WORLD YIELDS OF MARINE ORGANISMS

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Contents

Summary

This chapter provides a review of the state of the world's marine fish stocks, based mainly on capture fishery statistics up to 1996. It refers to the world fish production and to major trends in world fisheries since 1950. Attention is drawn to the generalized high level of exploitation of the more valuable marine resources. More detailed remarks are

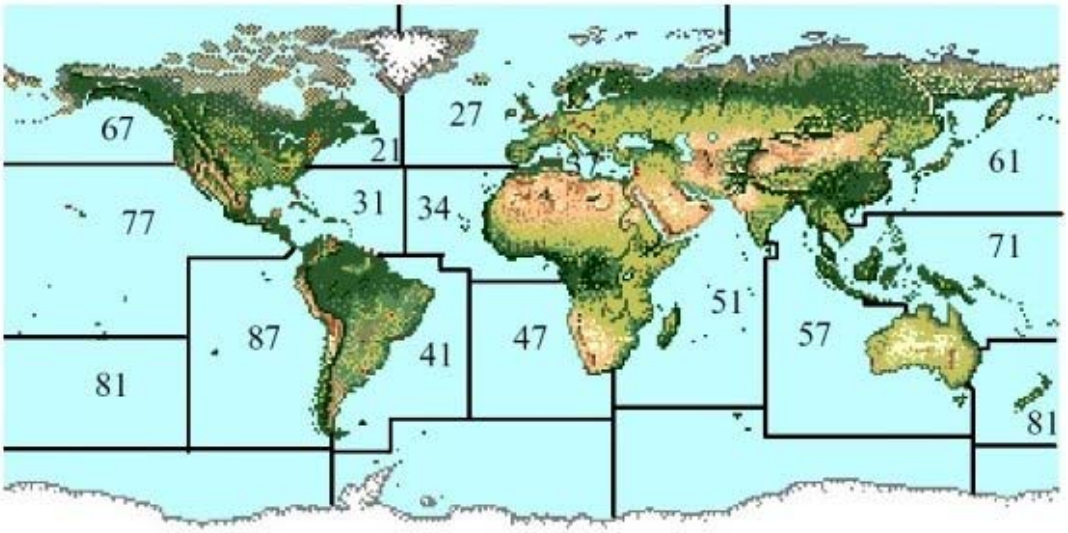
provided for each FAO Fishing Area, together with a discussion of the major changes and trends that have occurred in specific resources. A summary is provided for each Fishing Area showing historical and recent landings for the major groups of marine resources.

1. Introduction

A first major review of the state of world fishery resources was produced by FAO more than two decades ago and since then the FAO Fisheries Department has been producing periodical updates almost every two years. The present chapter was prepared based on the information contained in the latest available issues of the "Review of the State of World Fishery Resources: Marine Fisheries" and of "The State of World Fisheries and Aquaculture". Main geographical areas are presented here and follow the FAO classification (Figure 1). Fish productions are also given following the International Standard Statistical Classification of Aquatic Animals and Plants (ISSCAAP, see Table 1).

This chapter is composed of:

1. a general review of world fishery production
2. more specific reviews of marine fisheries by FAO Fishing Area



21 - Northwest Atlantic (NWA)
27 - Northeast Atlantic (NEA)
31 - Western Central Atlantic (WCA)
34 - Eastern Central Atlantic (ECA)
37 - Mediterranean and Black Sea (MBS)
41 - Southwest Atlantic (SWA)
47 - Southeast Atlantic (SEA)
51 - Western Indian Ocean (WIO)
57 - Eastern Indian Ocean (EIO)
61 - Northwest Pacific (NWP)
67 - Northeast Pacific (NEP)
71 - Western Central Pacific (WCP)
77 - Eastern Central Pacific (ECP)
81 - Southwest Pacific (SWP)
87 - Southeast Pacific (SEP)

Figure 1. Geographical boundaries of FAO Marine Fishing Areas for statistical purposes.

Number	Corresponding fishery groups
23	Salmons, trouts, smelts...
24	Shads...
31	Flounders, halibuts, soles...
32	Cods, hakes, haddocks...
33	Redfishes, basses, congers...
34	Jacks, mullets, sauries...
35	Herrings, sardines, anchovies...
36	Tunas, bonitos, billfishes...
37	Mack., snoeks, cutlassfishes...
38	Sharks, rays, chimaeras...
39	Misc. marine fishes
42	Sea-spiders, crabs...
45	Shrimps, prawns...
53	Oysters
55	Scallops, pectens...
57	Squid, cuttlefish, octopuses...

Table 1. Main ISSCAAP groups used in this review.

2. World Fishery Production over the last Half of Century with Recent Trends

The last assessment made by the FAO Fisheries Department, showed that in 1995 and 1996 total world fish production (including both, marine-freshwater capture and aquaculture production) expanded rapidly, reaching 121 million tons in the second year. Aquaculture output grew dramatically during the biennium while capture fisheries production registered a slight increase. Supplies for human consumption increased considerably, rising from 14.3 kg per caput (live weight equivalent) in 1994 to 15.7 kg in 1996. However, this increase was almost entirely due to production rise reported for mainland China. Excluding mainland China, at 13.3 kg, the average food fish supply for the world in 1996 remained close to the level recorded during the first half of the 1990s but was lower than that of the 1980s. Catches destined for the production of fishmeal and fish oil (reduction) reduced slightly (Figure 2 and Table 2).

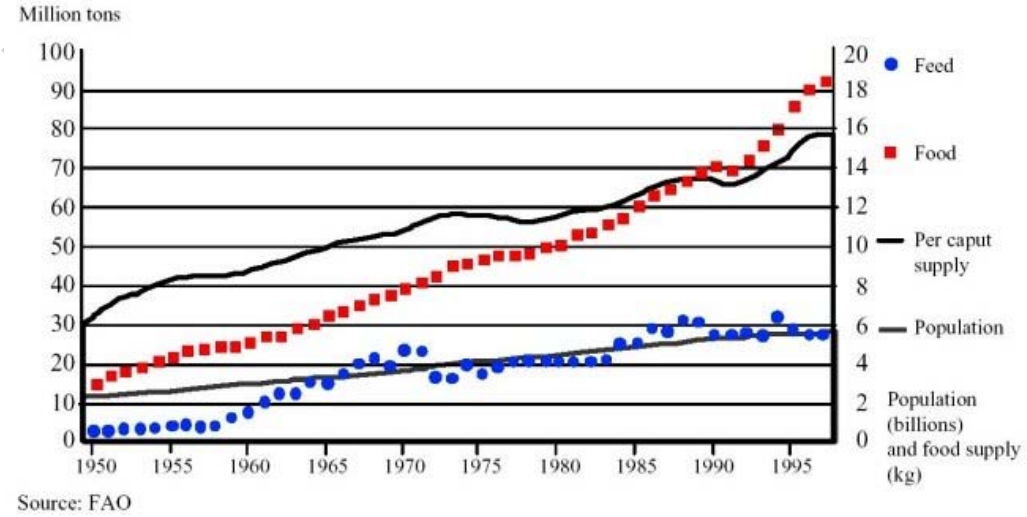


Figure 2. World fish utilization and food supply.

	1990	**1992**	**1994**	**1995**	**1996**	**1997** *
PRODUCTION						
INLAND						
Aquaculture	8.17	9.39	12.11	13.86	15.61	17.13
Capture	6.59	6.25	6.91	7.38	7.55	7.70
Total inland	14.76	15.64	19.02	21.24	23.16	24.83
MARINE						
Aquaculture	4.96	6.13	8.67	10.42	10.78	11.14
Capture	79.29	79.95	85.77	85.62	87.07	86.03
Total marine	84.25	86.08	94.44	96.04	97.85	97.17
Total world fisheries	99.01	101.73	113.46	117.28	121.01	122.00
UTILIZATION						
Human consumption	70.82	72.43	79.99	86.49	90.62	92.50
Reduction	28.19	29.29	33.47	30.78	30.39	29.30

* Preliminary estimate.

Source: FAO, 1999. The State of World Fisheries and Aquaculture 1998. FAO, Rome, Italy, 112 p.

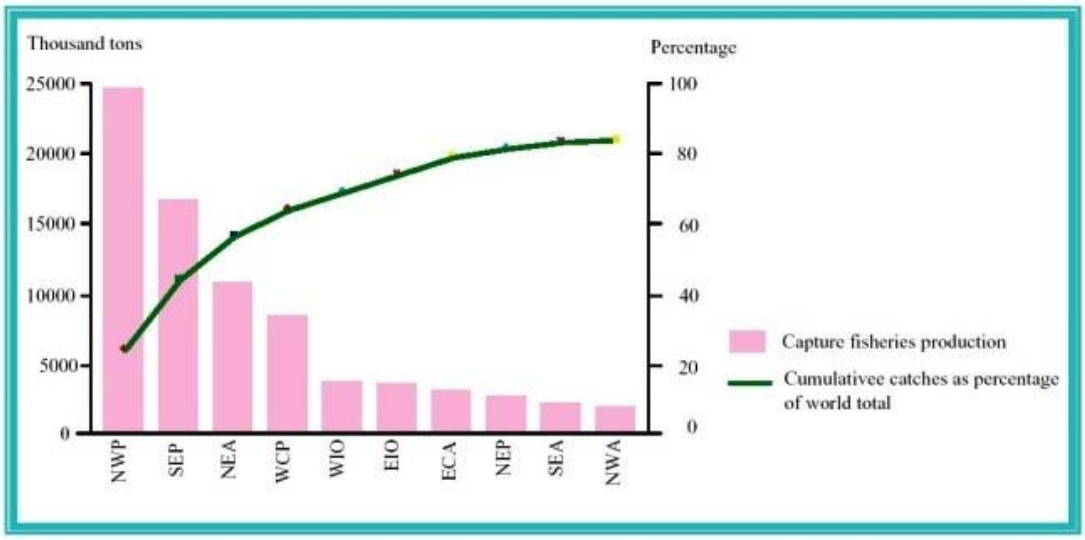
Table 2. World fisheries production and utilization (million tons).

Trade increased during the 1996-1997 biennium, although at a slower pace than in the previous two years, and the value of world exports of fish and fishery products reached US$52.5 billion in 1996, with developing countries achieving a net trade surplus of US$16.6 billion.

Capture fisheries increased from around 18 million tons in 1950 to over 90 million tons in the 1990s, about 30% of which is used for animal feeds. Fisheries and aquaculture provide livelihood directly and indirectly to about 200 million people. Total capture fisheries production in 1996 amounted to 94.6 million tons. China, Peru, Chile, Japan, the United States, the Russian Federation and Indonesia were the top producer countries in 1996, together accounting for more than half of world capture fisheries production in terms of tonnage. Marine capture fisheries continued to account for more than 90% of world capture fisheries production, with the remainder coming from inland waters.

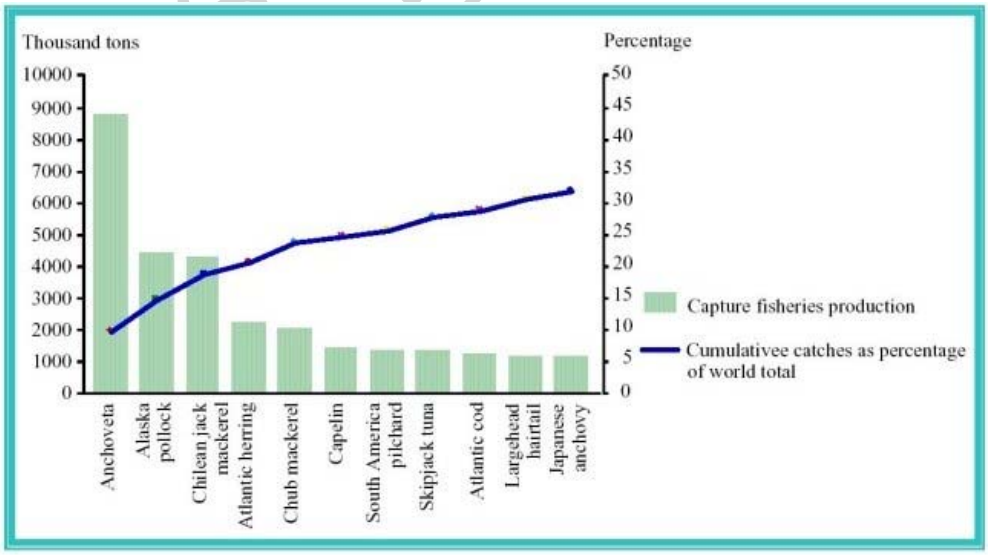
Marine fishery production reached a new record of 87.1 million tons in 1996 (Table 2). However, as in previous years, the rate of increase continued to slow during the biennium. In the 1950s and 1960s, total world marine fisheries production increased on average by as much as 6% per year, doubling from 17 million tons in 1950 to 34.9 million tons in 1961, and doubling again in the following two decades to reach 68.3 million tons by 1983. In the following decade, the average annual rate of increase dropped to 1.5% and to a mere 0.6% during the 1995-96 biennium. The Northwest Pacific remains by far the most important fishing area in terms of both volume and value of landings (Figure 3).

For the world as a whole, therefore, landings of marine fish are continuing to level off. This is also the general trend for most major fishing areas of the world, where fisheries have evolved from a phase of increasing fishing effort and production to one in which production has stagnated and in some cases declined (i.e. a senescent phase). Judging from known fish stocks and resources of traditional fisheries, the total marine catches from most of the main fishing areas in the Atlantic Ocean and some in the Pacific Ocean would appear to have reached their maximum potential some years ago, and substantial total catch increases from these areas are therefore unlikely.



Note. Fishing areas listed are those with a production volume of more than 2 million tons.
Source: FAO

Figure 3. Capture fisheries production by principal statistical areas in 1996.



Note. Species listed are those with a production volume of more than 1 million tons.
Source: FAO

Figure 4. Capture fisheries production: top species in 1996.

The relatively stable production of marine capture, for the last three years, masks some major fluctuations for individual species. Major increases in landings between 1995 and 1996 were recorded for capelin, chub mackerel and Japanese anchovy, whereas major decreases between 1994 and 1995 were observed for South American pilchard and anchoveta as well as Japanese pilchard. In 1995, six species - anchoveta, Alaska pollack, Chilean jack mackerel, Atlantic herring, chub mackerel and capelin - accounted for 25% of total capture fisheries production (Figure 4).

Distant-water fisheries production, as defined here as catches taken in fishing areas that are non-adjacent to the flag state of the fishing vessel used, has declined sharply since 1990 (Figure 5), mainly owing to the demise of the state-sponsored fleets of the former USSR. Japan had the largest distant-water fisheries production in 1996, with total catches of 668 000 tons. This is Japan's lowest figure since 1963, as the country's distant-water production has declined steadily since the early 1970s when it amounted to about 2 million tons.

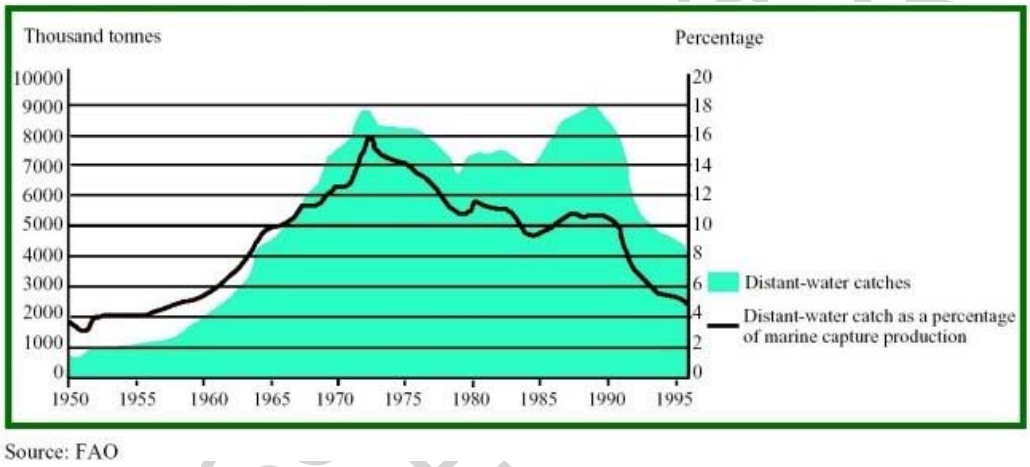


Figure 5. Distant-water marine capture fisheries production.

In 1995 the world fishing fleet numbered about 3.8 million vessels. About one-third of these were decked vessels, the remaining two-thirds were undecked vessels, generally less than 10 m in length. While almost all decked vessels are motorized, only about one undecked vessel in three is equipped with an engine. Most of the world's fishing vessels are operating in Asia. The proportion of non-motorized vessels is higher in Africa (about 80%) than in any other continent, while Europe has the highest proportion of decked vessels (about 70% in 1995). In the Asian fleet, slightly fewer than 40% are reported to be decked vessels.

The average size of decked vessels in 1995 was about 20 gross tonnage (GT). Those larger than 100 GT (or longer than 24 m) amounted to about 37 000 or just about 1% of the world fishing fleet. China has approximately 40% (15 000) of these vessels, while no other country has more than 10% of this fleet and about 20 countries together account for 50% of the total. The world fleet is not likely to have grown as fast as the number of fishers, although this cannot be established with certainty because the various employment categories used for reporting statistics include both capture fishers and aquaculturists. Nevertheless, there has been an upgrading of the fleet inasmuch as the

proportion of decked vessels increased from about one in four in 1970 to about one in three in 1990.

3. Profile of Catches by FAO Fishing Area

3.1. Northwest Atlantic (Area 21)

Peak landings in this area occurred during the late 1960s, with an average of 4.0 million tons per year during this decade. Landings declined to 3.3 million tons in 1990 and yet further to 2.0 million tons in 1994 (Figure 6). The peak in the late 1960s can be seen as principally due to large landings of species belonging to the ISSCAAP Groups 32 and 35. Although reported catches of herrings have declined considerably from this earlier peak, herring is now the dominant group. This is largely due to the catastrophic decline in catches of Group 32. The high total catches of the late 1960s were sustained into the early 1970s by increasing catches of mackerels, redfishes and jacks (Groups 37, 33 and 34 respectively). By the late 1970s, catches of species in these three groups had declined. During the 1980s and 1990s the clams and cockles (Group 56) became more significant, and catches of these species are now second only to the herrings. Catches of scallops (Group 55) are now the third largest group.

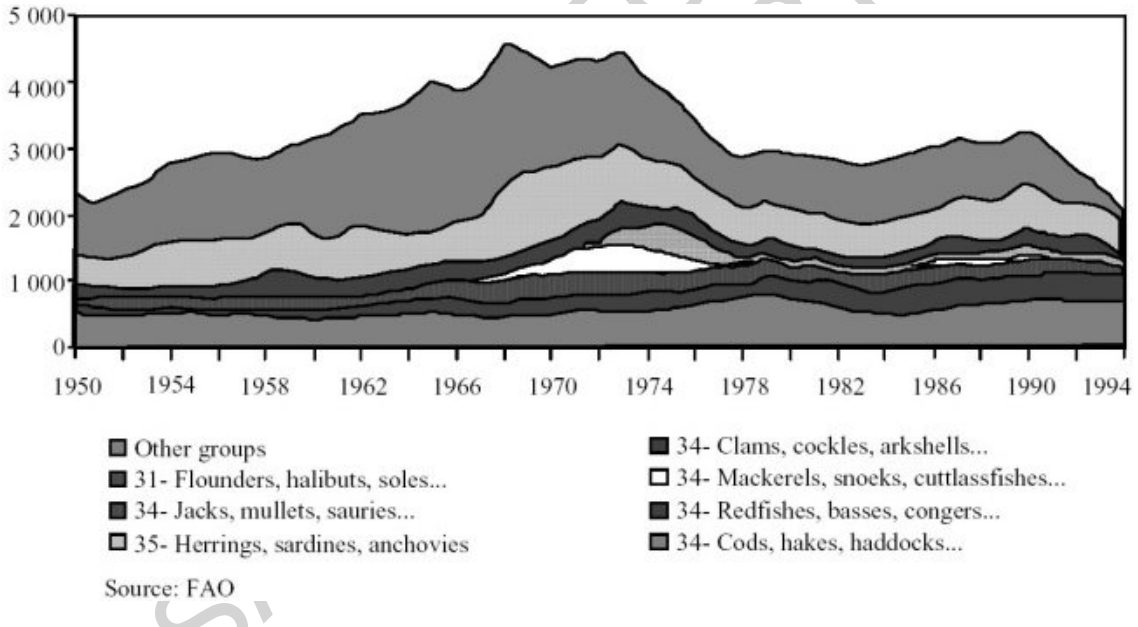


Figure 6. Landings (thousand tons) in Northwest Atlantic area from 1950 to 1994 by ISSCAAP group.

The most important member of gadoids has been cod. Reported landings of this species literally peaked in 1968 at ~1 866 000 t and then fell steeply to ~482 000 t in 1978. There was a subsequent recovery during the period 1982 to 1989, followed by the collapse to the point of closure of the fisheries in Canada, essentially still the situation in Canada today. The decline in landings of cod has been progressively greater in the northern part of its range (i.e. Labrador, The Grand Banks, Scotian Shelf and Gulf of St. Lawrence). In 1989, when landings were at a level of 639 936 t, landings by the US, which would mainly be from their EEZ, were 5.6% of the total. In the following years,

this percentage increased from 7.8% to 36.2% as ocean cooling and subsequent stock closures took effect and landings fell to 48 477 t in 1994.

Declines have also been recorded for haddock, a gadoid of importance in the more inshore fisheries. Changes in landings of silver hake have largely reflected the result of fishing agreements reached between the Cuban and Canadian Governments, though catches of this species were also taken by eastern European fleets in the past. The flatfish and redfish are other demersal groups showing a decline corresponding to that of cod. Shrimps are now the fourth most important group landed (i.e. pink shrimps), whereas in the past the catches of these crustaceans had been insignificant relative to the enormous catches of cod.

Herring, still important, reached nearly a million tons of landings in 1968 and 1969 as foreign fleets, primarily eastern European vessels, targeted stocks on Georges Bank. However, a decade later reported landings were down to 252 949 t and continued to decline, a consequence of falling stocks and reduced demand as North Sea herring stocks recovered and the western Atlantic stock, with its higher oil content, lost market share.

Since the adoption of Extended Fisheries Jurisdiction (EFJ) the catches of Atlantic mackerel have also been affected by the exclusion of Distant Water Fishing Nations (DWFNs) from the EEZs of Canada and the USA. Peak landings (420 500 t) were reported in 1973 while catches in the 1990s have ranged from 65 467 t in 1990 to 27 685 t in 1994. Capelin, too, show a similar trend, the consequence of varying effort by DWFNs. In 1972, 272 400 t were landed, compared with 2 242 t in 1994.

While important pelagic and demersal resources have been declining, molluscan catches have expanded dramatically as new resources and have been exploited in response to availability of markets, both for domestic and export markets.

While ocean quahog had always been harvested in small quantities prior to 1976 (reported landings had not exceeded 4 700 t), after 1976 catches went up steadily to 195 793 t in 1985 and stayed above 169 732 t in subsequent years. Surf clam and American scallop are the other important shellfish in this group.

Prior to the introduction of EFJ in 1977 catches by distant water fishing fleets made up nearly half of the total catches taken in the Northwest Atlantic. The majority of the catches in several Northwest Atlantic fisheries were taken by distant water fishing fleets (i.e. in the 1970s, Canadian catches of cod constituted only 26% of the total).

The development of these distant-water fisheries in the Northwest Atlantic occupies a central role in the history of Europe from at least the 15th century. Peak landings by foreign vessels were in 1973 with reported catches of 2 453 093 t.

It is only in the last few years with the advent of extended jurisdiction that these centuries old fisheries have almost stopped. By the 1980s the DWFNs (all nations except Canada, Greenland, St. Pierre and Miquelon and the USA) share of the catch had declined to 12%.

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Biographical Sketches

Catherine Aliaume was born in France in 1962 and got a Diploma of Water Techniques and Sciences (major in Hydrobiology) in 1985 at Montpellier University, France. She defended her Ph.D. in Biomathematics at the University of Paris in 1990 on the spatial and temporal structure of fish communities in relation to environmental factors . She went to North Carolina State University in a postgraduate program at the Department of Zoology. She got appointed Research Associate at North Carolina State University where she became project coordinator of a 4-year project dealing with gamefish population assessment in tropical coastal zones, in collaboration with the Department of Natural Resources. She started a teaching/research career in 1995 as an assistant professor in the University of Montpellier. Her research activities focus now on fish bioecology and stock assessment : recruitment, colonisation, growth and survival modelling, in relation to environmental factors. Her teaching fields include quantitative data analysis, ecological and biological modelling. C. Aliaume is currently involved in a research program on adaptive response of fish populations and communities under environmental (climatic or anthropic) stress, in collaboration with the Institute of Research for Development (IRD).

Dr. Serge Michel Garcia is a French scientist born in 1945, in Algeria and he holds a Doctorate in Science of the University of Marseille (France, 1976). He started his scientific career on Biology, dynamics, fisheries and management of penaeid shrimps in Cte d'Ivoire (1968-1975) as a staff of the Institute of Research for Development (IRD). In Senegal (1976-1979), he worked as specialist of shrimp and tropical demersal fisheries, as Demersal Fisheries Programme leader, Director of the national Oceanographic Research Centre and Head of the Department of Oceanography. He joined the FAO Fisheries Department in 1979 as responsible for West African fisheries research and management. He headed the Marine Resources Service of this Department from 1984 to 1990 and is, since 1990, Director of the Fisheries Resources Division, in charge of marine and inland fishery resources as well as aquaculture. He is a member of the ICLARM Board of Trustees.

Dr Richard Grainger is Chief of the Fishery Information, Data and Statistics Unit (FIDI) of the Food and Agriculture Organization of the UN (FAO). An Irish national, he graduated in natural science from Trinity College, Dublin, Ireland. He obtained a postgraduate degree in Computation in the Life Sciences from the University of York, England, and a doctorate in fisheries oceanography from University College, Galway, Ireland. From 1977 to 1989, Dr Grainger worked as a Fisheries Scientist at the Irish Fisheries

Research Centre on ichthyoplankton research and later took charge of stock assessment for demersal fish. He was a member or chairman of several stock assessment working groups of the International Council for the Exploration of the Sea (ICES), a member of the ICES Advisory Committee on Fishery Management and a member of the EC Scientific and Technical Committee on Fisheries. He joined the ICES Secretariat in Copenhagen, Denmark, as Fishery Secretary in 1989 where he was responsible for the work of the Secretariat related to fisheries. This included providing support to about 20 stock assessment working groups, acting as Secretary to the Advisory Committee on Fishery Management and transmitting advice to three fishery commissions, the EC and ICES member countries. He joined FAO in 1992 as Senior Fishery Statistician in FIDI where he was responsible for the fishery statistics programme of FAO and Secretary to the inter-agency Coordinating Working Party on Fishery Statistics (CWP) and the Joint Working Party on Fishery Statistics and Economics (JWP) of the Asia-Pacific Fishery Commission. He served on the editorial board for the Elsevier journal Fisheries Research from 1993 to 1996. He left this post in 1998 when he was appointed Chief of FIDI.

Thang Do Chi got his PhD of Natural Sciences at Montpellier II University, France. He is currently Professor and Head of the Lagoon Ecosystems Joint Research Laboratory (CNRS and University Montpellier II). He worked for the Food and Agriculture Organisation of the United Nations as Fishery Resources Officer in the Marine resources Service of the Fishery Resources Department, Rome, Italy, from 1991 to 1996. His terms of reference were to follow the state of marine resources, with special emphasis on West African marine fisheries and to provide technical backstopping as scientific Secretary to the FAO Fishery Committee for the Eastern Central Atlantic (CECAF) and its working parties on resources, especially the CECAF Working Party on Resources Evaluation and the CECAF ad hoc Working Groups on Stocks Assessment. He was also responsible for the development of the GIS for the Fisheries Department. During the period 1979-1987, he was fishery biologist/project manager of the UNDP-FAO project Estimation and Monitoring of Marine Resources based at the Fisheries Research Institute, Casablanca, Morocco. Before his assignment at FAO Fisheries Department, he was Professor at the University of Western Brittany, Brest and Assistant-Professor at the University Montpellier II. His research topics focused on fisheries biology and ecology, population dynamics and stocks assessment. T. Do Chi is recently involved in the development of applications of geographical information systems to coastal and lagoon fisheries ecosystems.