtained from fishermen and observation of fishing activities, and was accompanied by an administrative monitoring system of catches and effort. Reflecting the existing fisheries situation, this system set categorisations of the fleet into major segments (coastal, fisheries and overseas) and gear (nets, longlines, trawls, beach seines, etc.), separated between mechanised and rowing boats, and established a statistical data collection frame. The administrative separations and fisheries statistics method have remained the same since then, despite the changes that have occurred in the structure of the fleets and the effects of mechanisation.

At that period of time, the stocks were probably underexploited and the fishery sector was largely self-regulated, in the sense that the entry to the fisheries was controlled, up to a certain extent, by profit and market demand. Therefore, efforts were devoted to increase and mechanise the fleet in order to increase its production capacity. It is characteristic that one of the conditions set by Law Decree 666/1966 for getting a trawl fishing license was that the vessel's engine power should be at least 80 HP. For purse-seiners, the engine power should be at least 30 HP.

In the subsequent years the fishing conditions changed radically. Technological progress enabled the construction of powerful engines and effective navigational and electronic equipment, which extended the capacity of fishermen to travel longer distances, to haul more bulky gear and to detect fish. Progressively the size of the fleet and the proportion of mechanised vessels increased, with a concomitant increase of production. Thus, the number of coastal fishing vessels in 1975 was 8900 (avg HP 16.3), and in 1985 was 11400 (avg HP 29.8). In 1990, when limited entry to the fisheries started being in effect, the fleet had exceeded the 20,000 vessels and probably had approached 23,000 vessels (data from inventory statistics and: (1) *Non-industrial fisheries in the Member States of the Community. Problems, prospects and measures at national and Community level (1992). European Parliament Studies. Agriculture - Fisheries - Forestry Series. Special Publication of the European Parliament Directorate General for Research, 205 pp.* (2) *Regional Socio-economic studies in the fishery and aquaculture sector. Region GR.1 (1992). Foundation of Economic and Industrial Research. EU contract XIV/417/92, 182 pp.*). The highest rate of increase was in the period 1980-1990.

At that time period, improvements in preservation technology and transportation means led to more effective distribution and marketing pathways, a consequence of which was that the demand increased beyond the supply potential, and the sale prices increased. The profit made by the fisheries attracted more fishermen in the profession. According to the study *Regional Socio-economic studies in the fishery and aquaculture sector. Region GR.1 (1992). Foundation of Economic and Industrial Research. EU contract XIV/417/92, 182 pp.*), the rate of increase of the number of fishing vessels from 1983 to 1990 was around 5 % per year. The rate of increase of the coastal fisheries was around 5.4 % per year, being highest between 1983 and 1988 (6.1 % per year). The increase of the total engine power of vessels over this period was more significant than the increase of the total number of vessels, corresponding to around 10.4 % per year, which was observed in all fisheries categories.

The high rate of increase of the coastal fishing vessels during that period can partly be attributed to favourable financing opportunities from national financing programmes (Law Decree 1262/82). The Community grants had little applicability in the coastal fisheries sector, but contributed significantly to the development of the medium fisheries sector. After 1990, due to limitations on entry, the number of fishing vessels started to decline. In practice, the fishing effort did not decrease, as on the one hand the less active vessels applied for withdrawal, and on the other hand the fishing capacity of the vessels continued to increase as a result of modernisations.

It therefore becomes an interesting question '*How these changes in the fishing capacities of the fleets reflected to production?*' The Greek fisheries statistics system does not effectively monitor the landings, especially those of the coastal fisheries category (see section 1). Nonetheless, the inventory data show a constantly increasing trend of production, from 18,700 tons in 1965 to about 65,000 in 1990 and a stability thereafter (the data are very unreliable). It seems likely that up to the '80s this increase was a true reflection of expanding fleet capacities and increasing productivity. The production continued to increase thereafter, but this was probably the result of expanding fleet capacities alone. Indeed, there is evidence from two studies that analysed the production and fleet data to arrive at estimations of catches per vessel that the production per vessel actually decreased in all fisheries sectors ([1] *Community systems of economic aid for investments in the fisheries sector – fishing vessels (the Greece case). Sequences and improvement possibilities (1986). PASEGES, EEC studies (DG XIV), 315 pp., plus Appendix;* [2] *Regional Socio-economic studies in the fishery and aquaculture sector. Region GR.1 (1992). Foundation of Economic and Industrial Research. EU contract XIV/417/92, 182 pp.*). Both studies warned that the fleet capacities had expanded beyond the potential provided by biological productivity and that high landings were maintained by depleting the stocks.

It is also possible that the statistical data from which trends of production were derived are misleading. According to this explanation, the fisheries statistics system fails to trace the real trends of production. The poor quality of statistical information has been stressed by the study "*Integrated fisheries information system for the Mediterranean: design of a scientific and technical observatory in Greece (1994). Athens Consultancy*

Center. EU (DG XIV) contract TR/MED92/021, 192 pp. (plus 3 Appendices)", and the conclusion was that the data are probably highly biased, due to various methodological and processing inefficiencies and shortcomings. The President of a fisheries association has a different explanation *"The data are manipulated. We were once invited at the 'Caravel hotel' for holding a discussion with EU officials. They wanted us to state that the production is increasing. When I protested, I got threatened...."*.

Nonetheless, the long-term planning of the fishing industry was based on the assumption that providing financial aid for the development of the fishery could not but have positive effect on catches. However, the positive relationship between catches and effort that was established at low levels of effort may not exist at high levels of effort. It is characteristic that in the '80s the grants provided for construction of a vessel reached about 75 % of the investment cost, while most of the rest could be covered by low-interest loans. One of the implications of the favourable financing opportunities was that, while up to that time, the fisheries sector attracted mainly people from traditionally fishing families, a number of people with no experience in the profession or family tradition started to show interest for the job.

Another parameter that was neglected in the planning of the fishing industry is the subsequent explosive development of the sport fisheries. According to a recently conducted census of sport fisheries (*Sport Fisheries in Eastern Mediterranean (Greece & Italy). Parameter estimates, linkages and conflicts with professional fisheries. A.P.C. Ltd – I.R.PE.M. EU project 96/018, 234 pp. (plus 11 Appendices)*), the total number of licensed sport fishing vessels in 1996 was about 71,144 and probably there are many more sport fishermen that have not applied for a license. In view of the fact that a significant proportion of sport fishermen fish with professional gear, it seems that sport fishing imposes a high fishing mortality, the level of which could not be appreciated.

At the same time, research also failed to assess or predict the changes occurring in the exploitable resources. Obtaining reliable fisheries data is always a difficult task. The multi-species fisheries of the Greek fishing grounds and biological complexities, in particular the high natural mortality, the small body size and the short life-span of most commercial species, makes difficult the applicability of stock evaluation techniques. The problem is particularly acute in the case of coastal fisheries due to the lack of a well organised system of data collection and processing, the scattered nature of the landings and the large number of operational boats.

Partly because of these problems and partly because research effort has traditionally been orientated to biological studies in the offshore zone, where the economically more important medium fisheries is conducted, there are no reliable assessments from research data concerning the state of the fisheries resources in the coastal zone. As a consequence, there is surprisingly little useful information about the state of the coastal resources. More importantly, this research has not been appropriately directed towards the study of effort, nurseries and seasonal migrations of young fish. The scarcely existing information (e.g. *Selectivity of fixed nets in Mediterranean. SELMED, Institute of National Centre for Marine Research, EEC 95/C/76/12*) comes from small-scale and short-term studies, and most usually is the by-product of investigations on gear

selectivity. The results of these studies are not immediately comparable, to the different approaches employed and lack of standardisation in techniques and methodology. Routine data upon which trends can be deduced, and the long-term planning of the fisheries policy can be based, are largely non-existent.

Although the fishing effort of the Greek fishing fleet (both professional and sport) in terms of fishing days and amount of gear used are poorly known, there is indirect evidence that effort is not in balance with the availability of resources. The persistent claims of numerous fishermen that their catches are declining, emphatically described in this report, constitute just one piece of evidence. Another one, is the decline on the average size of fish in the catches reported in many cases, which is one of the first symptoms of overfishing. This decline has 'necessitated' the decrease of the mesh sizes used by the fishermen, and in essence, intensifies the problem of overfishing. The consequence of overfishing is the decrease of catches and the increase of fishing expenses. The fisheries sector affected most is the coastal one, and particularly the owners of small vessels, who are economically and competitively more weak.

The current study concludes that the management priority should be towards the decrease fishing effort. The main points of the management policy would be the enforcement of an adequate system for assessing and monitoring fishing effort and the application of more effective effort-reducing techniques (not necessarily decommissioning schemes), especially in fisheries sectors that suffer from overcapacity. The policy may also include stricter technical conservation measures, but the emphasis should be given to the potential efficiency of its applicability and enforceability.

Upon prioritising the management measures, it has first to be agreed which will be the primary targets: to increase national production, to increase the economic efficiency of fishery or to increase its social importance. A pragmatic compromise between all is difficult, because the biological, the economic and the social programmes have –more than often- conflicting aspects. For example, the most productive gear are usually the most destructive, while unproductive gear employ more workers per capital investment. The position of this research team is that the strong social character of the coastal fisheries should not be overlooked. Bearing in mind that the prosperity of many coastal human communities strongly depends on coastal fisheries, effort should be devoted to protect inshore fishing activities which are economically vulnerable but socially advantageous. Also, to sustain a healthy fishing environment by protecting the resources from abuse and introducing more transparent social and professional criteria for acquiring or maintaining the fishing rights.

It is also important to control the effort of sport fisheries and to define more sharp boundaries from the professional fisheries. By far, professional fishermen have born alone the burden of restrictions imposed for the needs of conservation. When the legislation on sport fisheries came into force, neither the explosive development of this fisheries sector nor the magnitude of implementation difficulties could be envisaged.

There might still be difficulty, however, in rationalising the fisheries, unless effective management bodies are established and granted implementing powers. A management system that would acquire social acceptance should be largely based on the cooperation of fishermen. Given that the coastal fishermen are badly organised, professional organisation should be encouraged to play a more active role, through appropriate incentives and support. The scope for promoting professional organisation is multi-fold: to transfer to the fishermen part of the responsibility of management, to win their support on conservation measures, to reduce the administrative, inspection and patrolling costs involved in fisheries management, and to improve the marketing standards. Professional organisation may also increase the competitive capacity of coastal fishermen, can strengthen their position in the society and the market. Another advantage of professional organisation of socio-economic importance is that fishermen can undertake collectively to develop trading infrastructure (cool rooms, distribution channels), and to arrange for the supplies of ice, boxes, fuel, fishing equipment, etc. Finally, under such a scheme, data concerning the personnel and fleet capacities will become more readily obtained and scientific work will become more effective, as well as data concerning the landings will become more easily concentrated.

It becomes clear that the state must act promptly and efficiently, out of the long-standing attitudes and perceptions on the management of the national fisheries. The time is very critical for significant and 'brave' reforms to take place, through an integral and largely holistic approach, towards the sustainable conservation of the marine resources and the people making a living out of it.

ANNEX I

Presentation of information collected through meetings and interviews with representatives of regional fishermen's co-operatives and associations

"Agios Nikolaos" - Fisheries Association of ZEA (Pireus)

Aspects of the area and the organisation

"Agios Nikolaos" is an agricultural and fisheries association, based in the Zea port, near the Pireus port. The area is urban and has undergone intense development over the past 30 years. Being located near the biggest port of the country, the fishermen of Zea are strongly affected by the navigational activities in the surrounding region. Currently there are about 80 members in the association, while 5 years ago there were about 180 members. There exist nine more coastal fisheries associations in the northern region of the Saronikos gulf, with approximately 500 members in total.

Technical aspects

Average length of boats is between 8 to 9 meters, with 5 meters being the smallest one and about 13 m the longest. The normal area of operation extends to the Salamis and Aegina islands. Stronger vessels can reach more remote areas, such as Glyfada and Selinia. The local fishermen operate almost exclusively trammel nets.

Socio-economic aspects

Despite the fact that the northern part of the Saronikos gulf is protected from adverse conditions (generally northern winds), the average number of fishing days in a year is about 150. As the local fishermen stated, the reason for the limited operational days is that *'fishing is no longer profitable'*. Many coastal fishermen try to get other jobs, particularly in building construction as unskilled labour. The average annual income from fishing is between 2 and 2,500,000 drachmas. The fish are directly sold to consumers from boat. In recent years the prices of fish remain stagnant or decrease, due to competition from imported fish and fish from farming units.

There is no succession in the profession and youngsters are not willing to continue with the work of their fathers. Part of the reason is that social security is not paid, and Greek youngsters refuse to work without any insurance coverage. Also, there is no kind of social insurance covering damages of boats and gear. The cost of private insurance is very high and therefore prohibiting to coastal fishermen.

Moreover, for young people who want to enter the profession as newcomers there is difficulty to obtain a fishing license.

Environment

Technical works in the broader area of the Pireus port (e.g. dredging), strong increase of navigation and soil dumping in the area have caused environmental deterioration and have reduced the available fishing areas and spawning grounds. The seabed was once 'healthy', with weeds, crabs, and many other animals. Now the bottom is covered by mud and the *Posidonia* meadows are extinguished. There seems to be a new type of seagrass present, probably as a result of organic pollution. Some segments of the gulf (e.g. the Perama area) are entirely dead, with no signs of animal life. Fishermen consider the disappearance of *Posidonia* as the main cause for the extinction of the picarel (*Spicara* sp.) from the area. Other species as well, such as medole, have almost disappeared. Nowadays, following the establishment of a purification plant, there is an evident recovery of the marine environment. One evidence of such recovery is the re-appearance of parrot-fish (requiring clear waters), in certain areas.

Interactions with other fisheries – perceptions on the overfishing problem

In comparison to previous years the catches have declined considerably. Overfishing was stated to be responsible, at least partly, for this decline. The overfishing is attributed mainly to trawlers, which enter illegally the fishing grounds allocated for the coastal fishermen, and in addition, frequently cause destruction of the coastal fishing gear. Purse-seiners were also stated to cause overfishing, as their owners operate the seine as a towed gear. Sport fishermen also contribute to the overfishing problem, because of their large number and the fact that many of them employ illegally professional gear and operate in the limited available fishing grounds. Moreover, the coast-guard, the relevant law enforcement agency, is not implementing the law.

Other problems - perceptions - suggestions

- **Engine power:** The restrictions on engine power have resulted in reduced fishing capacities, increased danger, reduction of working days and disproportionate maintenance costs. If a fisherman fully respects the rules on engine power "*he must abandon the profession, because with the licensed engine it is almost impossible to reach suitable fishing grounds or to use proper gear. In most cases the actual engine power is higher than the registered*".
- **Fishing grounds:** Pollution and fishing prohibitions in navigational routes have greatly reduced the available fishing grounds. The nearest fishing grounds where fishing is allowed have been overexploited, the more distant ones are not accessible by underpowered boats. To prevent destruction of their gear, many fishermen avoid fishing in areas of possible trawl operation.
- **Port facilities:** There are no port-facilities such as fresh water supply, sanitary facilities etc. Fishermen are required to pay rent for keeping their place in the port. The cost incurred is 8500 Drs per month for a vessel of about 8 m long. Due to space limitations, new fishermen are not given a mooring place in the port.
- **Fuel:** The transit diesel offered to fishermen is proportional to the power of their engine (thus fishermen who have replaced illegally their engines by ones of higher capacity do

not take the quantities needed). The transit diesel is not of good quality and often damages the engines. Its colour is 'black' and not 'green' as it should be. The bureaucratic channels through which the transit diesel is obtained is very time consuming and in more than often requires 3-4 days to complete the arrangements, resulting in the reduction of the available days for fishing. Also, small boats have small tanks which cannot be properly filled, and thus to take advantage of the transit diesel which is provided to fishermen only in one sum and only once in a month.

- **Damages by marine mammals, turtles, etc.**: A high occurrence damages on the nets and the catch due to the presence of dolphins was reported. Due to protective measures, the number of dolphins has increased considerably.
- **Fishing regulations – enforcement difficulties:** The area between Faliro and Salamis island opens to the trawling fishery between 1 November and 30 March. Coastal fishermen claim that at the onset of the trawling season their catches diminish, and for this reason they ask a permanent trawling prohibition in the Saronikos gulf. Another problem is that fishing zones and navigational routes have not been defined accurately, which results to conflicts with the coast patrol services. They also claim that there are no regular patrols by the coast guard and that medium fishery violations are overlooked.
- **Administration - organisation aspects:** There are no Ministry consultants on fisheries aspects. There are no subsidies for coastal fishermen, nor compensation for damages. EU funds are given to vessels larger than 12 m, which are unprofitable for coastal fisheries. Fishermen believe that many of their problems could be resolved should the activities of all fisheries associations were effectively co-ordinated by a central professional organisation.
- **Other problems:** Trawlers and seiners employ illegal workers, mainly economic immigrants, rather than Greek workers. Their employment does not confront with all the legalities and the employers usually fail to register and pay the social security of these workers.

"Evros" – Fisheries Co-operative of Alexandroupolis

Aspects of the area and the organisation

The area is mainly rural with only small proportions of sub-urban and urban characteristics, near the estuaries of the Evros river (which is the boundary between Greece and Turkey. The available workforce is occupied in the agro-fisheries sector with a small number employed in various other services. Industrial activities are underdeveloped in the area. There are not many employment alternatives other than in fisheries and agriculture.

About 95% of the local fishermen are registered in the EVROS Fisheries Co-operative. Only a small number of fishermen who do not depend entirely on fishing do not belong to the co-operative. The co-operative was established in the year 1986 and has 76 members, of which more than 90 % are full-time fishermen. The remaining are part-time fishermen, engaged seasonally in agricultural activities.

Technical aspects

Vessels are between 4 and 15 m but most are below 8 m. The fishing tools mostly employed are trammel nets and funnel fish traps. The predominant species landed in the region are the grouper, dentex, shrimp, octopus, cuttlefish, flatfish and mullets. Another locally used trap is specifically designed to catch octopus (one-end-closed cylinders). The use of this gear is illegal. Almost invariably, trips last one day or less.

Socio-economic aspects

The majority of fishermen came from areas where the land is not suitable for culturing. Most of them have inherited the boats from their fathers and went on with the only profession they knew. It seems however, that there will be no more succession to the profession as the reduction of catches cannot guarantee a safe income, turning the new generation to seek for alternatives.

Most fishermen with vessels below 20 HP are old-aged people of low educational level. Many are pensioners with no specific family-responsibilities who practice fishing as an income-supporting hobby. In most cases their offspring look after them and support them financially, as they are too old to work in the fields. Like in other areas of Greece, retired fishermen are registered in the OGA security and pension fund (a state-owned social security fund for people employed in the agro-fisheries sector). Their vessels are not covered by any sort of insurance, as the cost of such is considered too high.

On average, fishermen work about 20-23 days per month, about 250 days per year. These 250 fishing days yield roughly 2.5 million Drs. The products are distributed exclusively through the co-operative. The local co-operation has organised the marketing and distribution of the catch in such an efficient manner as to be considered as a model by the national fisheries syndicate. Fishermen land their catch at the local landing site where the auction takes place and the catch is sold to wholesalers. The non-sold landings are then being transported, by a truck hired by the local co-operative, to the markets of Kavala and Thessaloniki where they are sold. For each price category of species an average price is calculated and 14% of the sales is retained for the expenses of the co-operative, and the rest is distributed according to each fisherman's landings. The co-operative also supplies its members with ice.

Environment

The local fishermen consider that a reduction of the fish stocks has occurred. The reduction is being strongly attributed to environmental degradation of the marine environment, particularly in the coastal area of Alexadroupolis, which receives the polluted run-off of the Evros river. According to them, the river carries to the sea chemical wastes from industrial plants in Bulgaria.

Interactions with other fisheries – perceptions on the overfishing problem

In addition to its effect on the environment, intense and illegal fishing have also contributed to the reduction of the stocks. The seabream has been greatly reduced and so has the corb. On the contrary, the catches of shrimps have increased.

Fishermen blame their Turkish counterparts who not only fish with large trawlers and seiners all-year-round (while in Greece there is a four-month prohibition of trawling), but also violate the borders and often enter in Greek territorial waters. Turkish purse seiners have been observed to fish for tuna as far as Samothraki. Greek bottom trawlers often violate the ban of trawling in the coastal zone.

As the resources decrease the number of working days increases and the cost of fishing increases, thus reducing the overall income. Fishermen claim that in past years only 150 fishing days per year and deployment of nets not exceeding in length 1 km would suffice to get the same quantities of fish they get now working 250 days in a year and deploying nets of total length about 4 km.

Other problems – attitudes - suggestions

- **Engine power:** Due to the overexploitation of the fishing grounds near to Alexandroupolis, profitable fishing grounds now exist at distances between 8-10 nautical miles from the port, meaning that more than an hour is required for a vessels to reach these grounds. The most important of these grounds are in the Evros

delta, and the localities Trana and Kokina Vrahia (Red rocks). Coastal fishermen, in order to remain competitive in the industry, must also use bulkier gear. An engine of 20 HP is not adequate to haul such gear. In addition, underpowered vessels are vulnerable to sudden weather changes. Among other problems, low engine power results in delay return to the port and reduced demand for the catch, as bigger and faster vessels have already reached the port and sold their catch, having satisfied the local demand to a great extend.

- **Fuel:** Fishermen complain about the cost of the fuel which is greater in the cases when the actual engine power is greater than the registered one. The 'transit' fuel given by the state monthly corresponds to 21 litres per HP. This way a fisherman with a boat of 20 HP receives 420 litres, and in the case where the engine is greater, this quantity is not enough. On the contrary, someone with an engine of 46 HP receives actually more than the required, and sells the rest making a profit.
- **Fishing regulations – enforcement difficulties:** The fishery in the Evros river estuaries and the adjacent zones is regulated by a number of Presidential Decrees. The local coastal fishermen would like the decisions on local fisheries regulations to be taken at a local level, because they believe that the central fisheries authorities (in Athens) are both unaware of the local conditions and slow in creating legislation.

Fishermen wish an extension of the seasonal and geographical trawling prohibitions, as well as a stricter enforcement of the legislation. One of the most significant nursery grounds for many species is just offshore the Alexandroupolis port, in a place called 'lakos' (hole), where bottom-trawlers operate (within the 3-mile zone). They state that when trawlers fish in the area in October, the fry of many species (such as red mullet) is destroyed and recruitment is diminished. The only available local coast-guard vessel is not sufficient to survey and control their wide fishing area.

Another problem relates with the locally used octopus traps. In the past, disputes arose between fishermen employing this gear and others catching octopus with other gear. Unable to settle the dispute, the administration issued a ban on this gear. Many local fishermen are dissatisfied with the ban. They state that under the current state of exploitation of the stocks fishermen owing small boats cannot make a reasonable income by using traditional fishing techniques. By contrast, they can make a living using octopus traps, because this gear is more productive than other gear (a fisherman with a boat under 20 HP can deploy 5-10 such traps on a daily basis).

"Anagenisi" -Fisheries Association of Glyfada

Aspects of the area and the organisation

Glyfada is a rapidly developing suburb of the wider Athens area, in the Saronikos gulf. Being close to the main urban centre of the country, Glyfada has become the center of many marine leisure activities, including recreational fisheries. To support these activities, a number of small harbours and marinas have been constructed where many yachts and recreational fishing vessels are accommodated. As many people are exercising leisure activities in the area, there are many space or resource use conflicts with professional fishermen.

The association of coastal professional fishermen of Glyfada is located in the main port of Glyfada, where the town council has provided the fishermen with free-of-charge space. In addition a boat-maintenance yard has also been provided at a lower rate. The main activity of the association is to represent its members to the administration. The number of members of the association, at present 76, is constantly declining.

Technical aspects

Boat size ranges from 5 to 11 meters, but the optimum size is from 6 to 9 meters. Boats up to 7 meters do not need an additional person for assistance.

All members of the association employ nets, except five who usually work with longlines.

Socio-economic aspects

Fishermen go out at sea about 200 days per year. Some fishermen go fishing at a maximum 250 days but they put their life in danger as they have to confront rough conditions. The net income of a 'tough' fisherman ranges from 2,5 to 3 million Drs per year. To make a living, some fishermen are seasonally engaged in other professions, mainly in building construction as unskilled workers.

The economically viable boat size in the area is from 6 to 9 meters. Boats longer than 8 or 9 m need an additional person, which results to a sharp increase of the fishing cost.

In the past there were more fish but the prices of fish were relatively low, and in addition, at that time the gain was going to the retailers. Today, although fishermen have stronger boats and better gear, they catch less fish. However, though the quantities are small, the prices fetched are satisfactory, because following the urban development of the area, the catch is sold directly to the consumers. Only during the summer when the trawlers don't work do the fishmongers ask for their catch.

The imported fish cause the reduction of the fish prices, as most of the retail shops now sell imported fish.

There is no succession in the profession. Younger people enter the industry only in the absence of alternative job opportunities.

Environment

According to the local fishermen, trawlers damage the marine environment and are responsible for the decline of the *Posidonia* meadows and the destruction of the calcareous hard substrates. The pollution of the Saronikos gulf from the urban wastes of Athens has also caused a serious degradation of the marine environment. Species such as dentex and red porgy, lobsters and annular seabream seem to have disappeared. In general, however, the species diversity has increased but the quantity of catch and the size of the fish have been reduced significantly. Currently there seems to be a slight recovery of the environment due to the operation of the new sewage-treatment of Athens.

Purse-seiners also cause environmental problems, through the use of nylon ropes, with a stone at the end, to anchor the light-emitting devices. Upon the recovery of the device the rope is cut and remains in the bottom. Nowadays, the seabed of the Saronikos gulf is scattered with nylon ropes. In addition to the environmental damage, these ropes cause damage to the propellers of coastal vessels.

Interactions with other fisheries – perceptions on the overfishing problem

Coastal fishermen claim that the fishery resources are constantly declining due to the destructive and illegal operation of trawlers close to the shore. They also blame the trawlers for destroying their gear when these are not on sight. The problem became intense after big trawlers with powerful engines were constructed with EU financial assistance. Thanks to their powerful engines, modern bottom trawlers now have their nets fitted with special "beams" (karoulia), by which they can overtake or scrape over the small reefs, and therefore destroy the last remaining refuges of fish. Modern purse-seines are also detrimental to the demersal stocks. They too are large vessels, having nets up to 700 fathoms deep, and usually operated in such a way that the seine scraps the bottom and depletes the demersal resources. Beach-seining is another fishing branch which is also very detrimental to the stocks. The forthcoming banning of beach-seiners under the new EU fisheries policy for the Mediterranean is highly appreciated.

The presence of a large number of sport fishermen, with whom the local professional fishermen compete for the resources available, is an additional problem. What bothers the professionals is that the sport fishermen are not subject to restrictions on engine power, and having stronger engines, they can go fishing under adverse weather conditions and stay out more. Also, many of them have sophisticated electronic gear and auxiliary equipment

(GPS, radar, sonar), which are not available by professionals. Sport fishermen allegedly steel the gear of the professionals and sell or distribute their catch to their colleagues at work. Moreover, they catch and keep very small octopuses while the professionals respect the environment and return small octopuses back to the sea. Competition for favourable fishing spots is also intense. Especially during the weekends, the sport fishing gear occupy all available space and professionals cannot find sites for placing their nets.

Problems – perceptions - suggestions

- **Engine power:** Low engine power severely limits the fishing capabilities both by restraining the number of exits and prohibiting the use of certain gear. It also exposes fishermen to danger during sudden changes of the weather.
- **Fuel:** Thought they are entitled to 'transit' fuel, the local fishermen pay regular price (210 Drs instead of 58 Drs/litre) because oil companies and/or petrol stations are not willing to dispatch the fuel to the coastal fishermen due to their low profit margin. The fisheries association is trying to find ways to contract a petrol station to provide a vehicle for the transportation of the fuel at the port.
- **Damages by marine mammals, turtles, etc.:** Serious damages occur because of the presence of the dolphins. The day of the interview 4 fishermen of the local association had lost their gear due to bad weather and dolphin damages.
- **Fishing regulations – enforcement difficulties:** Trawlers and seiners are owned by businessmen who can afford and often bribe the law enforcement officials. Some of the latter overlook violations by the medium fishery and only target the small-scale fishery. Other officials want to target the violations by the medium fishery but they cannot. The association requests a banning of trawling within the Saronikos gulf, if not from the Lavrio area (border of the gulf), then at least from the Fleves-islets limit. Another request is to permit coastal fishermen to use nylon nets, which are in anyway used (illegally) by sport fishermen.
- **Administration - organisation aspects:** There is no state or EU funding or subsidies for coastal fisheries. Also, there is no compensation for damages in boats and gear, as happens in other fields of agricultural activity. At least, there should be compensation for gear destroyed by dolphins. On the contrary, the EU provides financial support to fish farming, though this activity, is believed by the fishermen to affects adversely the environment.

Trawlers catch large quantities of undersized fish. These fish are illegally sold in the fish markets, without any control from the state.

The criteria for the issuing of new fishing licenses are not transparent. Even civil servants can get a license, arranging the license to be issued to their wife's name.

"Mesiniakos kolpos" -Fisheries Association of Mantineia

Aspects of the area and the organisation

The fisheries association "Mesiniakos Kolpos" has about 100 members and is based in Mantineia, a village near the medium-size town Kalamata. Kalamata is an important port of south-western Peloponnese. The area is rural with moderate development of agricultural industries. Fishing activity takes place within the Mesiniakos gulf, where about 300 coastal professional fishing boats operate. There are another five fisheries associations in the area.

Technical aspects

Vessel length ranges from 5 to 13 m. Engine power ranges from 10 to 200 HP. The largest vessels (over 10 m) have high operation and maintenance costs and become increasingly unprofitable. Most fishermen employ nets (mesh sizes range between 18 and 40 mm stretched), only few employ longlines.

Socio-economic aspects

The average number of fishing days is 180 in a year. Many fishermen have complementary incomes form other professional activities, mainly in agriculture. The products are sold directly to consumers or to restaurants because the quantities of fish caught are small. Even the owners of beach-seiners, which are supposed to conduct bulky catches, sell the products directly to consumers, because the quantities are small. In the past, when the catches were higher, most products were distributed through middlemen or retailers. In recent years the prices of fish remain stagnant due to the import of large quantities of fish from abroad.

Environment

Fishermen claim that the marine environment is undergoing serious degradation. They attribute the degradation to pollution, as a consequence of which a progressively larger proportion of the Mesiniakos gulf is occupied by grey mud. Possible sources of the pollution are stated to be the wastes of the town of Kalamata and agrochemical/sewage brought to the sea by river Pamisos. The navigational activities are considered an additional source of pollution. A purification station treating the wastes of the town of Kalamata started to operate in 1992. The fishermen claim that the situation did not improve. Some even claim that the situation has deteriorated since then. There is a strong reduction of catches, and although many fishermen consider that the reduction is due mainly to overfishing, others attribute the reduction to organic pollution.

Interactions with other fisheries – perceptions on the overfishing problem

The fisheries association believes there is heavy overfishing in the Messiniakos gulf and that the species suffering most are the demersal ones. A large number of species, once abundant in the area, were stated to have now disappeared. All fisheries segments should be blamed, but in the opinion of most members the main responsibility should be attributed to beach-seining. There are five beach-seiners in the area (in the past there were six) but many fishermen believe that these gear are very destructive, due to their operation close to the coast and the small mesh size used.

The operation of two local trawlers also gives rise to conflicts, as it appears that they are powerful vessels. Coastal fishermen blame the trawlers both for destroying the resources and damaging their nets. There is only one local purse-seiner, but vessels from other areas perform frequent visits to the gulf. According to coastal fishermen, sprat and other pelagic species have disappeared from the gulf due to the operation of these purse-seiners, and this disappearance has caused the decline of swordfish, bonito and other pelagic predators.

The presence of a large number of sport fishermen constitutes another major subject of conflicts. All fishermen seem to agree that illegal fishing with dynamite and chemicals also constitute major problems.

Problems – perceptions - suggestions

- **Engine power:** Most vessels have low-power engines. Under the current state of overexploitation of the stocks in the gulf, a strong engine is required in order to perform trips to more distant areas (Tainaro, Kyparisia). In this respect, vessels with small engines are at a disadvantage. Another reason that a strong engine is required is that the gulf is very exposed to southern winds. In practice, only some old fishermen with little activity have maintained the engine recorded in the license.
- **Fuel:** The provision of transit diesel is associated with long bureaucratic procedures. In addition, the monthly quantity of diesel is provided "all at once", and the vessel's tanks cannot accommodate for all this quantity.
- **Conflicts:** Due to the decline of catches, conflicts among fishermen are now intense and they are often resolved with violence.
- **Damages by marine mammals, turtles, etc.:** Damages of nets caused by dolphins are frequent.
- **Fishing regulations – enforcement difficulties:** An issue of debate between the association and the administration is the local fishing regulations, especially those concerning the permitted zones for towed gear (trawlers and beach-seiners). In the past, the inner part of the gulf (between Profitis Ilias and Petalidi) was closed to the trawl fishery all the year round, later the prohibition was reduced to only seven months. The association is demanding a re-closure of the Mesiniakos gulf to the trawl fishery to be implemented, arguing that during the period of trawling prohibition (in 1991) the catches of coastal fishermen increased significantly. The association blames the administration

for being reluctant to impose such a closure and also to take measures against illegal fishing.

Fishing with small-mesh-size nets is destructive. However, fishermen turn increasingly more to small mesh-size nets in order to ensure at least some catches. The association proposes that a minimum allowed mesh size of 22 mm should be enforced by law.

The view of the local administration

During the interviews, the fisheries inspectorate of Kalamata was conducted for expressing a view on the fishermen's claim. On the basis of empirical evidence (decline of catches, increase of the proportion of undersized fish in the landings) the inspectorate believes that there is overfishing. Today, only the very active and experienced fishermen with well-powered boats can make a reasonable income from fishing. However, no research has been conducted, and no scientific data are available to confirm this empirical finding.

The overfishing should be attributed to the many vessels fishing in the gulf. An important increase in the number of vessels has occurred since 1989, when many new licenses were issued. Now, through the withdrawal programme, the number of vessels is declining, but only nominally. The reason is that most active fishermen remain in the profession, and only those presenting little activity decide to withdraw their vessels in order to benefit from the compensation offered. At the same time, there is an enormous number of sport fishermen fishing without any effective control.

Trawlers greatly contribute to the overfishing problem. According to an official *"Each year, when the inner gulf first opens to the trawl fishery, trawlers yield some good catches near the Pamisos river estuary for one or two days, and practically they catch almost all fish. However, fishermen are unfair to blame us for this situation. We have tried to introduce a permanent prohibition of trawling in the inner gulf, but as you know, the prefecture has no competence to decide such a prohibition. The competent authority is the General Directorate of Fisheries (Athens)."*

Fisheries association of Amphiloxia

Aspects of the area and the organisation

Amphiloxia, a small town (5,000 inhabitants) in the south-eastern part of the Amvrakikos gulf, is in the center of an area with agricultural activities. The gulf is enclosed and maintains connection to the Ionian sea through a narrow opening near the town Preveza. The gulf harbours unique and rare species of birds and mammals and is protected by international treaties (e.g. Ramsar Convention, NATURA 2000).

The local fisheries association, and also the associations based in adjacent villages (e.g. Sparto) present little activity. This is the reason Why in this particular area the contacts were made with individual fishermen rather than with the administrative boards of the fisheries associations. Some of these fishermen are members of associations.

Technical aspects

In the port of Amphiloxia there are about 80 vessels, 5-7 m long rarely 8, specifically designed for fishing in shallow waters (elongated, without a keel). These vessels are locally called "*priaria*". The engine power is ranges from 8 to14 HP, and rarely larger. Amphilochia is the area with the higher percentage of small and under-powered vessels of all areas visited. The fishing gear mostly used is the shrimp-net.

Socio-economic aspects

Almost all fishermen are only seasonally engaged in fishing, and most consider the fishing activities as complementary to the agricultural activities. Few of them are engaged in mussel farming. In fact, no more than 5 fishermen are engaged in fishing all the year round. All others practice fishing for no more than 6 months annually (usually less than 100 days), during periods favourable for fishing and/or low work demand in agricultural activities. The income from fisheries is low and rarely the net profit exceeds 6,000 drachmas in a day. The price of fisheries products in the area is good, but the quantities caught are small. All fishermen sell their products directly to consumers or to restaurants.

In the past there were many fishermen fully engaged in the profession, but now fishing is unprofitable. Now there are no young fishermen, almost all are of aged between 35 and 70 years. The target species of most fishermen is shrimp. Shrimp fishing is a labour-consuming occupation, due to the long time required to clean the net after its use.

Environment

Amvrakikos gulf is an area of exceptional beauty, with more than a dozen of lagoons, sandy coasts, sand dunes, salt marshes, extensive reed beds and numerous marshes. Two large rivers, Arachthos and Louros, discharge in its eastern side. The gulf and the associated wetlands are inhabited by a large number of birds, amphibians, reptiles and mammals.

All available evidence indicate that the Amvrakikos gulf is undergoing a severe degradation. Pollution, that accompanies the agricultural development of the area, is the most important threat. Agrochemicals, pesticides, fertilisers, wastes from olive press installations and other organic and chemical pollutants drain to the gulf through the rivers, and these cause deleterious eutrophications and toxic phenomena. The effects of these pollutants on the marine environment is very severe, because this enclosed gulf cannot buffer the harmful effects from the pollutants in the way that open water bodies can. In addition, the rivers have also been affected by large-scale water conservation practices (hydro-electric and irrigation dams). The irregular release of water through the dams has modified the flow pattern and thermal regimes in the estuarine area. It also generates abrupt changes of salinity and has altered dramatically many estuarine habitats. Another frequent now phenomenon is anoxia in deeper water layers, resulting to mass mortalities of fish.

The Amvrakikos gulf was once one of the richest fishing areas of Greece, and this is the reason why specific plans for the fisheries development of the gulf have been established. All fishermen now complain that the fisheries resources have been reduced to such an extent, that fishing is no longer a viable activity. "In the past, the bottom was covered with weeds 1-2 m in height. There was life everywhere and the fish were abundant. Later the weed-beds disappeared, and so did crabs, brown meagre, corb and squids. Progressively, perch, scorpion fish and other good quality fish vanished. Now, first class fish like soles, are rare. Third-class species, like twait-shab (*Sardinella aurita*), are abundant, but there is no market demand. Even shrimp, which used to be very abundant, has been reduced dramatically".

Interactions with other fisheries – perceptions on the overfishing problem

Trawling and purse-seining are prohibited inside the gulf. Fishermen believe that the fishing effort currently exerted on the stocks of most species (except shrimp) is low, and that environmental degradation rather than intense fishing is the reason of the decline of catches. Due to this decline, fishermen from other areas are not visiting their area now, except for few who enter the gulf to fish for rays when the sea is rough outside. Therefore, there are no conflicts among the different fisheries sectors, but there are conflicts with sport fishermen using illegally professional gear and/or explosives, as well as divers who -as the fishermen claim- use chemicals.

Problems – attitudes - suggestions

- **Engine power:** In contrast to all other areas visited, there is no need for strong engines, because the gulf is protected from winds and fishing is a very local activity.
- **Damages by marine mammals, turtles,** etc.: Marine turtles and dolphins cause serious damages to the nets. The populations of these species has increased in recent years, and the fishermen believe that this increase is the result of protective measures introduced under the pressure of ecological organisations. One of the stated reasons that fishermen tend to abandon their profession is that they cannot bear the cost of damaged nets by dolphins and turtles (compensation is not provided by the State).
- **Fishing regulations – enforcement difficulties:** Despite the efforts of the local patrol guard, it is impossible to reduce illegal fishing activities.
- **Administration - organisation aspects:** Fishermen feel the need of organisation and consider the lack of an effective professional organisation in the area as a major weakness. The role of such an organisation should be primarily to co-ordinate efforts for the protection of the environment and secondarily to control illegal fishing.

Association of professional fishermen of Nea Kios

Aspects of the area and the organisation

Nea Kios is an agricultural village, now being increasingly dependent on tourism, near the town of Nauplio. The village is located in the Argolikos gulf, one of the important fishing centres of the country. The Association of professional fishermen of Nea Kios was formed from the merging of four associations, previously located in the town Nauplio and the villages Nea Kios, Kyveri and Myloi. The association has 160 members. There are about 800-900 professional fishing vessels and many more sport fishing vessels operating in the Argolikos gulf.

Technical aspects

Vessel size ranges between 5 and 12 m. In the past some fishermen were attracted by the favourable financing opportunities and constructed vessels larger than 12 m. These vessels could not be kept long in operation due to high operational cost. Most fishermen (70 %) employ nets, and the remaining employ longlines.

Socio-economic aspects

For most members of the association, fishing is a full-time activity, but some have alternative or complementary employment. Full-timers are engaged in fishing about 200-250 days annually, depending on weather and vessel size. Under the present circumstances, young people are reluctant to become fishermen. Fish are usually sold directly to the consumers from the boat, especially during the tourist period, or are delivered to restaurants. More rarely, some quantities are sold to retailers. Competition from imported fish becomes increasingly a greater problem.

Interactions with other fisheries – perceptions on the overfishing problem

According to the association, overfishing is severe but is underestimated by the State. The greatest problem is stated to be the daily operation of 7-8 modern purse-seines (most originate from other areas) in the gulf. In the past, there were only two small purse-seiners that used nets 15 m high and only one light source. Today there are eight large vessels, using nets 120 m high (thus, reaching the bottom) and six light sources. All use fine-mesh-size nets which destroy the fry of many species. The association also states that following the introduction of limitations on purse-seine in 1985 by a Prefectural Decree, the production of coastal fishermen increased significantly. However, the Ministry refused to issue a Presidential

Decree generalising and extending the limitations, and instead, granted licenses for new and more powerful purse-seiners.

Trawlers also use fine meshes and are considered by the coastal fishermen as been responsible for the almost disappearance of many species, such as hake, and the decline of other species, such as red mullet, red-pandora and lobster.

The association admits that coastal fishermen too use destructive fishing practices, such as the deployment of nets with small meshes. According to the President, "*in the past all professionals used at least 20 mm meshes, but now fishermen are forced to use increasingly smaller meshes, sometimes only 14 mm in order to catch red mullet, otherwise they catch almost nothing; there are so many gear in the area, if you spare a small fish, there is little chance that you will catch it at a later time*".

Sport fishermen, especially those using illegally professional gear such as trammel nets, are also blamed for contributing to overfishing. Illegal fishing with dynamite is stated to be a daily phenomenon. Dynamite is also been used by a small number of professional coastal fishermen. Purse-seines are using dynamite to kill sardine, in order for dead sardine to act as an attractants to larger species, which form the target of their fishery.

Problems – perceptions - suggestions

- **Engine power:** Under the current fishing circumstances, a much higher engine power is required than that recorded in the license of vessels. The main reasons invoked are safety under adverse weather conditions and the need to haul a larger gear. The association agrees that upper engine power limits should exist, but these should be based on a carefully established relationship between vessel size and engine power. Transit diesel should be provided on the basis of this relationship.
- **Damages by marine mammals, turtles, etc.**: There are no serious damages by dolphins in the area, but problems exist in nearby areas (Tolo, Ermioni).
- **Fishing regulations – enforcement difficulties:** In an exchange of letters with the General Directorate of Fisheries (Athens), the association has demanded the closure of the inner part of the Argolikos gulf to trawlers, purse-seiners and beach-seiners. The Directorate replied that no scientific data on the state of the stocks is available, upon which the requested closure could be discussed.

  Another demand of the association is to prohibit the use of meshed traps for octopuses, because these traps retain small individuals. They also ask for the introduction of a minimum mesh size for set nets (at least 17 mm), claiming that the existing regulations on minimum landing size are not practically enforceable. They add that if a rule on minimum mesh size will be introduced, they undertake the responsibility to destroy all the fine-mesh nets they are holding. Last, the association is asking for stricter controls in the landing places and markets, where undersized fish are sold without any inspection.

On the implementation issue, the coast guard does not have the means and personnel required to enforce discipline to the rules. Moreover, they are subject to various kinds of political pressures.

- **Administration - organisation aspects:** The association identifies as a problem that people who have no relation with fishing are entering the profession, simply because they have the money to buy or construct a boat. This way 'real' fishermen are excluded from the profession. The association considers that the problem arises from the way that individual fishing licenses are issued (currently, such licenses are issued by fisheries associations, and in the absence of them, by agricultural associations, to applicants who have their main income from fishing). However, the procedures are not transparent, especially as regards agricultural organisations. In addition, both fisheries and agricultural associations do not have the organisation efficiency required to check incomes, etc. The proposition is to reform the licensing system in a way ensuring that only real fishermen get a license.

  Another problem identified is the absence of essential assistance for the modernisation of small vessels, whereas such is provided for large vessels or aquaculture units.

- **Other problems:** There is an unfair market competition with imported fish, which are presented to the consumers as of Greek origin, and therefore enjoy high prices. Measures should be taken to minimise such misleading practices, and therefore to protect both the fishermen's and the consumer's interests.

Fisheries co-operative of Stylida

Aspects of the area and the organisation

Stylida is a small town situated in the northern part of the Maliakos gulf, where river Sperchios discharges. The gulf is very productive and supports an important coastal fishery. Fishing always played an important role in the economic and social life of Stylida, which is mainly rural with medium development of agricultural industries.

The fisheries co-operative of Stylida has 60 members, while the total number of fishermen fishing in the gulf is about 300. This co-operative is one of the few examples of coastal fisheries co-operatives that without appropriate support and incentives has managed to organise the provision of supplies to their members, to construct storing rooms and to create an efficient marketing infrastructure. Moreover, the co-operative intervenes in environmental and management aspects, for example by implementing to its members adherence to the conservation rules.

Technical aspects

The Maliakos gulf is protected from winds, thus limiting the need for larger vessels, which range from 4 to 8 m in length (one vessel is longer than 10 m), the majority being between 6 and 8 m. The main gear used are nets and longlines. Some fishermen employ dredges for oyster capture or dive for collecting cockles.

Socio-economic aspects

With the exception of very few, all members of the co-operative are full-time fishermen. On average, they fish 15-20 days per month and the annual income is about 2,500,000 drachmas. The catch of the members is distributed through the co-operative. Most products are sold in a local fish shop owned by the co-operative, the rest are transported to nearby towns. The oysters are exported to Italy.

Environment

The estuarine area is an ecologically sensitive zone and is protected by national regulations. In addition, it is an important nursery ground for many species, sole being an important one. There is pollution from a nearby cable industry and from contaminated discharges of the Sperchios river, but the problem is not acute. From the fisheries perspective, the main conservation objective must be the protection of fry, which abounds in the estuarine area and suffers heavy mortality due to fisheries with fine meshes. This holds particularly for sole fry

which, due to its awkward shape, is caught in large quantities by normal nets addressed to other species.

Interactions with other fisheries – perceptions on the overfishing problem

Despite the significant increase of fishing effort during the last ten years, the co-operative believes that the gulf is not yet suffering overfishing, in the sense that too many fish are caught. However, fish are caught at a small size.

Since there is a ban on trawling and purse-seining in the gulf and the area is not frequently visited by fishermen from other areas, conflicts with other fisheries sectors are rare. However, disputes frequently arise between fishermen using different gear, and also between professional and sport fishermen. Some locals from nearby areas fish illegally in inaccessible estuarine areas using fine meshes, causing enormous damage to the sole fry.

Problems – attitudes - suggestions

- **Engine power:** Fishermen state that as a result of intensified fishing effort the catches decline progressively. As the catches decline, the need for longer travelling distances and increasingly larger amount of gear are generated, and therefore stronger engines are required to haul the gear. Fishing is almost impossible with the engine capacity licensed to the vessels. The engine capacity should be at least proportional to the size of vessels, and the transit diesel provided should correspond to this capacity.
- **Damages by marine mammals, turtles, etc.**: Destruction of gear by dolphins are frequent, especially when fishing takes place in the outer part of the gulf. A single dolphin can destroy more than 1,000 yards of nets within one hour.
- **Fishing regulations – enforcement difficulties:** A Presidential Decree sets fishing rules for the Maliakos gulf, but the co-operative believes that the rules are both inadequate and insufficiently implemented. The position of the co-operative is to increase the permitted mesh size (the minimum mesh size in most areas should be 36 mm, as opposed to 22 mm that applies today) and to regulate the fisheries of certain species that appear in some areas seasonally by special rules. They also ask for the prohibition of ring-nets, on the grounds that they are destructive, for the significant increase of the penalties for violations, and for the provision of the local coast guard with the means required for the effective supervision of the area.
- **Administration - organisation aspects:** The co-operative believes that the central administration (the General Directorate of Fisheries) is slow and ineffective in tackling the local problems of fisheries. Rules should be decided by the regional administration, in Cupertino with the fishermen.

  The co-operative also believes that the State does not encourage the professional organisation of fishermen, especially the co-operative scheme. Co-operatives not only stabilise the markets and protect the fishermen from the exploitation of middlemen, but they also back their members financially and undertake responsibility in fisheries management. Despite their social role, the co-operatives are not supported by the State. The local co-operative created its infrastructure (shop, ice-making machines, cool rooms, office, etc.) with the contribution of its members alone, who also have to pay 11.5 % on

the price of their products for administrative expenses.. Sometimes, membership in co-operative organisations is discouraged (until recently the product distributed through the co-operative were taxed by 8 %, while there was no taxation in the products of individual fishermen).

A last item of disagreement with the administration concerns the fishing licenses. As the rules now stand, many people having other professional activities become holders of fishing licenses, while real fishermen are excluded. Similarly, people who work in civil services arrange a license to be issued to their wife. The co-operative's proposition is fishing licenses to be issued on the basis of both social and professional criteria.

The view of the local administration

The local fisheries inspectorate has evidence (based on fisheries data kept routinely over the past 7 years) that the pressure on the local stocks has increased dramatically, mainly as a result of the very rapid increase of the number of sport fishermen. Many sport fishermen employ illegal fishing practices. However, controls and enforcement of the fishing rules are practically impossible. Data available in the inspectorate also show that the income of fishermen has decreased by half over the last ten years.

The best vessel size for the area is from 7 to 10 m. Small vessels (4-5 m, sometimes up to 6 m) are not viable units. Such vessels are owned by part-time fishermen or by people who acquired a fishing license in the `80s circumstantially, when there were no limitations to the entry to fisheries. Today, the owners of these small vessels tend to apply for a withdrawal under the current decommissioning scheme, either because fishing is not a profitable activity, or because the withdrawal programme offers to them an unexpected income. There is similarly a strong tendency for withdrawals among fishermen owing large vessels (11-13 m), because these vessels too are hardly viable economic units.

Fisheries co-operative of lake Trichonis

Note: Until recently, freshwater fisheries was not included in the EU common fishery policy on aspects of resource conservation and management, although the Community rules on structures, markets and professional organisation were fully applicable. Council Regulation 2792/1999, introduced on 17 December 1999, makes a satisfactory reference to freshwater fisheries. We take this opportunity to include in this study a freshwater lake, which is one of the ten most important fishing areas of the country.

Aspects of the area and the organisation

Lake Trichonis is the largest (97 km^2) and deepest (maximum 58 m) natural freshwater lake of Greece. The lake maintains an open connection to the sea through the Acheloos River. The surface effluents of Lake Trichonis flow to the adjacent smaller and more shallow lake Lyssimachia through a narrow channel 6 km long. Another channel, 9 km long, connects Lake Lyssimachia with the Acheloos River. In 1969 a dam was constructed in the channel connecting the two lakes with no provision for the ascent of euryhaline fish, like mullets and sea bass. Through the communication to the sea, a landlocked population of the schooling euryhaline species *Atherina boyeri* (sandsmelt) was established in the lake. This population is very abundant and supports an important purse-seine fishery.

The fishermen of Lake Trichonis are badly organised. Only 28 of the about 230 fishermen in the lake are members of the fisheries co-operative of Trichonis, the main activity of which is to negotiate with the administration on fishing rules and other aspects of fisheries and environmental management.

Technical aspects

The fleet consists of 8 purse-seiners and about 180 small boats. The purse-seiners addresses to *A. boyeri*, which is the commercially most important species of the lake. All purse-seines have been constructed locally by the fishermen themselves, have a length between 10 and 12 m and are equipped with motorcar engines with a power around 80 HP. Each purse-seiner requires 6-7 people as crew. In accordance with a local legislation that sets limits on gear capacity, the purse-seines have a maximum length 150 m and a maximum height 20 m. About ten years ago a larger purse-seiner (16 m) previously fishing in marine waters was transported to the lake. Faced with the strong reaction of the local fishermen, the administration prohibited the operation of this vessel in the lake.

The boats are between 4 and 6 m in length, have engines between 7 and 10 HP and are operated by one, rarely two, fishermen. The most frequently used gear are trammel and gill nets, targeting a great variety of fish species. However, few of the species caught have

commercial importance. The sandsmelt net (a type of gill net) is used exclusively for the capture of *A. boyeri*. Longlines are used seasonally for the capture of eels and large-bodied species, like *Scardinius acarnanicus*.

Before 1990, fishing for *A. boyeri* was conducted with four beach-seiners. Due to the operation of this gear in the littoral zone and the small size used, the catch consisted of many fish of no commercial value. Hence a very laborious sorting procedure was required after the end of each haul to separate *A. boyeri* from the other species. Most of these species had little or no commercial value and were discarded. Based on the results of previous research studies, the annual fisheries production in the period 1988-1991 was about 600-700 tons, of which about 450 tons were the production of *A. boyeri*. The volume of products from the purse-seine fisheries was estimated to around 400 tons of *A. boyeri* and 100 tons of other species. All other gear (nets and longlines) caught about 50 tons *A. boyeri* and about 100 tons of other species.

The purse-seine technique which has been adopted since then is more friendly to the environment, and yet there is no need for sorting, because the catch consists almost exclusively of *A. boyeri*. However, this technique was very productive. The profit attracted more fishermen, and now there are eight purse-seiners fishing in the lake. The increase of effort was detrimental to the stock of this species. Initially, high catches of *A. boyeri* were maintained by depleting the stock. Subsequently the catches started to decline and now the total production from all gear is estimated to about 50 tons *A. boyeri* annually. The volume of catches of other species also declined to about 100 tons, not because of decline of resources, but because of low market demand.

Socio-economic aspects

Of the bout 230 fishermen of the lake, about 30 have fishing as their exclusive or as their main activity. These fishermen are involved mostly in purse-seine fisheries, and are often assisted by members of their families. During the period of prohibition of purse-seining they use other fishing gear. The number of fishing days is between 200 and 250 annually. The daily income from fisheries varies from 3,000 to 10,000 drachmas per fisherman, depending strongly on season.

The remaining 200 fishermen are part-timers, engaged seasonally in fishing with nets and longlines (mainly in winter). During other seasons they spend more time in agricultural works and go fishing infrequently. The average number of fishing days is about 70 per year. The daily income from fisheries varies between 2,000 and 4,000 drachmas.

A. boyeri enjoys a relatively good price (500-1000 drachmas per kg) and is sold in big towns as a delicacy. With the exception of few quantities which are consumed locally or in nearby towns and villages, most of the production of this species is sold to wholesales and is brought to Athens. All other species have little or no commercial value and are consumed locally. After discarding the less valuable species, the remaining are sold either directly to consumers in the landing places or are to retailers, who carry them with cars and motorbikes for sail in

nearby villages. Note that lake Trichonis produces very small quantities of carp, which is an important marketable species. Carp is the main product of almost all other fish-producing lakes of Greece.

In the past, there was a much higher local demand for freshwater fish. Now the marine fish are easily accessible and as a consequence the demand for freshwater fish is declining year by year. It is believed that large opportunities to increase production exist, should there be a higher market demand.

Environment

Lake Trichonis was once oligotrophic but through man-made actions (mainly organic pollution from agricultural activities) is now mesotrophic. The lake hosts 20 primarily freshwater fish species plus the euryhaline species *A. boyeri*. Before the construction of the dam, two more euryhaline species (*Mugil cephalus* and *Dicentrarchus labrax*) were abundant in the lake and were exploited by the local fishermen.

Lake Trichonis has been characterised as an area of special conservational value and high research interest because of its many endemic diatoms, Chrysophyceae, Cyanophyceae, molluscs and fish. Of the 20 freshwater fish species of the lake, 11 are endemic to Greece. Of these Greek endemic species, four are endemic to the lake and/or the Achellos River drainage only. It is characteristic that *Economidychthys trichonis*, one of the endemic species confined exclusively in the lake, is the smallest freshwater fish species of Europe at maturity (matures at 15 mm SL).

In the past, the operation of beach-seines in the littoral area caused damage to the aquatic vegetation, to the endemic species and to the fry of many other fish species. The situation improved following the replacement of beach-seines with purse-seines. However, the operation of purse-seines caused overfishing of *A. boyeri* and the population of the latter declined, leaving a vacant ecological space. Some other species have benefited from this decline. One of these is the semipelagic gobiid *Economidichthys trichonis*, which is now extremely abundant; another is the schooling cyprinid *Tropidophoxinellus hellenicus*.

Interactions with other fisheries – perceptions on the overfishing problem

With the exception of *A. boyeri*, all other species of lake Trichonis are underexploited. Despite contradictory evidence from research studies, the purse-seine fishermen do not consider that the stock of *A. boyeri* is overfished. They rather attribute the drop of production to restrictive policies on the purse-seine fisheries imposed by the Directorate of Inland Waters of the Ministry of Agriculture (see below). By contrast, the fishermen employing nets and longlines strongly attribute the decline of *A. boyeri* to the effects of purse-seining. As expected, these fishermen are in agreement with the above restrictions on purse-seining.

Problems – perceptions - suggestions

- **Engine power:** There is no need or request for an increase in the engine power.
- **Port facilities:** There are no port facilities and landing places in the lake. The owners of larger boats construct a shelter, usually close to their homes (simple deep elongated excavations in the land). Smaller boats are left in small protected bays or in pulled ashore.
- **Fuel:** No transit diesel is offered to freshwater fishermen.
- **Fishing regulations – enforcement difficulties:** The fisheries management system includes only rules for the purse-seine fishery (prohibition of purse-seining from March to July, only four purse-seiners are allowed to operated each day, and there are limitations on the daily fishing hours, on the dimensions of seines and on the maximum number of light sources). As in all freshwater fishing places, the competent authority for enforcing the regulations is the police. The fishing rules are not easily enforced. However, many purse-seine fishermen have been fined repeatedly for violations.
- **Administration - organisation aspects:** Purse-seine fishermen are in conflict with the administration over the rules for purse-seining that limit, as they claim, their fishing opportunities and income.
- **Other problems:** According to legislation for inland water fisheries, fishermen must pay a "rent" in order to maintain their fishing rights in lakes. In the case of Lake Trichonis, the rent is 15 % of the gains from fisheries. In practice, rent is paid only by the purse-seine fishermen who yield bulky catches and have permanent landing places.

  All fishermen request the re-establishment of free communication between the Lakes Trichonis and Lyssimachia, which was interrupted by the construction of the dam. This communication will allow commercially important euryhaline species to re-enter the Lake Trichonis.

Association of fishermen of Naupaktos and adjacent

Aspects of the area and the organisation

Naupaktos is a small town near the estuaries of river Mornos. The town is situated in the center of the small Naupaktos bay, just in the borders of the Korinthiakos and the Patraikos gulfs. The area is rural, but tourism becomes increasingly an important economic activity. Trawling is prohibited in the Naupaktos bay. There are about 70 coastal fishermen in Naupaktos and the surrounding villages, most of which are members to the association.

Technical aspects

The local vessels are from 5 to 9 m long, the typical size is around 7 m. Most vessels employ exclusively nets, but seasonally some vessels employ longlines. In older times longlining used to be an important local fishing activity, but its importance is gradually declining due to change of the fish species composition and the decline of abundance of large-bodied fish. The species caught in the area are hake, cuttlefish, shrimp, red mullet, sole, large-eyed dentex.

Socio-economic aspects

In older times all fishermen operated in local waters. Today, fishermen who rely exclusively on fishing as a source of income have to move seasonally to more productive areas, such as the Astakos, Kylini, Echinades and the Ionian islands, and sometimes to remain there during an entire fishing period. An active fishermen works about 200 days in a year. An average daily income for an efficient fisherman is 8,000 drachmas.

Due to the strong south-western winds prevailing in the area, smaller vessels (below 6 m) are not capable for a continuous fishing activity. On the other hand, large vessels (above 9 m) have become uneconomic, due to high maintenance and operation costs in relation to catches (the main cost for such vessels is the demand to employ a worker, in addition to the vessel owner, who is usually the sole operator of the boat).

Almost half of the local fishermen have an alternative job. Young people do not enter the profession. The president of the association, at the age of 40, claims that he is the youngest member of the association.

Fish are sold directly by the fishermen to the consumers in an open space provided by the municipality, where all fishermen bring their landings. The prices are good, because the consumers are prepared to pay a high price for a local fish. In addition, direct selling prevents 'cheating' trade practices (i.e. imported fish to be sold as local), because the local origin of the fish exposed in the open market is guaranteed.

Environment

The delta of river Mornos was once an important fishing ground for the local fishermen. A dam has been constructed along the route of the river to conserve water for urban needs. This dam and a number of other smaller irrigation dams retain most of the water, and now only small quantities reach the estuarine area (in the summer period the lower part of the river dries completely). As a result of reduced water supply the estuarine environment has been degraded seriously. Some previously abundant exploitable estuarine species (corb, soles) are now very rare, while others (mullet, sea-bream and sea-bass) have declined in comparison to previous years. On the other hand, bonito made its re-appearance in the area after 40 years. Other major negative impacts on the estuarine fish fauna have resulted from illegal fishing, mainly with nylon nets.

Evinos, another river situated close enough to Naupaktos, also used to offer favourable fishing grounds. The delta of river Evinos is an ecologically important zone and is protected by the Ramsar Convention. Here again dams retaining water for domestic use and irrigation have been constructed, altering dramatically the estuarine environment and resulting to the loss of many fishing grounds.

Interactions with other fisheries – perceptions on the overfishing problem

Local fishermen assert that the catches are declining and attribute the reason to the presence of numerous sport fishermen, both locals and people originating from other areas. They have estimated that during the tourist period more than 1000 sport fishermen fish in the limited area of the Naupaktos bay, and almost half of them use illegally professional gear (e.g. trammel nets). In addition to causing overfishing, sport fishermen take position of all favourable fishing grounds, leaving no space for the professional gear.

Another fisheries sector blamed for overfishing is the purse-seining. The association claims "Modern purse-seiners are very powerful vessels and have expensive fish-detecting electronic equipment. They utilise enormous quantities of surrounding nets and practically trap all fish in the area of operation. There is no resemblance with the old purse-seiners that had a limited fishing capability and caught only pelagic species. Due to technological improvements, today the purse-seines actually operate as towed gear. Therefore, the rules concerning purse-seining should change". The position of the association is that purse-seines addressing to demersal species should not be allowed to operated near the coast.

Local fishermen also claim that despite the prohibition of trawling in the Naupaktos gulf, trawlers often enter there, sometimes reaching up to the port. The main problem with trawling seems to be the damage of nets and other coastal gear left overnight. Due to high incidences of damage local fishermen avoid setting their nets in areas where trawling is likely to occur.

A conflict identified in this area is between fisheries and aquaculture. There is one hatchery in the area and some on-growing cage units. In the fishermen's view, one problem related

associated with aquaculture is pollution. The other problem is that the cage units occupy protected and productive bays, where fishing is now prohibited.

Problems – perceptions - suggestions

- **Engine power:** Underpowered vessels are at a disadvantage, mainly for three reasons: they are at danger during sudden changes of the weather, they spend less time fishing, and they are confined in local fishing grounds. For these reasons, there are no prospects for full-time employment in fisheries if the engine power is less than that required for the size of vessel.
- **Port facilities:** The local port is small and fishing vessels compete for mooring space. In addition, there are no ports or shelters in the areas around Naupaktos to provide protection during sudden storms.
- **Fishing regulations – enforcement difficulties:** The fisheries association suggests that a minimum mesh size should be implemented in the area and even higher meshes should apply in certain localities or in specific seasons. Also, that trawling should be prohibited in the area Toumpa (outside the estuaries of river Evinos) where an important nursery ground of hake exists. The suggestion for sport fisheries is that only handlines and rods should be allowed.

  The fisheries association strongly protests for the lack of effective control of illegal fishing. The problem is more acute in the estuarine areas, where violations of the fishing rules is a daily phenomenon (fishing with dynamite, and chemicals, deployment of fine meshes, illegal approach of purse-seiners, etc.). The main reason for ineffective enforcement of regulations is that the local coast guard is not equipped with a vessel. It is only the vessel of the coast guard of the town of Patra that occasionally visits the area to perform inspections. An associated problem is that the procedures for ascertaining violations are ineffective. Practically, a red-handed arrest of the offender is required in order to erase a charge. Red-handed arrest at sea is a rare phenomenon, because upon sighting the patrol vessels the offenders have adequate time to escape or to get rid of the illegal gear or catches. Moreover, many sport fishing vessels have very powerful engines and are faster than the patrol vessels.

  The rules on minimum landing size are also not respected (undersized fish are sold freely in the markets). Another frequent violation is illegal fishing by owners of cage units, who catch enormous quantities of fish that are attracted in the cage area by the smell of food offered to the cultured fish (according to the current legislation, fishing is not permitted within and around aquaculture units, even by the owners of the units).

The view of the local branch of the Agricultural Bank of Greece

The local branch of the Agricultural Bank of Greece considers that the economic profitability of fisheries in the area of Naupaktos is declining. Although some fishermen live exclusively on fishing, most have to switch seasonally to other activities in order to complement their income. One of the most important commercial species, sea-bream, has practically disappeared, and sea-bass is becoming a rare species. Today, the average daily catch is only 5-

10 kg of fish. The number of applications to the bank for fishing loans is also decreasing, not only because the interest of youngsters for the profession is declining, but also because the high interest rates that render such loans prohibiting to many fishermen.

Fisheries association of Korinthos areas

Aspects of the area and the organisation

Korinthos is a medium-sized town not far away from Athens (about 80 km. Due to its proximity to Athens, there is high concentration of tourist during the summer period in coastal villages and small towns around Korinthos. These areas also attract people from villages and towns of northern Peloponnese without access to the sea. Many of these people practice sport fishing, and their high number gives rise to conflicts, as it appears that there is a high competition between coastal and sport fishermen.

Fishing is operated in the southern side of the Korinthiakos gulf, which is relatively deep without many suitable fishing grounds. Trawling is prohibited in a great portion of the gulf (it is permitted east of the Halcyon islands, where the Korinthian fishermen do not normally operate). The local fisheries inspectorate has registered 250 coastal fishing vessels in the prefecture of Korinthos. The local fisheries association of coastal fishermen has about 50 members. There are three more associations in adjacent areas.

Technical aspects

Most vessels are between 7 and 9 m in length. With the exceptions of three longliners, all local vessels employ nets.

Socio-economic aspects

Despite competition from imported fish, the fish enjoy high prices in the local markets. However, intense and illegal fishing has reduced the stocks to such an extent that an enormous amount of gear is now required to catch a moderate quantity of fish. As a consequence, the fishing expenses have increased considerably. Characteristically, it was stated that nowadays a fisherman needs 2000 fathoms of net and a strongly motorised boat in order to catch the same quantity of fish that a fisherman would catch 40 years ago with 200 fathoms of net and a row boat.

Another consequence of reduced catches is that fishing is hardly now a viable activity. Most fishermen have alternative employment, mainly in agriculture, and only those without land property are fully engaged in fishing. The number of fishermen that remain active throughout the year is about 75. An active fishermen works about 250 days in a year but he has to move seasonally to other areas (e.g. to the Saronikos gulf), where better catches are expected.

Interactions with other fisheries – perceptions on the overfishing problem

Despite the prohibition of trawling within most of the Korinthiakos gulf, the local fishermen claim that trawlers enter illegally the gulf. There is only one local purse-seiner in the area, but purse-seiners form other localities visit the area. Their presence in the gulf generates conflicts with the coastal fishermen, as it appears that nowadays purse-seines operate like towed gear and address to demersal species.

However, the major subject of conflicts in the area is the operation of numerous sport fishermen. It appears that the biggest conflict is competition for space, especially during the summer period. Professionals claim that these fishermen occupy all suitable fishing grounds, leaving no room for them and that their income is seriously affected by their inability to secure favourable fishing spots. Other problems associated with sport fisheries are: many sport fishermen use illegally professional gear, steel or destroy the gear of professionals, employ destructive fishing practices, and sell their fish at low price generating unfair competition.

In the view of professional fishermen the quantities of all species have been reduced dramatically, and some species (sea-bream, white sea-bream) have almost disappeared. Due to the scarcity of fish, many fishermen now use extremely small mesh sizes (e.g. 14 mm in order to capture red mullet).

Problems – attitudes - suggestions

- **Engine power:** Fishermen claim that the fishing environment has become very competitive and it is impossible for vessels with a low engine power to remain active. The main need for a high engine power arises from the demand to switch seasonally to new fishing grounds and to employ large amount of gear.
- **Damages by marine mammals, turtles, etc.:** Infrequent incidences of damage of gear by dolphins were reported.
- **Fishing regulations – enforcement difficulties:** Illegal fishing both by professional and sport fishermen is a frequent phenomenon in the area. Unable to control violations of fishing regulations, the coast guard is confined to inspections of safety equipment (life-vests, light rockets, etc.). In addition, due to the lack of effective inspections of catches, undersized fish are commonly sold in the markets.

"Lakonikos kolpos" -Fisheries Association of Githio

Aspects of the area and the organisation

Githio is a small town in southern Peloponnese, close enough to the estuaries of River Eurotas and two other smaller rivers. In the past, the small port of Githio was an important trading centre of agricultural products, but now the importance has declined due to the development of alternative trading pathways. There are about 100 fishermen in Githio and the adjacent villages (the number of vessels is about 30). Their area of operation is the Lakonikos gulf, and especially its western part. The eastern part is exploited mainly by the fishing fleets of Neapoli and Elafonisos (about 40 vessels). The Fisheries association "Lakonikos Kolpos" has 50 members, mostly coastal fishermen. This is the only association in all areas visited that has members from all fishing categories (beach-seine and trawl fishermen).

Technical aspects

The size of coastal vessels ranges from 5 to 12 m, most are being between 6 and 9 m. Nets and longlines are used at equal proportions. The mesh size is rarely less than 20 mm.

Socio-economic aspects

About half of the coastal fishermen of the area live exclusively on fishing. The remaining have a complementary income from agricultural activities. For full timers, the number of fishing days ranges from 200 to 270 annually.

Fishermen complain for declining catches. They claim that with five times more gear used today, they catch less fish than 20-30 years ago. The reason is attributed primarily to the operation of trawlers, and secondarily to pollution from agrochemicals, fertilisers and wastes from agricultural industries that are drained to the Lakonikos gulf through the Eurotas river.

Most fish are sold directly to the consumers or to fish shops and restaurants. When the catch is high, some fishermen load the fish on their cars and sell them in surrounding villages. In winter, when the supplies are higher than the local demand, the fish may be sold in Athens through middlemen or be transported and sold there by the fishermen themselves.

Environment

The coasts around the estuaries of River Eurotas are important spawning grounds of the marine turtle, *Careta careta*, and have been declared as conservation areas. The local fishermen participate in an environmental management project aiming to protect the turtles

and to reduce the mortality rate of turtles caught accidentally in the nets. The estuarine area has undergone severe habitat degradation due to pollution, engineering and swamp drainage, but recovery plans have been undertaken under a LIFE project.

Another environmental problem stated is the abandonment of used or damaged nylon nets, which do not decompose, on the bottom.

Interactions with other fisheries – perceptions on the overfishing problem

In the past there were four old and obsolete wooden seiners in the gulf. Now there are only two local seiners (one more is based in Neapoli), but the coastal fishermen claim that these are modern and powerful vessels (20 and 25 m respectively), causing enormous destruction to the stocks. Moreover, they accuse the trawl fishermen for frequent violations of the trawling prohibition within the 1-mile coastal zone and the 3-mile estuarine zone, thus damaging the coastal and estuarine nurseries. To strengthen their argument, they cited examples of huge catches of fry of red mullets and stripped mullets captured by trawlers. A species that has almost disappeared from the area is bogue.

However, in contrast to all other areas visited, destruction of coastal gear by trawlers do not occur. A communication system between the trawl and the coastal fishermen has been established, the former informing the latter in advance of trawling about the intended area of operation.

There are six old beach-seiners in the area. Many fishermen demand the abolishment of this gear on the grounds that large quantities of undersized fish are caught, though they recognise that beach-seiners bear heavy 'social charges' (each vessel employs 3-4 people). No serious conflicts with the sport fishermen were reported. The latter employ gear of low capacity (e.g. longlines with less than 300 hooks) and their number in the area is not very high. However, there are conflicts with diving sport fishermen who are blamed for destructive and illegal fishing. These fishermen are considered responsible for the reduction of abundance of groupers and other large-bodied species living in crevices.

Problems – attitudes - suggestions

- **Engine power:** For a fishermen to make a living exclusively on fishing, he must spend a lot of time in the sea, to travel long distances, to use a large amount of gear and to practice fishing under adverse weather conditions. Under such circumstances, a fisherman not permitted to have a strong engine on his vessel cannot remain in the profession as a full-timer.
- **Damages by marine mammals, turtles, etc.:** Dolphins and turtles are damaging the coastal gear. The most serious damage is caused by dolphins, the population of which is increasing constantly. If the damage of a net takes place at the beginning of the fishing season, the entire season is lost because there is not adequate time to buy a new net and to attach floats and leads. A long-standing request is to get compensation for such damages.

- **Fishing regulations – enforcement difficulties:** There are no local fishing rules. The coastal fishermen consider that the national rules do not offer adequate protection to the fisheries resources. They ask severe restrictions to be imposed on all gear (minimum mesh size, seasonal bans, etc.) in zones extending three miles from the estuaries of all rivers. They based their argument on that during a period of a general prohibition of fishing in the estuaries in the decade of '80s the catches of all gear increased considerably.

  They also ask additional geographical and seasonal (April-May) prohibitions to be imposed on trawling. Since it is practically impossible to prevent trawlers from operating close to the shore, they propose the construction of artificial reefs, which act as obstacles to trawling.

  Up to 1998 the local patrol guard was not equipped with a vessel and practically there was no way to enforce discipline to the fishing rules. Now a vessel is available and the situation has improved, but still the problem of effective surveillance and enforcement of legislation is far from being solved.

- **Administration - organisation aspects:** The prefecture of Lakonia, to which Githio belongs administratively, does not have a fisheries inspectorate. The fisheries aspects are handled by agricultural officers.

Association of coastal fishermen of Volos

Aspects of the area and the organisation

The town of Volos, situated in the inner part of the Pagasitikos gulf, is an industrial centre, and also a tourist centre. In addition, Volos is one of the main fishing centres of the country and concentrates an important part of the fishing fleet. The local fisheries inspection has registered 1,050 vessels, of which more than 50 % have their home port inside the gulf. Trawling is prohibited within the gulf since 1958.

Pagasitikos is a relatively closed gulf. It has an area 672.6 km^2 and is relatively shallow (maximum depth does not exceed 100m). The number of fishermen regularly fishing within the gulf is estimated to about 200. To this figure, an unclarified but apparently high number of sport fishermen should be added (the fisheries association estimates the number to be 5,000). Many sport fishermen utilise professional gear and practice fishing on a more or less professional basis. The association of fishermen of Volos has 150 members.

Technical aspects

Vessel size ranges from 5 to 12 m. The optimal vessel size for the area is about 9 m. Most vessels work as netters, some switch seasonally to longlining. The largest vessels shift seasonally to fishing grounds outside the gulf, such as in the Sporades islands.

Socio-economic aspects

All owners of vessels larger than 8 m are almost exclusively engaged in fisheries. Owners of smaller vessels usually have complementary incomes from other activities. Practically, under the fishing conditions in the Pagasitikos gulf, it is difficult for an owner of a small vessel to rely only in fishing for a living, especially during poor fishing seasons (in such seasons the largest vessels perform exits outside the gulf). For a full-time fisherman the average number of days at sea is about 20 days in a month (less in winter), the average catch is about 20 kg in a day (between 3.5 and 4 tons in a year), and the net annual income ranges between 3 and 3.5 million drachmas. Main reasons of inactivity are damages, national or religious days and maintenance work.

Environment

In the absence of trawling within the gulf, damaged nets abandoned by the fishermen accumulate on the bottom (ghost nets). The presence of high quantities of such nets seems to be an important environmental problem.

High concentrations of phytoplankton, probably associated with climatic factors, occur sporadically, causing problems to the fisheries due to the clogging of nets.

Interactions with other fisheries – perceptions on the overfishing problem

Despite the prohibition of trawling, the stocks decline constantly, and the decline is becoming alarming during the very last years. On the other hand, the abundance of some small non-exploitable species has increased, effectively meaning that the species composition of the fish community has changed in favour of the small unmarketable species. Since the fishing effort of professional fisheries has not increased (in fact, it has decreased as a consequence of withdrawals of vessels from the fisheries), the association attributes these changes primarily to the very rapid increase of the number of sport fishermen and secondarily to destructive illegal fishing. The numbers of sport fishing vessels and gear in summer are such high that professionals find practically impossible to go fishing during the weekends, due to no vacant fishing grounds.

Some conflicts with purse-seine fishermen also exist. The latter anchor their light sources with ropes to which a stone or other weight is fastened. Rather than recovering the stone at the end of fishing, they cut the rope, leaving the stone with a piece of rope on the bottom. More than 150 such stones are thrown each night in the gulf. The problem for the coastal fishermen is that the hooks of the longlines are seized in the ropes, causing the loss or a damage of the gear. A more serious damage occurs when the ropes are entangled by the propeller.

Problems – perceptions - suggestions

- **Engine power:** According to the available statistics, half of the fishing vessels of Volos and the surrounding areas have engines of less than 20 HP. Fishermen claim that no vessel with such a low power can practice professional fishing, and therefore a fisherman has to choices: to abandon the profession or to replace illegally the engine with one of higher capacity. A third possibility is to practice illegal fishing, for example by dynamite. Therefore, the *status quo* imposed on engine power is discriminating against fishermen with a professional attitude.

  The problem with the engine power in the area initiated when the census of the fleet took place (1989), during which time most vessels were equipped with much stronger engines manufactured in Greece (such engines are not manufactured today). The power of these engines was measured in units that do not correspond to the international standards. Actually, 1 HP in the old engines is equivalent to almost four units of the modern engines. Another related problem is that many fishermen took advantage of a rule allowing the increase of the size of vessels up to 10.5 m to construct a larger vessel. However, a concomitant increase of the engine power was not permitted, and as a result, the engine power of the constructed vessel was far below the power needed for this vessel. The suggestion of the fisheries association is to conduct a special study in order to establish the optimum relationship between engine power and vessel size or tonnage.

- **Damages by marine mammals, turtles, etc.**: Damages of gear by dolphins, and secondarily by seals and turtles, are very common. Such damages are more frequent in the fishing grounds of the Sporades islands, outside the gulf. Fishermen have been persistently asking the State to establish some sort of compensation for damaged gear.
- **Fishing regulations – enforcement difficulties:** The main problem concerning fishing regulations is illegal fishing, mainly by sport fishermen who utilise trammel nets. Others fish at night using breathing devices, artificial light and spear-guns. These are considered responsible for the disappearance of large-bodied species, such as grouper, brown-meagre and others. Another illegal practice is the use of various types explosives. The products of illegal fishing are sold in the local markets without effective control.

  The only patrol vessel available in Volos cannot control the vast surface of the gulf and adjacent areas. In addition, the patrol officers have actual difficulty to ascertain violations, due to the requirement of a red-handed arrest set by the legislation. The association suggests the following modifications of legislation: trammel nets and longlines to be prohibited for sport-fishermen, the presence of illegal gear on board to be treated as an offence, and the fishermen to undertake responsibility in surveillance.

  Another disagreement with the fishing legislation concerns the procedures by which individual licences are issues. As the rules apply today, many people practising other professions can acquire a fishing licence, while people coming from fishing families remain out of the profession. Typical examples stated were big farmers and civil servants who arranged through their links and political interventions for a fishing licence to be issued to their wife. The suggestion is to apply more transparent procedures and to give a stronger emphasis on the social criteria for the issuing of licenses.

- **Administration - organisation aspects:** The fisheries association considers that fishing rules should be decided by the local fisheries authorities, rather than by the General Directorate of Fisheries.
- **Other problems:** Small-scale fishermen are usually excluded from subsidies and loans, either because they cannot cover their own participation or because they are uneducated and have little experience with bureaucratic procedures.

The view of the local administration

In the view of the fisheries inspectorate of Volos, Pagasitikos gulf is a productive gulf, but it is badly managed. The main management difficulty is to put fishing effort under control. Effort increased considerably during the `80s when, in the absence of a licensing system for the coastal fisheries, a law imposing catch limits and restrictions on gear to the sport fisheries was introduced. This law led many local sport fishermen (more than 200) to apply for a professional fishing license. Since then the effort continues to increase due to (a) technological improvements, (b) overfishing, which necessitates the use of increasingly more nets in order to get the same amount of catch, and (c) the constant addition of new sport fishing vessels to the local fleet each year. Of these three factors responsible for the increase

of effort, the latter (continuous expansion of the sport fishing fleet) is considered as the most important. Another difficulty is the inability to control illegal fishing, both by professional and by sport fishermen.

With the progress of time the proportion of full-time fishermen declines. One reason for this decline is that the income from fisheries is low. This is particularly true for fishermen owing small vessels. It is highly debatable whether a fisherman with a vessel below 6 m in length and an engine power below 20 HP can remain in the profession as a full timer. Such a fisherman could make a living from fishing in the decade of `70s, perhaps also in the decade of `80s, but certainly not today. For a viable professional activity today, the vessel size should be 9 m and the engine power higher than 100 HP. Such vessels have the capacity to operate larger gear and also to perform visits to non-fully-exploited fishing grounds outside the Pagasitikos gulf.

Nowadays, no more than 50 fishermen can be characterised as full-time professionals (spending 18-27 days fishing in a month). The remaining have an alternative job (mainly in agriculture or in tourism) and are engaged in fishing seasonally or during favourable weather conditions. However, taking into account the prevailing socio-economic structures, it would be a mistake to remove the licenses of part-time fishermen, as some people claim. The suggestion of the Inspectorate is to use a new type of license for part-time fishermen (i.e. those who have additional sources of income from other activities). The latter should be subject to more severe restrictions on gear and technology than the full-timers, and should not be granted national and Community subsidies.

The restrictions on engine power have created an enormous problem to many fishermen and have acted non professionally. At least in the Pagasitikos area, the problem originated during the census of 1989, when the engine power of many vessels equipped with engines manufactured by Greek companies was miss-recorded (just because the Greek companies used different units to measure the engine power than the foreign companies).

The national fishing legislation is out of date. Under the present fishing conditions, the fisheries management requires complicated and flexible decisions, that may involve gear, seasons and areas. Such decisions cannot be taken by central services, that are ignorant of the local fishing conditions. Therefore, a decentralisation in decision-taking is required. Fishing rules should be decided at a local level.

The view of the local branch of the Agricultural Bank of Greece

The local branch of the Agricultural Bank of Greece has granted many loans to fishermen. One of their staff is collecting information on various economic and social aspects of the local fisheries and is experienced with the local fisheries problems. According to him, the production per vessel ranges from one to five tons annually and depends on the fishing capacity of the vessel, the experience of the fisherman and the degree of his insolvent in fisheries. The annual production of most full-time fishermen is between 2.5 and 3.5 tons annually. At least one third of the local fishermen have an annual production between one and

two tons. These are all part-timers and have an alternative employment. Many sport-fishermen reach or exceed this figure, and in this respect, they fish in a more professional manner than part-time fishermen. The number of sport fishermen in the Pagasitikos gulf is difficult to be evaluated. The number of recreational (leisure) vessels included in the registry of the local patrol guard is about 11,000, and many of these practice sport fishing.

Illegal fishing with explosives is becoming progressively a major problem. The local practice is to use first a small amount of explosive to kill small fish; these small dead fish attract larger predatory fish, and then a larger amount of explosive is used. Many of the products of illegal fishing are sold in taverns. Most of those practising illegal fishing are sport-fishermen or part-time professionals. Full-time fishermen who rely on fishing for their income are strongly against such illegal practices. To act against illegal fishing is a difficult but not an impossible task. For instance, most fish killed by explosives have a broken backbone, and these fish could be detected by proper inspections. For all above reasons, actions should be taken to encourage professionalism. The number of part-timers should be reduced, since many of those who fish intermittently have a tendency to violate the rules.

For each fishing area there is an optimum vessel size, depending on the weather conditions and the abundance of resources. Very small vessels have a low fishing capacity, since they cannot visit productive grounds or use the proper gear. Very large vessels (usually above 12 m) have high operational costs in relation to catches. In fact, the data available in the Agricultural Bank show that many of the local vessels with a length larger than 12 m have an increased difficulty to pay their debts for loans, and for some of them repossession procedures have initiated. This holds particularly true for large vessels specialised on tuna and swordfish fishing.

About 20-30 years ago most vessels were less than 7 m in length and some of them were mere rowing boats, lacking an engine. As at the time there were adequate fisheries resources, these vessels were economically viable units. Under the present fishing conditions, the ideal vessel size in Pagasitikos is between 8 and 10 m (sometimes up to 12 m, if the owner is a very experienced fisherman), provided that the power of the engine corresponds to the size of the vessel. The engine power for vessels between 8 and 10 m should be between 50 and 100 HP, otherwise the vessel does not constitute an economically viable unit. However, most of the local vessels of this size have a license for a much lower engine power. Almost to the degree of certainty, if the owner of such a vessel will respect the fishing rules or the rules on engine power, he will experience an economic failure. In order to remain an active fisherman, he must violate the rules on engine power and refit an engine of higher capacity.

Unfortunately, those who have established the restrictions on engine power have no sense of the proper relationship between vessel size and engine power. The administrative arguments are that such restrictions prevent overfishing and protect the fishermen from acquiring a powerful and uneconomic engine. These arguments would be correct if the minimum necessary engine power for a particular vessel was ensured (taking into account the needs for propulsion and hauling the gear). However, many vessels up to 10 m in length have a licensed engine power less than 20 HP. It is hardly possible for such a vessel to move out of the port, especially if at adverse weather conditions. On the other hand, there are vessels with a length less than 6 m that have a licensed engine power higher than 60 HP. Clearly, the "freezing" of

the engine power of vessels that was enacted with the census of 1989 created many problems and discriminations. The reason is that the census failed to make a true recording of the vessels' engine power. As a result, the recorded engine power of many vessels was lower than the actual. A special study by engineers and fisheries experts is required to decide on the proper engine power for each typology and size of vessels.

Association of coastal fishermen of Preveza

Aspects of the area and the organisation

The town Preveza, capital of the prefecture of Preveza, is in the mouth of the Amvrakikos gulf. Fishing, pollution, fluctuating discharge volumes from the rivers and other man-made actions induce environmental instability and threaten both the fisheries resources and the biodiversity (the problems of the Amvrakikos gulf are briefly outlined in the description of the fisheries association of Amphilochia).

In the summer period, the town attracts many tourists. The total number of fishermen in the Prefecture of Preveza is about 300. Most are organised in four fisheries associations (the associations of Preveza, Zalogo, Ammoudia and Parga) and in one fisheries co-operative (the co-operative of Preveza). The co-operative exploits state lagoons situated close to the town of Preveza using traditional farming techniques. Most members of the fisheries association are from Preveza. Some are from villages situated outside the gulf (e.g. Lygia). The number of members of the association (currently about 50) is declining progressively.

Technical aspects

Most members of the association, particularly those from Preveza, normally fish within the gulf. Those with larger boats and all fishermen from the village Lygia fish outside. Vessels are up to 9 m in length and are of two kind: typical fishing boats with keels, and boats without a keel (locally called "*priaria*"), suitable for fishing in very shallow waters. The latter require calm weather and practice fishing exclusively within the gulf. Fishing within the gulf is practised with nets. Outside the gulf, more fishermen employ nets, few employ longlines. However, longlines become increasingly unprofitable, and many fishermen have switched to nets.

Socio-economic aspects

About 70 % of the coastal fishermen have some land property and are involved in agricultural activities to a greater or lesser extent. Those with no property have to go fishing all the year round, even under very adverse conditions. A full-time fisherman spends between 250 and 300 days at sea. The monthly gross fishery income is about 350,000 drachmas. Nowadays the fishing expenses are very high (fuel, nets, boat maintenance, damages by dolphins, etc), and if these expenses are accounted for, the average monthly net fisheries income is between 150,000 and 180,000 drachmas.

High quality fish are sold directly to consumers, lower quality fish may be sold to retailers. Some fishermen fishing outside the gulf move seasonally to better fishing places (e.g. in Corfu or other islands), where they may remain up to two months.

Environment

A short description of the environmental conditions in the Amvrakikos gulf is given in the presentation of the fisheries association of Amphilochia. Like the fishermen of Amphilochia, the fishermen of Preveza complain for the deterioration of the marine environment due to pollution. Pollution is attributed mainly to the drainage of organic and chemical pollutants through the discharge of rivers, and also to the presence of many fish farming units. The fishermen stressed the disappearance of sea weeds, which has been accompanied by the dramatic reduction of the abundance of some fish species and crustaceans (sole, sea bream, sea bass, shrimp, etc.). On the other hand, they stated that red mullet, which prefers muddy bottoms, and twaite-shab, have increased in abundance. They also stated instances of mass mortalities of fish, due either to pollution or freshwater discharge variations from the rivers, causing lethal variations of salinity. The species mostly affected are the sharp-snout bream and the sea bass.

Another environmental problem is the presence of large quantities of rubbish within the gulf, especially plastic bags carried out with the water of rivers. The association believes that some trawling for a limited period should be allowed within the gulf not for catching fish but for removing the mess.

Interactions with other fisheries – perceptions towards the overfishing problem

Although fishing with trawls, beach-seines and purse-seines is prohibited within the gulf, the fisheries resources decline continuously. This decline is attributed partly to pollution and partly to the presence of many sport fishermen. The conflict with sport fishermen takes mainly the form of competition (a) for favourable fishing grounds, (b) for resources and (c) for the markets.

For fishermen fishing outside the gulf, the main problem is the damage of coastal gear by trawlers operating illegally in shallow waters.

Problems – perceptions - suggestions

- **Engine power:** Underpowered vessels can work only on calm days and only within the Amvrakikos gulf. More powerful vessels have better fishing opportunities, being able to work outside during poor fishing seasons in the gulf.

  The problem with the underpowered vessels in the area originated as following: The Ministry gave permission to fishermen owing very small vessels to construct larger ones that comply with the present-day fishing requirements. Many fishermen responded to the

challenge and built vessels up to 10 m long, often having to borrow money for it. However, no permission to use an engine of higher capacity than the one fitted in the old vessel was granted. In a way, the fishermen were trapped. Many local vessels 8-9 m in length have a licensed engine power less than 20 HP, whereas 80-90 HP would be required for this vessel size. If marine engineers and shipbuilders were asked, they would confirm that it is impossible for such a vessel to travel in safety, and even more, to conduct fishing.

- **Damages by marine mammals, turtles, etc.:** The populations dolphins and turtles have increased considerably as a result of restoration programmes and protective measures. The damages caused to the fishing gear by these animals have increased concomitantly, but no compensation is offered. For some fishermen, the replacement/repair of damaged gear constitutes the main fishing cost. To avoid damages, fishermen avoid leaving their nets overnight, which is a normal fishing practice. Fishing takes place between 18.00-23.00 or between 05.00-11.00 h.

- **Fishing regulations – enforcement difficulties:** Fishing within the gulf is regulated by a special Decree that sets prohibitions on the trawl, purse-seine and beach-seine fisheries and certain restrictions on other gear (e.g. minimum mesh sizes for nets, seasonal bans in the shrimp fisheries and fishing with harpoons at night). These rules are acceptable by the local coastal fishermen, but they state that the enforcement is inadequate. Due to the enforcement difficulties, those who really gain from the restrictions are the illegal fishermen.

  The association claims that many sport fishermen have very powerful and fast-moving vessels, and thus escape the patrol guard vessel. They also use illegally large quantities of professional gear, even gear which are prohibited (e.g. nylon nets). Despite the efforts of the local patrol guard to reduce the extent of violations, the situation is out of control.

  The most important violation of fishing regulations by professionals that was reported is the illegal use of a locally constructed gear resembling to a beam trawl (a kind of trawl, used for shrimp fishing, the horizontal opening of which is provided with an iron bar or tube). Fishermen using this gear have a competitive advantage over fishermen using shrimp-nets, which are less productive, very expensive and wear out very quickly.

  A new Presidential Decree is under preparation. This Decree has been elaborated under the pressure of ecological organisations working for the protection of marine turtles and mammals and sets severe restrictions on coastal fishing (one provision is that any fishing activity will be prohibited within the 1-mile coastal zone over a great part of the Amvrakikos gulf, from Preveza to Menidi). Fishermen state that their only defence against the Decree is illegal fishing; otherwise they would be enforced to abandon the profession.

The view of the local administration

The fisheries inspectorate of Preveza agrees with most issues raised by the fishermen. On the environmental issue, the inspectorate confirms that a major change in the bottom fauna and flora has occurred and that many previously richly vegetated areas of the gulf are now covered by mud. The production has declined significantly, but this only partly due to the environmental deterioration. The main problem is the uncontrolled expansion of fishing effort. About 20 years ago there were between 150 and 200 fishermen in the gulf, whereas

now there are about 800 fishing boats registered in the prefectures of Preveza, Arta and Aetoloacarnania that fish regularly within the gulf. At the same time, the number of sport fishermen has increased from insignificant numbers 20 years ago to about 3,000 sport fishermen today.

Most fishermen from Preveza (almost 90 %) fish in the Amvrakikos gulf. This high concentration of fishing effort in the gulf is due, to a significant extent, to the engine power limitations that prevent many fishermen from going outside the gulf. Overfishing has serious socio-economic consequences, in addition to the biological ones. One of these is that as the professional prospects deteriorate, youngsters avoid entering the profession (there are only 15 fishermen of age less than 40 years out of the about 250 fishermen of Preveza). A decline of the population of fishermen, especially of those that choose fishing as the main professional activity, is to be expected in the future.

The new Presidential Decree (in the final stage of preparation) regulating the fisheries within the Amvrakikos gulf imposes severe limitations to coastal fishing activities. This Decree will reduce significantly the fishing opportunities and is expected to meet the severe reaction of fishermen. The inspectorate's opinion is that the Decree should not be implemented in its present form.

"Analipsis", Association of "free" fishermen of Messolongi

Aspects of the area and the organisation

Messolongi (12,000 inhabitants) is an important fishing centre, situated in the ancient delta area of Acheloos river. The town is close to a number of large lagoons (the total area including associated wetlands is about 270 km^2, the exploited area is 150 km^2). The whole of the delta-system is of great ecological significance and protected by the Ramsar Convention. From the ancient times, fishing and aquaculture have been important local activities. Fishing is practised by coastal boats operating both in the lagoons and in the associated coastal zone. Aquaculture is practised by traditional extensive farming techniques (the "entrance" of the lagoons is opened in spring for some period of time, and fry and young fish enter the lagoon, attracted by the productive environment and the warm-oligosaline waters; later the entrance is closed, and the fish trapped inside are caught with traps after a several month growth period). The management and exploitation of each lagoon is assigned on contract by the prefecture to fisheries co-operatives. The co-operatives actually hire the lagoons, having to pay a rent (about 15 % of the gross income of the co-operative from the sales of fish). This rent is usually used for maintenance works within the lagoon.

There are numerous fisheries co-operatives in the town of Messolongi, which compete with each other over acquiring the exploitation rights of a lagoons. Actually, most co-operatives have been established on the prospect of signing up a contract for a lagoon. The contracts do not usually last long, which prevents effective management, since no incentive is provided for investments and setting up long-term exploitation plans. Only nine co-operatives (with about 100 members in total) are active, in the sense that they have hired a state lagoon.

In addition to the fisheries co-operatives, there are two fisheries associations of coastal fishermen (two more are in the nearby town Aetoliko). The number of fishing vessels registered in Messologi is 270. Big vessels normally fish in coastal areas, reaching as far as Kefalonia island. Smaller vessels usually fish within the lagoons or the associated coastal areas. The coastal fishermen operating within the lagoons is estimated to number about 150. These employ fishing gear other than traps, and are locally named "free" (independent) fishermen, as opposed to the fishermen organised in co-operatives, who work collectively and employ fixed traps for catching fish. Messolongi is the only place of Greece where, due to a long tradition and "historical rights", free fishing within the lagoons is permitted (however, some fishing gear, e.g. nets, are prohibited). In all other areas of the country, the state lagoons are hired to co-operatives or private persons/companies, and fishing by independent fishermen is strictly prohibited. The association of "free" fishermen of Messolongi represents some of the local free fishermen and has about 60 members.

Technical aspects

Due to shallow waters (maximum 2 m), the vessels fishing in the lagoons lack a keel and are of two kind: "*gaites*", around 6 m in length, and "*priaria*", between 7 and 9 m. The former type is more suitable for fishing with harpoons and longlines, while the latter is more appropriate to use the gear "*stafnokari*" (see below). The nominal engine power of most vessels is between 8 and 20 HP.

According to the local rules, permitted fishing gear are the harpoons (worked either in day time or at night with the aid of artificial light), the longlines and a local instrument called "*stafnokari*" (netting material fitted in an horizontal frame that is left to the bottom, and raised swiftly when fish are passing above, with the aid of a system of levers adjusted to the boats).

Socio-economic aspects

Lagoon fishing and aquaculture activities make an important contribution to the local economy and employment. These two activities become increasingly threatened by overfishing. The association claims that free fishermen are in the worst situation, because of the 6-month fishing prohibition in the lagoons (see below). Inevitable, fishing is a part time activity for most fishermen, especially those with small boats or low-power engines that are confined to fish within the lagoon only.

Taking into account the existence of an extended fishing prohibition, and also that fishing is practised mainly on a part-time basis, an estimation of the annual income from lagoon fishing provided by the association is 500,000 – 1,000,000 drachmas. As a natural consequence of the part-time involvement in fisheries, the youngsters refuse to enter the profession. Also, many of those who practice fishing do not have a proper professional attitude towards the fisheries problems.

Environment

The Messolongi lagoons are highly diverse environments, with factors such as salinity, temperature, turbidity and dissolved oxygen fluctuating both temporarily and spatially. They are also key fishery ecosystems. On the one hand, they harbour important concentrations of crustaceans, mollusks and fish. On the other hand, they serve as nurseries for mugilids, sparids, flatfish and several other marine fish, the early survival of which affects recruitment both to the lagoon and to the offshore fisheries.

The extend of the environmental changes is increasing due to a number of man-made activities. Pollution from the sewages of Messolongi and many other interventions have altered the natural biotopes and induces a further stress that acts additively to the natural environmental stress. Another important source of pollution is the lubricants of the numerous

fishing vessels which, as stated by the association, are emptied in the sea. In calm days these lubricants concentrate on the surface, blocking the passage of air, and cause mass mortality of fish.

Overfishing of juvenile fish is another major problem. Fishing and traditional farming practices impose a high juvenile mortality and threaten the populations of species which occupy the lagoons during the early part of their life-history. However, the relative importance of the human actions on the lagoon fish stocks and nurseries are difficult to assess, because these effects occur concomitantly and thereby confound interpretations about the causing agent. An important difficulty with the management of the Messolongi lagoons is that efforts to reduce pollution and to rationalise the fisheries contradict local economic interests.

Interactions with other fisheries – perceptions on the overfishing problem

As is to be expected, the coexistence of cooperative and free fishermen within the same lagoon gives rise to conflicts, since both types of fishermen compete for the same limited resource. The conflicts are often resolved with violence. The 'free' fishermen accuse the cooperatives for not respecting the rules on minimum landing size, retaining small fish caught in the traps, instead of returning them to the sea. The cooperatives accuse the 'free' fishermen for illegal fishing with nets and other prohibited instruments. The president of the fisheries association of free fishermen admits that many professional 'free' fishermen fish with illegal gear or during periods of fishing prohibition, adding however hat these fishermen are not members of the association.

The impression left during the interviews is that illegal fishing is a common practice in the area of Messolongi. Illegal fishing seems to be such a widespread phenomenon that in someway it has been established as a tradition. In fact, illegal fishermen are referred to as a special fishing category, and the term "illegals" has been adopted in the local fishing terminology. These fishermen are of two kind: professional fishermen who do not respect the rules on gear permitted for "free fishing", and sport fishermen who do not respect the rules on gear permitted for sport fishing. In the opinion of the association, the number of illegal fishermen of the second category is enormous and overwhelmingly exceeds the number of illegal professional fishermen.

After all, it is not surprising that all fishermen complain for a serious reduction of the resources and a decline of the catches. According to the fisheries association, the reduction is due primarily to the capture of large quantities of fry and undersized fish, and those who should be mostly blamed are the numerous illegal sport fishermen. Young fish, product of illegal fishing, are sold in the markets without any inspection from the competent authority (Directory of Commerce). Secondarily, the reduction is due to the decline of fry entering the lagoons from the offshore nurseries, due to trawl fishery with fine meshes.

Problems – perceptions - suggestions

- **Engine power:** According to the association, the restrictions on engine power is the main reason that fishermen seek the safety of the lagoon and avoid going out of the lagoon (fishing out would relieve the local resources from the high fishing effort currently exerted on them). Some vessels are so underpowered that they are unable to work even within the lagoon. To solve the problem, the owners fit their vessels with car engines, giving a power up to 40 HP. [On this issue, a local administrative officer commented that some "illegal" fishermen use car engines not for safety or increased fishing capacity, but in order to escape prosecution, because car engines both provide high-speed and are noiseless].

- **Fishing grounds:** Within the lagoons, free fishing is allowed for only a six-month period. In most proximal fishing grounds outside the lagoons, fishing is prohibited all the year round, except in one area that lies in a navigational route. If the patrol guard will strictly enforce these prohibitions on fishing areas, all fishermen with small boats/engines (thus, unable to visit more distant fishing grounds) have to abandon the profession.

- **Fishing regulations – enforcement difficulties:** Fishing within the lagoons is regulated by articles of the Fishing Code (Presidential Decree 435/1970) that set the conditions for entry, gears and fishing seasons. Concerning "free" fisheries, the most important provisions are (a) a general prohibition on nets throughout the year, (b) a ban of fishing from May to October, and (c) a general ban of fishing in fishing grounds outside the lagoons. Fisheries is regulated to some extent by traditional controls rather than by regulations and tends to be based on fishermen's experience and local administrator's perception. In practice, many fishermen use nets. Even nylon nets, that are prohibited throughout the country (but freely sold in the market), are widely used. Another instrument used illegally is the funnel trap.

  All local fishermen seem to agree that low enforcement is extremely difficult, if not impossible. On the one hand, the lagoon areas are vast, and the number of fishermen is great. On the other hand, the vessel of the patrol guard is unsuitable for shallow waters (and usually, as the fishermen state, it is out of working order). In the opinion of the association, both suitable means should be provided to the patrol guard and the penalties for violations should increase substantially.

- **Administration - organisation aspects:** A long-standing demand of the 'free' fishermen is to get access to lagoon farming. They claim that they all come from fishing families, are professional and experienced fishermen, and their profession is highly compatible with lagoon farming activities. However, they claim that the local prefect prefers to hire the lagoons to circumstantial aggregations of people, of who many have not any experience in fishing or fish farming. These people associate to form a cooperative with the only objective to acquire fishing rights in a lagoon (nonetheless, these people are equipped with an "individual" fishing license, but according to the association, this is only because the criteria for acquiring a fishing license are very loose and incorrectly applied). The results of this practice is that real fishermen are excluded from lagoon farming, whereas people with unrelated professions become farmers.

  Another demand of the association is to rationalise investments and subsidies. As the rules have been set, fishermen get an almost insignificant proportion of the money available for the development of fisheries. For instance, well-paid training seminars that

supposingly are addressed to fishermen are held, but the trainees are anything else but fishermen.

The view of the local administration

The fisheries inspector of Messolongi considers that fishing effort within the lagoons is very high and that controls on fishing are extremely difficult, practically impossible. The problems are magnified by the high number of sport fishermen, who effectively fish without any control, and by the operation of trawlers and purse-seiners in nearby fishing grounds. Conflicts between "free" fishermen and "cooperative" fishermen (fish farmers) are frequent, as well as between "legal" and "illegal" fishermen.

The low engine power of vessels indeed confines the fishing activities within the lagoons, but there are cheating practices (which, however, bear a high economic burden to the fishermen). The restrictions on engine power, coupled with the extended fishing prohibitions, make "free" fishing highly unprofitable.

The need for a more rational management system of the lagoons is recognised, and also the need for more flexible regulations and a general revision of the legislation on "free" fishing, are recognised. The construction of artificial reefs would have positive effects on the local fisheries.

«Agios Nikolaos» - Coastal Fisheries Association of Naousa, Paros
«Professional Fishermen's Association of Paros»
«Fishermen's Association of Antiparos»

Aspects of the area and the organisation

Paros and Antiparos islands are part of the Cyclades a group of islands, in the south-central Aegean Greece. Because of their location, the two islands are strongly affected by the winds, especially the northern ones. Being away of the main navigational routes, no major pollution problems are experienced. In general, the area has some agricultural activity (barley and olive trees in the highlands and vineyards in the lowlands) as well as two bottling industries.

«Agios Nikolaos» is a coastal fisheries association with approximately 60 members, based in the Naousa port of Paros island. The «Professional Fishermen's Association of Paros» is another association, with 54 members, based in the Parikia port of the same island. The latter associations, along with the «Fishermen's Association of Antiparos», an association based in the small island of Antiparos, next to Paros, with 65 members, are the three major fishing centres of municipality of Paros.

Technical aspects

The average length of the fishing vessels is between 9 to 10 meters, with 6 meters the smallest and 16 meters the longest (Naousa port). All the fishermen with vessels over 10 meters length, employ two to five fish workers (mostly Egyptians). The area of operation extends to all the islands of the Cyclades complex. The fishing tools used are mostly longlines, simple and trammel nets and some times Kiourtos (a kind of trap).

Socio-economic aspects

Generally, in the Greek islands, most of the fishermen are ex-merchant marine seamen, who after several years in the sea, they made enough money to build a house and buy a boat. Moreover, since they had the right to transfer their social insurance from the navy (which would give them a respectable pension when they retire), most of them do follow that profession. However, this causes an additional economic burden, since they are need to pay the insurance premiums themselves, reducing therefore the monthly available income.

Due to the geographical location of these island and the prevailing northerly winds, the average number of fishing days in a year is between 150 to 170. The smallest vessels (under 8

meters of length) are pulled ashore for protection during the winter, from November to the end of February or even as late as March in some cases. The most profitable vessels are considered the ones being from 8 to 10 meters of length.

As the local fishermen claim, fishing is no longer profitable. Many fishermen are being forced to get a second job, while most of their wives are working too. The quantities of the fish caught are not as they use to be, so the products are sold directly to consumers and restaurants. The prices fetched are satisfactory during the summer, but in the winter the retailers are forcing prices down. Competition from imported fish is believed to be one of the main reasons for it. In the past few years, ten permanent withdrawals of vessels have being reported, only for the port of Naousa.

Environment

According to the associations, the fishing stocks have been reduced significantly, and overfishing is to be blamed for it. Most of the damage it is believed to be done by the so called «sheet» gear, a 20 to 30 meters long fine-mesh net, which is dragged near the shore by beach-seiners, catching very small bogue. These little fish fetch high prices during the summer. Fishermen consider the use of this gear as the main cause for the extinction of the bogue from the area. Other species such as mullets and lobsters, have almost disappeared. On the contrary, species such as tuna, mackerel, bonito and, seems to be increasing in the last few years. Fishermen reported that a few years ago, while Mrs. Papazoi, who was the head of the prefecture, it was forbidden for beach-seiners and purse-seiners to operate during April and May. The following year, the sea was full of fish *'but this was only for one year. If the decision makers do not forbid fishing in October, April and May, the fish resources will not recover and we will vanish with them. Many years ago, the standard catch was 50 kg of mullets, just in one night. Now, one vessel needs more than two years to catch so much of this species».*

Interactions with other fisheries - perceptions towards the overfishing problem

There are 35 beach-seiners, 10 purse-seiners and one trawler just for the Paros island. According to the associations, other trawlers from the island of Naxos, from Thessaloniki or from Chalkida perform frequent visits to their fishing grounds. "*The overfishing problem is increasing day by day. The purse-seiners are fishing in small depths, day or night, some times with less than 7 mm mesh size (4-5 mm), leaving nothing from bottom to surface. They are collecting ten boxes of fish and they are keeping only three. The others are undersized fish which being thrown back to the sea. Beach-seiners are employing illegally longer nets than they suppose to and they too are fishing at low depths (50 fathoms).*

The presence of a large number of sport fishermen (around 5000 in the Cyclades area, and increasing during the summer) constitutes another major problem. Professionals are reporting that amateurs illegally use professional equipment and since they are not subject to restrictions on engine power, they get first to favourable fishing spots first, they can go fishing under adverse weather conditions, they are catching the same or larger amounts of fish (most of

them undersized) and finally they are selling them to tourists and relatives reducing the local market size and pushing the prices lower.

Illegal divers seem to be another important issue. Fishermen claim that these are diving during the night, with flashlights. "*We are reporting them to the local authorities, they arrest them, but the next day they're free to go, because they have many acquaintances....*".

Other problems - perceptions - suggestions

- **Engine power:** *'Only 4 - 5 % of the local coastal fishermen have problems with the engine power. That is because most of us have already changed engines, so the actual engine power is higher than the registered one. The engine is the guarantee of safety of the vessel, and the fisherman. We would be in great danger if suddenly the weather changes..'.».*
- **Port facilities:** There are no port facilities such as fresh water supply eth. The Naousa port is very small and fishermen are required to pay rent (10000 to 15000 drs) for keeping their place in the port. There are three boatyards in the island, but the owner's priority is the tourist boats, so the fishing vessels come second and are often left without adequate maintence.
- **Damages by marine mammals, turtles, etc.:** Serious damages occur because of the presence of the dolphins. *'Their population either has increased in recent years, as a result of protective measures, or, because of the reduction of fish resources, they all coming to our nets for food'*. Another expressed opinion was that *'the only natural predator of dolphins is the sword fish. It goes underneath them and opens a hole to their belly. But the swordfish have been overfished by the Italian and the Greek long-liner's. So, maybe that's why the dolphins have increased'*.

  The local fishermen had two suggestions to make: *'The State must provide compensation for the damages to our nets, like it provides to farmers, when their crop is damaged by adverse weather conditions. Or it can provide us with ultrasound repellents that keeps away the dolphin'*.

  Seals are also causing damages to both their catch and nets. *'The seal is swimming to the nets during the night and eats every capturde fish. It even takes some and storse them to its nest for later....'*. Another fisherman stated to the interviewer: *'early this morning I went with my son to collect our longlines and the seal was there. While we were pulling it to the surface, the seal was stealing one by one every fish, which was coming to the surface. It was like a game for the animal. But for us it was a fight. At the end we had less than one kilo of fish to our vessel. Do you know how many hours a man needs to clean and prepare a set of longlines?'*
- **Fishing regulations - enforcement difficulties:** One of the problems is that although fishing zones and navigational routes are clearly defined, the ferry-boats often violate the routes and sail through the one-mile zone from the coast.

«Ypapandi» - Coastal Fisheries Co-operative of Kalymnos

Aspects of the area and the organisation

Kalymnos, as the local people describe it, is *'a big rock, thrown by God in the middle of the sea'*. Located in the southeastern part of the Aegean Sea, there is very little surface suitable for agriculture. Along with the islands of Astypalaia, Leros and Patmos, it forms the province of Kalymnos, part of the Prefecture of Dodecanese. The fishing grounds are strongly affected by the winds and rough sea conditions are common.

«Ypapandi» is a coastal fisheries co-operative, with 410 fishing vessels and at least 1000 members. The co-operative provides its members with fishing equipment and supports various trading activities. There is also another association in the island called «Fishermen's association for swordfish», with approximately 40 members, thought most of them are also members to former co-operative.

Technical aspects

The fishing fleet of Kalymnos consists of 423 vessels. All operate with passive gear, except 8 trawlers (mostly fishing away from Kalymnos), 4 beach-seiners, 1 day purse-seiner and few sponge-fishing vessels. The length of the fishing vessels ranges between 5,5 to 24 meters. All the fishermen with vessels over 7,5 meters length employ two to three additional fish workers. The area of operation extends to the whole Southeastern Mediterranean Sea. The fishing gears used are mostly bottom and surface longlines (83% of the vessels), nets (with some exceptions) only seasonally (48%), troll line and handlines.

Socio-economic aspects

The town of Kalymnos (14000 inhabitants) concentrates most of the population of the island (in total, 14500 inhabitants). The rest of the population is distributed in the five small villages/communities of the island.

Kalymnos is one of the most important fishing centres of Greece in terms of production and fishing units. Like in many other islands of the Dodecanese complex, fishing has traditionally played an important role in the local social life. For most of the people, fishing is their only professional activity, contributing to the local economy and employment either directly or indirectly. For some others it is a part-time activity and complements the income and employment from other activities, mainly in tourism and agriculture. The number of registered fishermen is around 1000. But, since one job at sea required at least another supportive employment place on land, the total number of persons directly or indirectly involved in

fisheries has been estimated to around 2500 people, which is the 50% of the professional active population of the island. This figure, even though it is considered as a conservative estimate, is about double than the average for other Aegean islands. Due to the restrictions in the issue of fishing licenses, many locals, coming from fishing families have been unable to enter the profession. So, a considerable number of them has been equipped with a sport fishing license but fish with professional gear and making a living by selling their products. According to the association, 85% of the fishermen earn their living exclusively from fishing activities.

The average number of fishing days in a year, for vessels using longlines and nets is between 200 to 250. They perform long trips which may last up to five days. There is a small number of vessels (10%) which employ surface longlines on a constant basis, targeting swordfish and large scombroid species. These vessels perform longer trips, lasting from 3 to 20 days, most of the times in distant fishing grounds of the southeastern Mediterranean. The average number of fishing days in a year for these vessels is between 120 to 130. According to the fishermen, these vessels are the most profitable ones, especially the 'family-owned' ones, as they can use nets and bottom longlines during *'dead'* periods of swordfish fishing.

As regards the marketing and distribution of the catch, 80% of the fishery products are being sold in the Dodekanisos islands, where most vessels land their catch. Only 20% of the products are being sold in the Kalymnos island. The biggest proportion of the swordfish production (80%) is being exported in Italy and only 20% is for domestic consumption. During the summer, 80% of tuna's production is being consumed in Greece and 20% is being exported to Europe, while in the winter the whole of the tuna landings is being exported (30% in Europe and 70% in Japan).

Special mention should be made to sponge fishing, which was once an important and economically viable activity. This specialised fishing activity had a long tradition in the Dodecanese, and especially in Kalymnos, where about 80% of the activity was concentrated. The vessels performed long trips (April to October) in the Aegean Sea and other Mediterranean areas. Up to 1970, Kalymnos was one of the world's largest 'producer' of natural sponge. Since then, the activity has been declining, and this has affected the economy of the island. Initially, the basic reasons for the decline were the increased difficulty to obtain licenses for sponge-fishing in the territorial waters of other Mediterranean countries, and the strong competition in the European Community market with sponges imported from third countries. In 1986, a disease in the sponge-banks of the Mediterranean killed almost all sponges. Following that event, sponge-fishing became a marginal activity and never recovered. Most vessels of the sponge-fishing fleet have been transformed for other fishing activities, such as shellfish fishing. Fishermen of the remaining sponge-fishing vessels are reporting: *'2-3 years ago, commercial sized sponges started to reappear in the Mediterranean. We were going to Crete for fishing, the production was increasing and many of us started to modernize their vessels. But, this year the disease strike down again. Now, we are thinking of going back to Italy again...'*.

Environment

The seabed topography (mainly rocks and hard substrates created by corals and calcareous plants) and great depths (in most areas the isodepth contour of 50 m is very close to the shore) are the two characteristics of the Kalymnian coastal marine environment.

Interactions with other fisheries - perceptions on the overfishing problem

The local coastal fishermen regard as their greatest problem the presence of the trawlers. *'The damage incurred to the fishery resources and specially the fry is tremendous'*. The coast guard has three patrol boats, which as the fishermen claim *'every time the trawlers are fishing in the area, all three of the patrol boats seem to be out of working order'*

An additional problem is the presence of the amateur fishermen and the spear-gun night-divers. This group of people, belonging to the local 'high-society', have high-tech equipment, and being under no control whatsoever are exerting significant pressure to the natural resources. Morever, during the summer months their number explodes.

Other problems - perceptions - suggestions:

- **Engine power:** According to the fishermen, 80% of the Kalymnian fleet is illegal, as they have been forced to change their engines with stronger ones, in order to safely perform the necessary long trips.
- **Port facilities:** One major problem of the fishermen of Kalymnos is the lack of landing places. According to them *' the aquaculture units (6 in the island) are located in all the available gulfs, forcing us to land wherever we can find a small refuge*! '. Problem is also the lack of adequate infrastructure in the remaining informal landing places, such as storing facilities.
- **Fuel:** Fishermen claim that the fuel given (transit diesel) is not sufficient for the long distances they have to travel. They propose to 'seal' the boat's control instruments and record the working hours of every engine so that transit fuel to be distributed according to the actual use.
- **Damages by marine mammals, turtles, etc.:** A high occurrence damages on the nets and the catch due to the presence of dolphins and seals was reported. *'A normal net last for at least three years. If you take from all the fishermen the invoices of nets they have for the last three years, you will see that something is seriously wrong...'*. They propose that *' a insurance and covering organisation could be formed which for a number of years would record the quantities of net purchased by each boat, correlate that to its typology and size characteristics and result in a fair system of subsidies, for nets renewed because of the damages incurred by marine animals. Though some would think of it as a non-fair system, the majority would benefit from it'*. They also claim that the problem with the dolphins is chronic and the solution once sought through the low-frequency sound repellants are not working anymore. Few years ago a Danish team of scientists had

provided them with such devices which worked for sometime but the end result was a failure as the dolphins either got used to the sound or get called by it.

- **Fishing regulations - enforcement difficulties:** The fisheries in the area of Kalymnos is subject to the national management rules. There are no local fisheries regulations, except for a provision under a Ministerial Decision that prohibits trawling in an area between Kalymnos and Kos islands. This is one of the few areas around Kalymnos where the depths and the bottom topography permit trawling. The Ministerial Decisions have a life-span of one year after which a Presidential Decree has to be issued for a permanent effect. However, the latter Ministerial Decision was never followed by a Decree and the prohibition was lifted. In addition to the trawlers, dynamite fishing was also reported to often be practiced.

Finally, the Kalymnian coastal fishermen raised an interesting issue. According to them: *'the Danish scientists brough us a special trammel net made by silk-thread. This net is finer but stronger than the one normally used, and much more economical than the 'good' one, the Japanese, as it is three times lighter. However, the Ministry officials did allow the use of it ...'*

«Ag. Apostoloi» - Fishermen's Association of Mytilini and adjacent regions

Aspects of the area and the organisation

Lesvos, an island in the North-eastern Aegean sea, is the second largest one in Grece. Its geomorphology and soil qualities favoured the development of agriculture from the ancient times. The culturing of olive trees is the predominant agricultural activity though fisheries has played a predominant role in the coastal communities.

The local fisheries association numbers 90 members and is located in the port of Mitilini, the island's capital. Four of the fisheries association are trawler owners. According to the locals, in the island there are about 700 professional coastal fishermen and 1200-1300 *'professionalised'* (!!) amateurs.

Technical aspects

According to the local fishermen, around the island, there are 1800 professional licenses registered, for both the coastal and medium fisheries, while the vessels number around 7500. Of these, 55% are from 4.5 to 6 m in length, 20% are from 6 to 8 m, and the remaining can measure up to 11 m. The gear mostly employed is nets and trammel nets, longlines, swordfish-longlines, and various types of traps. In the two large gulfs of the island, Geras and Kalloni, nets are mostly used with longlines accounting for 30% and 10% respectivelly. In the latter (Kalloni), oyster culture has also been developed.

Socio-economic aspects

There seem to be problems incurred by the relatively high operational costs of the coastal fishermen, the lack of resources (overfishing) as well as problems related to the distribution and marketing of the landings and the low prices fetched (attributed to competition with imported products). Therefore, the remaining available income is indeed very low in this area too.

In the older days, (1978-82) the net was bough for 700 drs per kilo. At that time, they required a net of 500 fathoms in length for the same amount of catch that 2000-3000 fathoms of net are required today. Moreover, the price of the net has risen to 4000 drs per kilo.

As the fishermen claim, the net in the island is sold at higher prices than in Athens, because of the intermediaries involved and the cost of transport.

Maintenance and servicing are also costing enough as a wooden boat needs to get ashore for painting and general maintenance at least three times a year, and a boat of about 8 meters costs 40000 drs just for pulling it ashore and return it back to the sea again.

Significant problems are also faced with regard to the distribution of the catch. Small quantities are sold directly to consumers and/or restaurants, mainly in the summer and some times in the winter. But for 'large' quantities, the distribution has to go through the main sea-transport routes (ferry boats). For such transports, isothermic boxes are required, further increasing the cost, while the catch has to transported within four hours from landing. However, the local ferry-boats set sail in the afternoon, and as a result, the early-morning catch remain unsold in the port. In conclusion, the fishermen in the islands are highly dependant on the local wholesaler, while prices are being forced at lower levels due to the imports from third countries and the increased farmed production.

The island of Lesvso is greatly affected by adverse weather conditions, so the days available for fishing range from 180 to 210 per year. For the smaller vessels of about 4-5 m, the number of days is even less. Vessels around 8 meters long seem to be more efficient, not only because they can operate for more days during the year but also because the may accomodate ice-storage facilities. Very few people live exclusively from fishing, as for the reasons explained, they cannot earn a respectable living out of it. The majority of them have income-complementing activities, in agri-farming, the tourist industry, in building and construction or even as fishworkers in seiners.

There is no succession in the profession as only 10% are aged from 27 to 40 years old, about 70% are from 40 to 55 years old and the remaining are older pensioners. The youngsters find no motives for entering the profession, new licenses are not issued, operational costs are high, prices are low, and the life associated with it is rough. In a few words, everything is against it. However, the gulf of Kalloni seems to provide an exception to it, through the development of oyster culture. Out of the 100 people involved in the oyster culture, 36 are young divers exclusively working in that sector. They obtain a respectable living and the days of work can get up to 300 per year.

Environment

There are no significant pollution related problems in Lesvos and its fishery grounds. There are however allegations of lead contamination of the soil from the burned forests which is transferred to the sea through river run-off. As the fishermen claim *'when it rains the sea turns red'*. They also state that the oil industry creates regional problems with untreated sewage.

Unfortunately however, the fishing grounds of the island with accessible depths are quite few while the rocky and reef-like places where fish used to strive are very scarce. Many fishermen report that they knowingly enter the Turkish waters where rocky substrates and reef structures are more abundant.

Interactions with other fisheries - perceptions on the overfishing problem

Under this context the local fishermen face a major problem which they claim is mostly attributed to the increase in the number of vessels (particularly the medium fishery) and to the increase of the fishing effort through the use of high-tech equipment.

More specifically, the coastal fishermen of the island claim that ' *the island has 8-9 bottom trawlers and 6-7 seiners, but such vessels also come from the island of Chios. However, the grounds for trawling are limited and once they have been exploited once, nothing is left for the others. The coast guard is busy chasing the illegal immigrants which try to enter the country and cannot dispose boats or personnel for the implementation of fishing rules. The greatest problem is when trawlers come as close as 500 meters from the coast and destroy the nursery grounds while in many cases they destroy the nets of the coastal fishermen*'.

As in most parts of Greece, here too there is a problem with the amateur fishermen, as they use modern technology and illegal gear. Indicative of the problem is the fact that during the last couple of years a number of professional fishermen could afford to wait for 2-3 years for the decomissioning scheme assistance and sold their fishing licenses to amateurs !!!.

Other problems - perceptions - suggestions:

- **Engine power:** There are hardly, as fishermen claim, one or two vessels with actual engine power in accordance to the registered one in their license. 'If the engines were kept at their registered HP then no-one would be able to fish under the current circumstances.
- **Port facilities:** There is no fishery supporting infrastructure in the island. The fishermen acknowledge the great need for the creation of modern and adequate distribution stations.
- **Fuel:** Only once per month can the local fishermen take their allowance on transit fuel, but since the boats cannot accommodate for such quantities in one filling the fishermen do not take all that they are entitled to.
- **Damages by marine mammals, turtles, etc.:** Dolphins seem to create greater problems than the seals and turtles. The local fishermen state that their Turkish counterparts systematically hunt and kill the seal which try to find refuge in Greek waters. The problem is great and they bring as an example a local fisherman who had to take a loan for buying new nets, after the dolphins had destroyed the old ones, and now the bank which granted the loan is seizing his boat.
- **Other problems:** Under the current circumstances there is absolutely no way to distinguish between the real professional fishermen and the professional amateurs. Pensioners, hotel owners, doctors, lawyers etc, they all issue professional licenses in their children's or wife's name. One solution proposed, which would nevertheless create internal problems, would be the issuing of invoices with every sale.