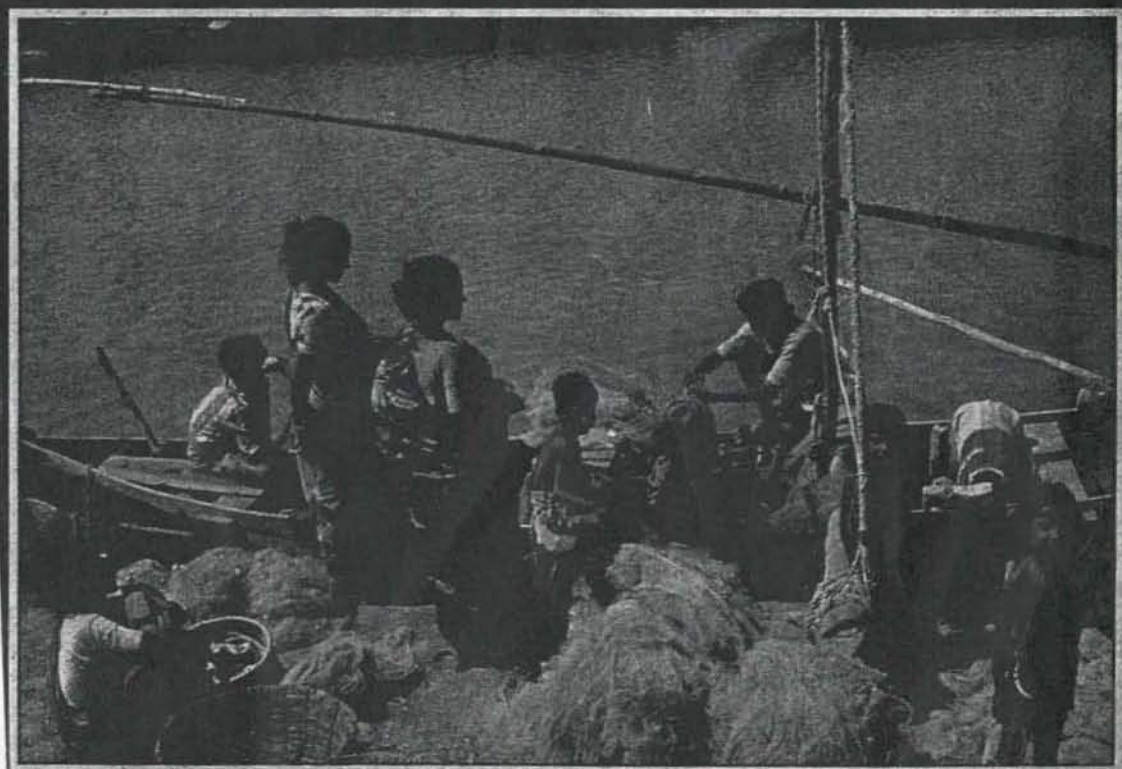


SAMUDRA

INTERNATIONAL COLLECTIVE IN SUPPORT OF FISHWORKERS

DOSSIER

GLOBAL FISHERIES TRENDS AND THE FUTURE OF FISHWORKERS



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Global fisheries trends and the future of fishworkers

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The articles in this dossier include a selection of papers presented at the Conference on the subject: "Global fisheries trends and the future of fishworkers" organised by the ICSF at Bangkok (Thailand), January 22 -27, 1990.

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Cover page: artisanal fishermen in the South of India (photo: Guido Grafi)

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Editorial**RESISTING MARGINALISATION**

Over the past ten years several factors have contributed to a considerable upheaval in the fishing sector.

Firstly, resources in Northern seas being on the verge of depletion, drive the industrial fleets of Northern countries further towards Southern waters. Despite bilateral fishing agreements, this redeployment of industrial fisheries have contributed to the plundering of fish resources and the deterioration of the marine environment, the main victims being small-scale fishermen and their families.

The emergence of industrial scale aquaculture has also led to profound changes in the profession. While the conversion from extracting to cultivating and breeding fish must be regarded as a positive change, we cannot lose sight of the fact that development in this sector, often governed by the search for maximum profit, has caused the destruction of coastal ecosystems. And all the effects of such destruction have yet to be assessed.

Other changes are the results of political trends in terms of financial investments. Financial assistance goes mainly to large-scale fisheries and capital intensive operations which only employ one-tenth of the world's fishermen. On the other hand, outside investors have recently begun to penetrate the small-scale fishing sector. This encroachment could lead to the increasing takeover of this sector by people from outside the fishing profession and to accentuating the marginalisation of fishing communities.

To this situation must be added the problems of fish marketing. As in the case of the repayment of the Third World debt, here too the tide is reversed. The majority of fish caught in Southern waters are exported to Northern countries instead of feeding populations who need it most.

What can be done in the face of these structural changes which have serious repercussions on the future of fishworkers?

In the face of the benefits enjoyed by industrial fisheries (financial aid from governments, adjustment of regulations, the ease with which they can market their products, etc.), the small-scale fishing sector is like the neglected child of an economic activity to which it nevertheless makes a signif-

The future of fishworkers

CHALLENGES OF THE PROFESSION: AUTONOMY OR SUBMISSION

Small-scale fishing in Chile is a major activity involving approximately 50,000 workers distributed throughout the country. In 1986, the country's fishworkers established CONAPACH (1), an autonomous organization, in order to confront the many problems facing them.

At the Bangkok Conference (Thailand), on the subject "Global fisheries trends and the future of fishworkers" organised by the ICSF from 22nd to 27th of January, 1990, the president of CONAPACH, Humberto Chamorro-Alvarez, presents the enormous challenges facing fishworkers and the objectives and means they have established in Chile in order to respond to them.

As fishermen, we serve as inspiration to many writers and artists, and in fact our life seems like some kind of "fantasy" to those who experience it as observers from the outside. For Jesus of Galilee, the fishermen were his disciples precisely because his call required the ability to confront the unknown and storms, while having faith that he would lead them to a safe port. Nevertheless, we fishermen know that our work is something which involves a great undertaking with respect to humanity since we daily provide families and individuals with the food they need to grow and survive.

We must also clearly affirm that our occupation is faced with enormous challenges which, in the medium term, could lead to its disappearance. And our responsibility is to make people aware of the values we represent and the dangers that await us for the future, and thus to be able to globally seek the solutions with a view towards ensuring a reasonable future for millions of

fishermen, who on every continent, work daily on the oceans, lakes, rivers and lagoons of our planet.

I am a Latin American from Chile, and I bring with me the greetings of the fishermen of America to the representatives of Asia, Africa and Europe. A very special greeting to the millions of fishermen of Asia who so often have to share their slim resources with a great number of people; we are well aware of the great richness of their tradition and the knowledge they have of their resources which provide maximum benefit to feeding their families. To the fishermen of Thailand, I bring the greetings of Chilean fishermen who await them so many miles away to establish friendly and working relations.

I would also like to bring a message of encouragement and thanks to the researchers, scientists, technicians and representatives of support organizations, and in particular, to the members of the International Collective in Support of Fishworkers for the committed effort they contribute for the improvement of our work and for the protection of aquatic resources which are the source of our occupation.

The old proverb that says: *"If you give a fish to someone who's dying of hunger, you'll be helping him for a day. But if you teach him to fish, you'll be helping him forever,"* takes on all its significance at the moment. The exchange between scientists and fishermen must be a permanent source of enrichment in our lives and work.

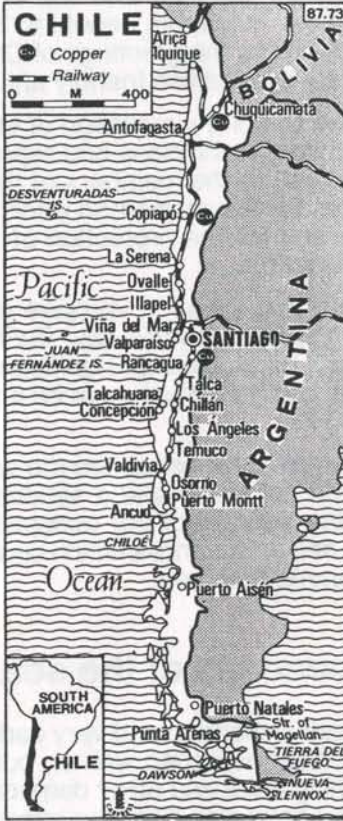
The future of small-scale fishermen the world over could be compromised if, unhappily, we do not undertake a serious struggle for the defence of resources and for the survival of our occupation. To this end, I would like to share some ideas and experiences which could serve as a basis for discussion and a later programme of action.

We are the beacons of the sea.

I am a small-scale fisherman and very early every morning I take to the sea in a small 6-metre boat equipped with an outboard motor and two long-lines prepared for catching hake and other demersal fish. But at the same time, for the past ten years, I have also been the executive of a union organization that counts 250 members, all fishermen. Thanks to our struggle, we have achieved the construction of a basic infrastructure. We have our Welfare and Health Service. We enlist our doctors and pay subsidies to our ill members. We bury our dead in our own cemetery. For all this, we have had to acquire great discipline, distribute jobs among committees with various tasks and share out our undertakings. Our fishing is ensured by 80 boats, our production provides work for approximately 1000 people and food for the city of Valparaiso.

In 1985, following an invitation from a University, we launched the idea to create a national organisation of Chilean fishermen. A special commission was thus established and a national Congress held in November 1986, 74 grass root organisations participated in this Congress. With the aim of forming an organisation that could represent our profession, CONAPACH (National

Council of the Artisanal Fishermen of Chile) was created. Thus began a long struggle for bringing together all regional organisations. A second Congress took place in 1988 and we presently represent 8 regional organizations with over 100 grass root associations from all over the country. CONAPACH is actively engaged in the struggle to defend the democratic rights of the Chilean fishermen. CONAPACH opposed strongly a law project in fisheries which would cause great harm to the fishermen and the country.



This experience shows us, small-scale fishermen, the importance of creating jobs, supplying good quality food, and contributing to the regional and national economies. As fishermen, we are also beacons of the sea because we detect the dangers that await our various resources. We know that pollution from cities, industries, mines and farming is very high in a number of countries, and that it affects life and the marine species that are the resources of our business.

In 1984, the FAO stated that almost one-half of the catches worldwide destined for human consumption came from small-scale fishing operations. For 1984, that represented close to 20 million tonnes of fish products thanks to our occupation. In reality, such large figures are difficult to understand, but it is easy to show that in a number of countries small-scale fishing provides food for the subsistence of many families. In India, it is estimated that there are nearly one million fishermen on the coasts. We know that in the Philippines thousands of fishermen are fighting to preserve their rights on a small section of lagoon in order to produce food, and that it is essential that a marine reform be implemented. And we are also well aware that in West Africa the fishermen of Senegal and neighbouring countries are fighting to defend themselves against European and Japanese fleets that plunder their fishing zones in agreement with local

governments. The African fishermen who see fish sold off in exchange for radios, televisions and cars are affected by the loss of their patrimony.

The problems we are facing

We are suffering from a **mass dispersion** because in general we live far from urban centres, near the coasts or on the banks of rivers or lakes; sometimes we live far from our villages. We are surrounded by nature and we rejoice in this advantage, but at the same time we suffer from a lack of services to satisfy our needs. This dispersion is even more serious when it affects the formation of representative organizations which fight for the de-

fence of rights and seek solutions to the problems and needs of our families and of our occupation.

As fishermen, we are often **marginalized** and we do not usually benefit from the advantages of education, housing, health, communication and culture. These advantages of modern society do not come easily to us. The problem does not lie in the lack of these services because solutions can always be found, but our marginalization is more profound since we are not considered when it is a question of participating in taking the decisions which affect our activities. Even though there was a series of struggles to improve the participation of fishermen in India, the Philippines, Chile, Senegal, Peru and Colombia, a lot is still lacking for a genuine presence and the integration of our representatives.

As fishermen, we are enormously **dependent** on creditors, merchants, local politicians and directors of social, and sometimes religious, organizations. In a number of cases we have mortgaged not only our assets, but also our dignity and future. When the Spanish "conquistadors" arrived in America five centuries ago, they fascinated the natives with their pendants and glass beads which were unknown to them. They traded these novelties for the gold which was so common to the natives; such trading brought with it the loss of the natives' freedom. We fishermen often see the arrival of foreign companies with their fascinating technology and if we are not careful we could lose our riches for a salary or a promise.

We find ourselves facing a large number of **contradictions** and **confrontations** that we must clarify in order to at least know who are our friends and who are our enemies. On one side we are facing the contradiction that exists between the city and the country, and because of this, the contradiction between traditional and contemporary values. We are often people of the land. We live in the country and think and act like country people. But at the same time, we incorporate contemporary values and technology and our products enter into the network of worldwide trade. For that very reason, we are in most cases the victims of a number of consequences to which the countries of the North subject the countries of the South. In developing countries, we are often exploited due to poor relations in the context of international trade imposed by the developed countries. It is hard to know when the developed nations are our friends and when they are our enemies. We must recognize that in numerous cases, we fishermen are facing industrialists. We are all fishworkers, whether we work on large ships or small boats. The sea is our "boss". But industrial companies, be they involved in fishing or commercial fish farming, are seeking to replace the small-scale fisherman and to turn us into salaried workers in their companies with the goal of their own profits from the resources of the sea, rivers and lakes.

This outlook, which seems pessimistic, should not be considered as such because it is only a first step in recognizing our realities. The diagnoses can enter further into the details of the living conditions of various populations of small-scale fishermen and fishworkers throughout the world. For example, one must add the enormous difficulties facing the crews of industrial fishing fleets which sail for fish companies in Africa, America and Asia. During a large Latin American meeting, with the participation of fishermen's representatives

from numerous countries, their problems came to light: long tours of duty on a boat without rest, no redundancy pay, bad living conditions on board, different treatment for European or Japanese crews compared to nationals (examples which were verified on Spanish boats flying Chilean flags in Chile).

It is essential to move ahead, without losing hope, in order to seek a solution to our problems and to build our future. We already know the challenges: **autonomy or submission**. And the most characteristic element in the life of a fisherman is precisely his freedom, his independence to tackle the problems and the occupation as a whole.

How do we build the future?

The first challenge is organization.

Without a solid organization, from the foundations up to regional and national structures, nothing good can be accomplished for our future as fishermen and the future of our families. But the organization must be born of ourselves. It must be ours without outside dependence or intervention; we must take our decisions freely and completely autonomously. Only fishermen can take part in our organizations; sellers, professional bodies, technicians and scientists must form their own professional organizations and thus must not intervene in ours.



Fishermen returning to the shore of "Caleta Portales" at Valparaiso, Chile. (photo: François Bellec)

An autonomous organization is the sole and major condition for building our future and for being able to confront our enemies. Based on the organization, we will know who are our friends and who are our enemies, who is with us and who is against us. Our organizations must be profoundly democratic and the respect between us very deep. But our participation must also be highly responsible. We must accomplish our undertakings. We cannot corrupt our organizations by our own corruption or our own faults. Our organizations must distribute power and have the participation of all members on committees of various types. Here we have our school, the place where we will learn from our elders their own traditions and secrets.

The organization must lead to development

The internal and autonomous organization must be directed towards development. Donations and aid from governmental or non-governmental organizations – all the money in the world – cannot buy an organization. Nevertheless, our organization can lead us into spiralling development. From the moment we have a solid organization, we can open the way towards cultural development, then towards social development. We will learn new technology and achieve economic growth. But first, we must have an autonomous organization – our own. Thanks to it, we will be able to advance and obtain social, technical, economic and cultural advantages. With all this, we will achieve our development. Many believe that outside plans and aid programmes can bring development. Yet we have seen how millions of dollars coming from banks or outside agencies are lost en route wherever there has been no truly autonomous organization.

We must take care of our resources

The future of the organization and internal development is also dictated by the survival of marine and aquatic resources in general. Yet these resources are in danger. Many nations have built fishing fleets or concluded accords for extracting existing resources in vast quantities along the coasts of West Africa, the South Pacific and Asia, or in coastal lagoons. On the other hand, the pollution which we have already cited affects the survival of fish, mollusks and crustaceans. For their part, nuclear experiments in the Pacific are placing in danger the quality of the water and concentrating radioactive elements in marine species. In the sea, everything communicates, and therefore, everything is in danger.

Over the coming years, we expect important changes due to the warming of the earth through the greenhouse effect caused by gas emissions and the hole in the ozone layer. These changes will affect marine life and we must not hesitate to warn about the sort of problems which are already being produced through temperature changes and rain.

Attention to the resources also means that we are seriously beginning to be "cultivators" or fish farmers within the realm of our possibilities. This is

being realized primarily when resources are depleted. We must watch over our resources and be in close contact with the scientists who can cooperate and exchange their experience and knowledge with us in order to start fish breeding and the cultivation of algae and shellfish .

We must participate and be present in decision taking processes

Our participation must be real and not necessarily favourable to the established structures of power. If we can count on an autonomous organization and internal and sustained development, especially in the economic sector, the authorities have to listen to us and give us the capacity to express our concern and our demands. Such was the experience of fishermen in some developed countries like France, Japan, Norway and Canada where fishermen's organizations are both respected and respectable. They are given the chance to discuss laws, and the laws protect their rights in the face of industrialists, businessmen, and other authorities in the land.

Fishermen walk on a road strewn with hope and, as executives, we cannot disappoint the expectations of millions of fellow fishermen who are spread over five continents. The future will be ours if we build it ourselves with the joint aid of those researchers and technicians who are with us.

This is a worker who is talking to you. He has not made any in-depth studies, but he has experienced and participated in the construction of an organization in Chile, and the struggle to earn the respect of the authorities and researchers. I hope that these reflections will help to clarify the road we have undertaken to build since the Rome Conference in 1984, which seeks exchange and greater awareness among all fishermen of the world. The day will soon come when a single voice will express the outcry of all the members of our profession within one international, autonomous organization of fishermen and fishworkers.

Humberto CHAMORRO-ALVAREZ
President of CONAPACH, Chile

Translated from Spanish

(1) National Council of the Artisanal Fishermen of Chile

The future of the fisheries sector in Senegal

TECHNOCRATIC APPROACH AND INEQUITABLE DEVELOPMENT

An exceptionally rich and varied marine resource base, a long tradition in fishing, a long standing experience in fish processing and traditional food habits all these factors favour a bright future for the Senegalese fisheries.

Those various potentialities have led the Senegalese government to put forward a development policy aiming at improving the living conditions of the fishermen and a more rational supply of fish to the populations by means of a generalised policy of motorisation and the creation of distribution networks. But the implementation of these policies did not involve efficiently the concerned people.

Aliou Sall, a sociologist and fisheries consultant for CREDETIP (Centre for Fisheries Research, Development and Intermediate Technology - Dakar), gives here an account of the situation and of the evolution of the Senegalese fisheries such as they are viewed by the artisanal fishermen themselves.

Senegal is situated in the most Western part of Africa, with a population of six million people covering an area of 197.000 Km². (see map). Senegal obtained its independence in 1960. The Senegalese economy, as is the case in most so-called Third World countries, is characterised by highly developed service sector and by a primary sector, typical of an export oriented economy; consequently it is very vulnerable to the fluctuations of international prices of raw materials. In fact, groundnuts (largely produced by monocultivation), phosphates, fisheries products and oil products are the main source of foreign

exchange (1). The monoculture of groundnuts (and its by-products for exports: oil and oil-cakes for cattle feed) has contributed on the one hand to the impoverishment of the soils, and consequently to a considerable shortfall in agricultural out-put far below the expectations of the peasantry; but also it suffered a fall in prices of raw materials on the international market. This can be attributed to un-fair market competition by North American and European edible oil products such as soya, colsa, sunflower, etc.. which are more competitive. To this was added a period of drought in the Sahel area which culminated in 1973. Hence, fishing offered a great potential for the future by supplying basic food requirements thanks to its rich resource base and its traditional role within the Senegalese economy.



This article does not attempt to survey all the problems of a very dynamic artisanal fishery. It rather attempts to make an evaluation of governmental interventions in this sector: the motorisation of canoes and the cooperative movement through which out-board motors were introduced. This evaluation will also cover in-

ustrial fisheries policies, which affect the artisanal sector and in a broader sense the food situation of the country.

An increasing rise in landings

The expansion and the dynamism of the Senegalese fisheries – linked to the receptivity of the artisanal fisherfolk towards innovation – can be attributed to several factors. Senegal has a large coastal area with a rich and varied resource base and exceptionally favourable natural conditions. It is part of the Central-East-Atlantic shelf running from Guinea Bissau to West Sahara. In this area the "upwelling" process takes place: (cold and nutrient waters coming up the continental slope are very favourable to the development of aquatic fauna). With a continental shelf extending over 26.000 km² and a coast line of

435 km (Fréon and Lopez 1983), the sustainable potential yield of Senegal (estuaries excluded) is estimated by two different sources to be respectively 500.000 tonnes/year and 420.000 tonnes/year.

According to those sources (the Oceanographic Research Centre of Dakar, Thiaroye -CRODT- and the Ministry of Rural Development - MDR) the ratio of exploitation of stocks was respectively 56% in 1982 and 64% in 1984. Those ratios concern both the foreign fishing fleets operating in the Senegalese waters and the national fishing fleets - industrial as well as artisanal (see annex: potentials and levels of exploitation).

According to the FAO, Senegal ranks 39th on the list of world producers with an estimated landing of 284,000 Tonnes in 1987 (FAO 1989). In terms of production of marine products per capita, Senegal ranks 13th in the world with 39 kg per capita in 1982 and 41 kg per capita in 1984 - 1986 (Leres, 1986 p56).

In 1987, among the African nations bordering the Atlantic ocean, Senegal ranked 5th after South Africa, Namibia, Ghana and Morocco (FAO 1989, p111-112).

In addition to this, one must add the important role played by the fisheries sector in the Senegalese economy: artisanal fisheries provide 150.000 jobs, against 1.500 in the industrial sector (Bilan diagnostic socio-economique de la pêche, 1989 p8). This means that the fishery sectors employ 5.5% of the active population. According to the census of 1984, there were 33.000 active fishermen (Senegalese marine fisheries statistics, 1984 - CRODT). In the related sectors, 70.000 people are employed on a full-time base and a few others earn their living occasionally (Action program 1986, p5).

The average cost to create employment on board is 22 times less in artisanal fisheries (200.000 CFA F) than in the industrial sector (Bilan diagnostic socio-économique de la pêche, p8).

Table 1: **EXPORTS OF SENEGAL 1988**
(en 1000 million CFA Franc)

Groundnut products	35,5
Fish products	62,6
Oil products	21,4
Phosphates	21,4
Total exports (FOB)	225,1
Share of fish in percentage	27,8
Source: CRODT, according to the Ministry of Economy and Finance.	

Table 2 : **SHARE OF FISH
IN SENEGALESE EXPORTS**

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Groundnut products	17,6	9,1	44,3	59,4	56,9	24,1	22,6	20,4	35,5
Fish	21,2	27,9	37,6	41,7	46	50,6	56,6	59,5	62,6
Oil products	29,2	38,3	45,8	40,8	45,7	57,4	19,1	20,0	21,4
Phosphates	16,5	17,9	21,1	22,7	26,5	22,2	23,4	20,0	21,4
General trade	101,6	139	193,7	216,7	243,2	239,1	215,6	212,4	225,1
FOB									
Share of fish (%)	20	20	19	19	20	21	26,2	26	27,8
Annual export variables		+ 35	+ 35	+ 11	+ 15	+ 5,4	+11,8	+ 5	+ 5

Table 3 : **SHARE OF FISH TO G.N.P.**

G.N.P.	1980	1981	1982	1983	1984	1985	1986	1987	1988
Fish	12,7	15,9	18	20,8	24	27,8	29,1	31,9	35
Primary sector	120,0	121,1	185,7	204,7	174,1	281,7	292,8	301,9	321,6
Fish/Sector %	10,6	13,1	9,7	10,2	13,7	9,6	9,9	10,5	10,7
Total G.N.P.	627,5	669,8	844,1	938,5	1015,5	1186,9	1296	1374,6	1476
Fish/G.N.P. (%)	2,0	2,4	2,4	2,2	2,2	2,3	2,2	2,3	2,4

Source table 2 and 3: Direction de la Prévision et de la Conjoncture (Ministère de l'Economie et des Finances, in Bilan diagnostique socio-économique de la pêche, p. 7)

Regarding exports, the contribution from fisheries products was estimated in 1988 at 27.8% (see tables 1-2-3). The contribution of the artisanal sub-sector to Senegalese export of fish products can not be under-estimated. Although the industrial fisheries sector is sometimes praised for its export capacity, it should be noted that the artisanal sector supplies 1/3 of its production to freezing plants and processing factories and thus supplies them 40% of their requirements (Durand, 1984, p5 – Weber and Fontana 1983).

Two remarks should be made at this point. In the first place, even if the products supplied for export by the artisanal fisheries sector –especially in processed form – are of low commercial value (40% supplied by this sector do not reach 10% of the export value), it does bear upon the quantity of fish supplied to the local markets (supposing, of course, that an adequate system of valorisation of products already exists). Secondly, more and more artisanal fishing units specialise themselves in the capture of shellfish, molluscs, crustaceans and noble fish for export. Those units supply the factories on contract basis, these transactions are so subtle and complex that it is difficult to collect statistics relating to the destination of their products.

The number of fish processing factories being very important in Senegal (over 40 freezing plants, 5 industrial processing factories, 2 fish meal factories and 3 canning factories (DOPM 1987), an efficient supply policy is therefore an urgent priority. This is of prime importance for those freezing plants handling noble fish, molluscs and crustaceans. To ensure a regular supply, some factories, deal directly with the artisanal fishermen through intermediary agents and middle-men. Such practices reveals the weaknesses of the traditional distinction between artisanal and industrial sectors.

For the food and nutritional prospects, fish products contribute a noticeable share to national food requirements. The artisanal fisheries sector ensures the direct requirements in a country where fish consumption is far above the world average, while the products from the industrial sub-sector are primarily destined for export. In the early 80s', the average annual intake of fish in Senegal, taking into account considerable regional disparities, was 22 kg per capita. However, due to the absence of adequate infrastructures, the distribution pattern – unequally partitioned region wise – was estimated at 46 kg per capita/year for the region of Cap Vert, 30 kg for Thiès, 28 kg in Diourbel, less than 9 kg in the Casamance region, 8 kg along the river, 6 kg in Louga.

It is the artisanal fishing fleet which ensures the regular required supply of fish. By September 1985, this sector numbered 4.249 sea worthy canoes in full operation and 2.451 river canoes, out of which 83% are operational during the cold season and 78% during the hot season (CRODT 1986, Senegalese fisheries statistics, p41). Some 64% of the canoe fleet, in other words the total number of canoes fit for motorisation are today equipped with outboard motors. The artisanal marine fishing fleet responsible for a total landing of 230.040 tonnes of fish, or 71% of the total fish landed, witnessed between 1981 and 1987 a rapid growth in terms of the bulk quantity of fish brought ashore (see table 4).

Table 4 : FISH LANDINGS-INDUSTRIAL/ARTISANAL

		1981	1983	1985	1987
Production (tonnes)	Artisanal	136.937	165.216	168.269	231.797
	Semi-industrial	805	500	364	58
	Industrial	132.444	120.577	112.167	91.564
	TOTAL	270.186	286.293	280.800	323.419
Estimated Commer- cial Value (in million CFA Franc)	Artisanal	6.657	14.475	17.843	23.832
	Semi-industrial	183	131	143	20
	Industrial	27.967	30.927	30.120	30.951
	TOTAL	34.809	41.348	48.106	54.804
Source: CRODT					

The generalised motorisation project of the government

The increase of the catches is mainly due to the introduction of outboard motors and purse-seines. In view of the development of its fisheries, the government of Senegal started a programme "for generalised motorisation" and the establishment of "marketing centres", aiming at the full utilisation of the potentialities of fisheries within its economy. In addition the government signed fishing agreements with other countries within the frame work of bilateral cooperation.

Some attempts for the motorisation of canoes were already made during the 50s'. But it is from 1972 onwards, with the introduction of CAMP project (campaign for the motorisation of canoes) and the CAPAS programme in 1979, one can really speak of a large scale operation. Both were Canadian-aided projects. The cooperative movement, already conceived in the 60s', went in full operation with the introduction of these projects and later on proved to be a total failure.

The CAMP was to be the first stage of an important programme called CAPAS; both projects have to be seen within the framework of the Third Economic and Social Development Plan of Senegal (1969-1973) aiming at a net total output of 200.000 tonnes/year.

The motorisation programme supplied traditional crafts with outboard motors. From 1950 to 1963, the Directorate of Oceanography and Maritime Fisheries (DOPM) had issued individual loans to fishermen to acquire such motors subsidised at 20% of their cost (personal communication, Malick Gueye, treasurer of the Collective of Senegalese Fishermen). From 1963 onwards, with the start of the Western style cooperative movement ("Rochdalian" model), cooperative members had to apply through their respective cooperatives administered by the National Bureau for Cooperation and Development Aid (ONCAD) which replaced the Regional Development Aid Centres (CRAD). From 1965 onwards, it was the National Development Bank of Senegal (BNDS) which provided the finances. The outboard motors supplied during that period through the cooperative stores were distributed on interest free hire-purchase basis payable in instalments over a period of eighteen months.

In 1971, while many loans were still outstanding, the debts of the cooperatives amounted to over 30 million CFA F (personal communication, Omar Senne, president of the Cooperative Union of Saint Louis, June 1989). Following the failure of this first generation of cooperatives, the cooperative movement was again pushed forward by the CAMP with the financial assistance of the Canadian International Development Agency (CIDA). An amount of 2.710.000 Canadian Dollars was granted as an interest free loan, to be repaid after fifty years, with deferred payment for a period of ten years (J. Rieucou. 1986. p35). Thanks to this financial aid it was possible to distribute 3.500 outboard motors, all other equipment (nets and accessories) excluded.

The Primary Cooperatives Stores (CPA) became the main element of the project. After the funds had been released, the target was a motorisation ratio of 90%. 83 CPA were created (see table 5).

Table 5: REGIONAL FISHERIES - MAINS OF PRODUCTION-LANDINGS & COOPERATIVES

	Canoes (%)	Ladings (%)	CPA (numbers)
Saint-Louis	8	6	4
Thiès	26	62	12
Dakar	27	19	12
Kaolak + Fatick	12	7	26
Ziguinchor	26 (1)	5	28
Louga	1	1	1
Total	100	100	83

Source SERA/DOPM in Bilan diagnostic p 24
 (1) Mainly river canoes (total motorisation 21 %)
 Dakar and Thiès: motorisation 89 %

For each CPA a share capital was required and loans granted through cooperatives could not exceed 10 times this amount. The fishermen would receive the outboard motor on cash payment of 25% of its cost (Malick Gueye, op.cit.). The balance would be paid in instalments spread over a period of 24 months. The loan was interest free and delayed payment was considered, taking into account the good or bad fishing season.

By 1986, the CAMP had already issued 10.600 motors, achieving a total ratio of motorisation of 64% for 1985 (Action Programme, p30) against 50% during the 70s (private distribution channels only).

The CAMP project had to face many difficulties mainly because of the technocratic development approach, the abuse of power and breach of confidence by the office bearers of the project. Other external factors beyond the control of the CAMP also played an important role.

The rigidity of the rules stifling the motor repair centres.

In fishermen villages, it is quite common to find 'engine cemeteries' awaiting spare parts. On the top of it, the fishermen had to take their entire engine to the work shop whenever it was in need of repairs, even for some minor break down. This rule was compulsory, failing which the CAMP would not deliver the needed engine parts. Those fishermen living at a long distance from the repair centres were discriminated as the workshops are often centralised in well specified areas and it is out of question to sell spare parts outside these recognised centres. Such stifling rules did seriously hamper the work of the fishermen.

The rise in social inequality due to the functioning of the fishermen's cooperatives.

The word "cooperative" hides several social realities (especially in Africa) which look contrary to the very spirit of cooperation itself. In spite of the

dynamism and the spirit of enterprise of many Senegalese fishermen, the cooperative has come to graft itself onto a system of traditional values among which the social relations – often influenced in certain areas by the school and the urban phenomenon – carry on to express themselves in a traditional expression. The traditional customs rule out the: "one man – one vote" principle.

This does not mean that a spirit of cooperation does not exist within the fishing communities, but it is understood in a different way. Indeed, many forms of collectivism are common tradition in Africa (different forms of mutual help for example).

As an unexpected effect of the cooperative system it was noticeable that many presidents could take advantage of their political power to enrich themselves at the cost of those who did not have the religious and/or traditional power. The presidents of the cooperatives together with their office bearers close to them, have often taken advantage of the services meant to be equally shared among the members. Those presidents enjoy state, religious and traditional authority and act as a "transmission belt" for the fisheries administration. Some of them are enjoying these positions for dozens of years thanks to their religious and traditional powers. They control the motors and spare parts business. While fishermen demand is continuously raising, spare parts and motors are in short supply; no wonder that cooperatives have become a ground marked more and more by "individualism".

Fishermen inability to repay by fixed instalments.

Eventhough delays of repayment have been granted to fishermen due to seasonal constraints, the "fixed instalments" have seldom been honoured by them. This is largely due to the inadequacy of the system to the local mentality and the social organisation of fishworkers.

Major expenses made for important social events could very well become a cause for the delay in the repayment. Technocrats often view these social expenses as useless and less important than the repayment of a debt. But it should be noted that the fishing canoe is more than an economic unit of production, it is also a trunk on which a whole culture is grafted and consequently a whole value system.

The notion of utility is very relative. That is how the parallel circuit of credit by fishmerchants is more successful than the CAMP. As long as the fisherman accepts to sell to a fishmerchant, he may benefit from a credit from the latter without having to pay a deposit neither being tied up by instalments set over fixed periods but repayment will be made according to the results of the activity.

Some agents of the CAMP used fraudulent practices

These agents, who have never been fishworkers, bought huge quantities of spare parts and sold them on the black market. Personally, I have noticed myself, that spare parts were sold in CAMP local stores at a higher rate than the official price.

Other external factors have also contributed to the failure of the CAMP project, such as:

- the monetary erosion due to the vulnerability of the CFA franc towards the fluctuation of the international exchange rate;
- the misappropriation of CAMP funds by the administration and the bureaucracy. The CAMP has known cash problems because of its financial support to the fisheries administration (DOPM), to the SEPM (2) and to marketing activities. Those supports were valued in 1984 at 446,061,000 CFAF (CAPAS Seminar p.8). In 1984, while the revolving fund had already vanished the arrears due to CAMP were estimated at 128,300,000 CFAF. The arrears were linked to the purchase of YAMAHA motors and they have been preceded by an other operation which was a noticeable failure. A deal involving the purchase of 574 motors was concluded with a Belgium based Outboard Company in 1971. Due to the defects of the motors delivered by that company a loss of repayment followed to the tune of 28,707,205 CFA F. Nowadays, the total loss of these transactions amounts to 157,007,205 CFA F or 15% of the total credit allotted to the motorisation program.

Marketing Program: the Fishmarketing Centres.

In 1977, an agreement has been signed between Senegal and Canada establishing "CAPAS" for the commercialisation of the fishery products. The main targets of the CAPAS Centers may be defined as follows:

- put an end to the dominating role of fishtraders,
- raise the living standards of the fishworkers,
- improve the distribution and supply in the country taking into account the important role played by fishery products in people's diet.

Considering this importance of fish and the absence of adequate shore infrastructure capable of handling the wastages of the resource and of correcting the inegalitarian distribution among regions, the second phase of CAPAS program envisaged the establishment of "Fish Marketing Centres". Fresh fish trade accounts for nearly 60% of all landings and this is on the increase. Traditional fishmarketing handled 194,000 T. in 1987 against 98,000 T. in 1984 (Bilan diagnostic p.23). This increase is due to strong demand in the national market where fish is of prime importance.

CAPAS started 3 marketing centres along the coast. They were designed for production and sales of ice and for marketing fish. In theory these units had to be managed by the Cooperative Unions with technical assistance from the Fisheries Department. The investment reads as follow:

- 163 millions CFAF for Kayar (1981),
- 189 millions CFAF for Joal (1982),
- 99 millions CFAF for Rufisque (1983).

Fresh fish is mainly consumed in urban areas near Dakar where distribution infrastructures do exist. There is no price control. Hence prices fluctuate according to the market and do not take into account the real expenses of the fishing unit and of its main input: fuel cost. Due to the spiralling oil prices which are not reflected by fish prices the financial viability of many artisanal fishing

units has become critical. In order to remedy this situation Marketing Centres (MC) were started in the 80's. The so-called management by Cooperative Unions did not materialise due to the administration grip (see later CAPAS evaluation) and cooperative members had no say (see CAPAS organigram).

The Cooperative sector counted 81 sections of CPA (Artisanal Fishery Centre), 5 regional Unions, 1 national federation. The objectives of the CAPAS read as follows:

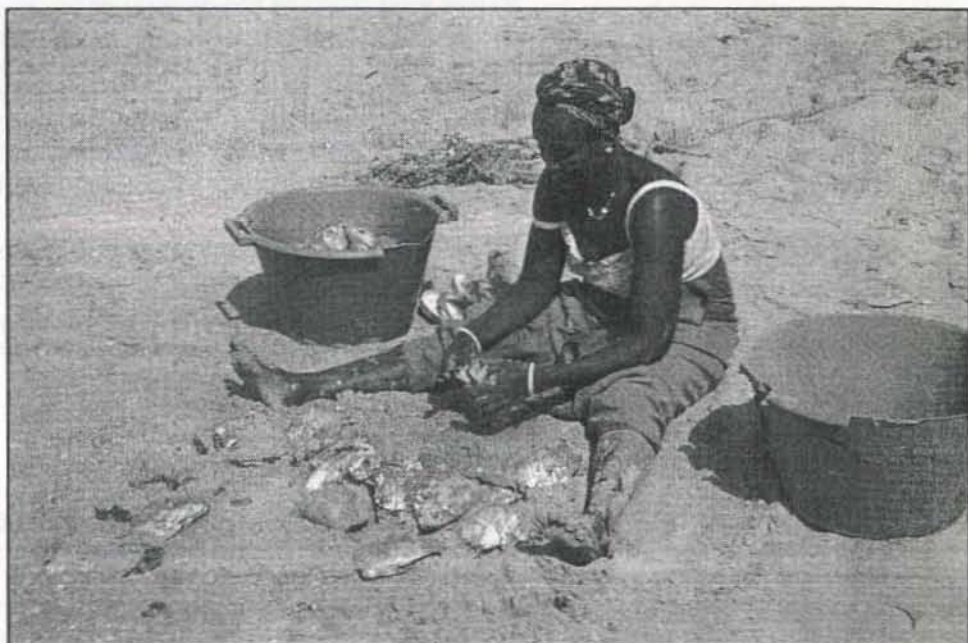
- assistance to the artisanal fishermen and to the fisheries cooperatives for storage, processing, transport and marketing of their products.
- financial and organisational assistance, cooperative training and animation of fishermen or group of fishermen.
- the buying and sale of the equipment to the cooperative members,
- the management of funds generated by the sale of equipments.

If one looks now at the assessment of the project one notices that the structure of the CAPAS has been from the start marginalising the true actors of the sector. The key posts were in the hands of technocrats eventhough some corrupted fishermen were also taken in to "colour" the office as shown in the composition of the Board of Directors:

- President: the director of the DOPM (Directorate of Oceanography and Maritime Fisheries)
- Secretary: Director of CAPAS
- Members:
 - 1 representative of the Ministry of Fisheries,
 - 1 representative of the Ministry of Economy and Finance,
 - 1 representative of the Canadian Embassy, the head of the Canadian assistance to the CAPAS project,
 - 5 representatives of the National Cooperative Union.

The corrupted technical officers have often overpowered the cooperative members by way of illegal practices. For example the financial balance sheet of the Joal centre was hardly shown to the cooperative members awaiting to know the position of their cooperator's benefit. The Rufisque centre was purchasing fish on the beach without issuing any receipt to the fishermen. Curiously the staff of the Centres were used to buy sometimes enormous quantity of ice. Discount promised to members selling to the centres were never granted and dissatisfaction soon grew among fishworkers. The CAPAS justified the non-payment of cooperator's share benefits arguing that its finances were in bad shape. In Pointe Sarène (on the "Petite Côte") however fishermen noticed how the financial situation of the Joal centre could improve without paying a single cent of share benefit. This subject is thus source of a lot of frustration. During a CAPAS Seminar in October 1984, the question put forward was whether coop share benefits had to be paid to all fishermen who had sold their fish to the centres or only to those who lived on the spot.

However the principle was clear: *"The surplus generated by the fish marketing activities must be shared by each and every members who has supplied the cooperative"*. In fact this was never applied by the Board of Directors. In the Northern Cooperative Union, the amounts given by the Kayar Center were not accounted as "share benefits" but as premium to the members of the Board of Directors. The international rules and regulations which allow such payment confirm once again the inadequacy of this cooperative model to the



After bringing the fish ashore it is being cleaned on the sand by a Senegalese woman.
(Photo : François Bellec)



Traditional fish drying in the Casamance region of Senegal (photo: François Bellec)

To this evaluation of the general policy of the state, it seems necessary to add some implications resulting from the international fisheries agreements signed by Senegal to secure foreign exchange against licences given to foreign fleets allowing them to operate in national waters. In spite of restricted zones for industrial fleets, some trawlers operate illegally in the zone set aside for the artisanal fishery. These violations occur mainly at night with all lights switched off. Such practises do not only cause casualties but also economic losses for the artisans:

- destruction of bottom set nets and driftnets,
- collision between ships and traditional crafts with sometimes loss of lives.

To this one must add the wastage of resources caused by fishing ships searching only high-value fish and throwing overboard other species which are often eaten by coastal populations.

Prospects for the future

The problems as they have been mentioned above demonstrate that beyond the economical problems (access to the cooperative credit), many other aspects in fishing do escape the control of the cooperatives. The damages done to the artisanal fishermen relate to the policies favouring the industrial fisheries and call for political answer. Cooperatives with their rules and regulations cannot resolve these problems. That is why, to face those new problems linked to the internationalisation of fisheries, the Senegalese fishworkers have started to organise themselves in an independent way. Independent, because the cooperatives and the GIE have been dropped from the top. Say our fishworkers: *"The bureaucracy may device its own organisation but does not hesitate to dissolve our own each time they feel that we start to act against their interest."* The National Collective of Fishworkers of Senegal (CNPS) which started already by the end of 87 counts today about 1,500 members and sympathisers (researchers and fisheries development agents). Of course this organisation knows and will go knowing administrative block from the authorities viewing it as a "undesirable power". But, in my opinion, this organisation should be considered by the Fisheries administration as a necessary entity.

Fishworkers Organisations become today a desirable element for any efficient fishery policy. First while searching for models of fish stocks management, a multitude of recipes do exist nowadays which will remain useless unless the fishworkers are involved in the conception and implementation. It is good indeed to have good biologist researchers to device models but it is also important to find fishworkers who accept to apply the rules. In Senegal, the artisanal fishworkers operate also within prohibited areas (shrimp area). Where the administration fails, genuine fishworkers organisations could associate with researchers and exercise a pressure on their members for the application of those models. Of course this implies beforehand a system of registration which is also useful for various researchers. At that level, the organisations can play an important role way ahead of their time.

Secondly at the level of cooperative credit or productive associations. A good number of projects granting credits had to be winded up because they were unable to recover the loans. The arrears of the CAMP which have contributed to its failure are a revealing example. A real implication of the fishworkers organisations in the credit management, thanks to the joint guarantee would avoid the well-known pitfalls and disappointments. The National Fund for Agricultural Credit (CNCA) very active nowadays in the financing of the fishery sector starts in an institutional way to make use of this joint guarantee system. By financing only half of a group of fishworkers in a GIE, the CNCA provides further loans only after the payment of the first series of loans. It goes without saying that an internal control by the fishworkers has to take place in each GIE.

Like in many African countries, the Senegalese fisheries development policy is a drop of water in the ocean of rural development programs in Senegal. The technocratic and narrowly "economicist" approach to the development leads inevitably to bottle necks and "mal-development". Some may not agree and will cite a few indicators like fulfilment of the motorisation objectives, rise in landings, etc. However, one has to look closer and discover who has benefited. Certainly not the great majority of the fishworkers who find themselves completely deprived of their resources. The challenges of today can only be taken up successfully if the fishworkers voice is heard at the top.

Aliou SALL

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- (1) The country has no petrol deposits but refineries of crude oil.
 - (2) State Secretariat for Maritime Fisheries.



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Annex: POTENTIALS AND LEVELS OF EXPLOITATION BY TYPE OF FISHING					
Types (1)	Exploitable potential according to sources (T/Y) (2)	Artisanal exploitation 1987 and (average 1984-1987/ tonnes) (3)	Industrial exploitation 1987 and (average 1984-1987/ tonnes) (4)	Total exploitation and (average 1984-1987/ tonnes) (5)	Recent situation of stocks (6)
Coastal pelagics	270.000 to 300.000	164.760 (124.813)	4.804 (5.230)	169.564 (130.043)	Under-exploited but over-exploited locally (Petite Côte). Available stocks situated outside traditional artisanal fishing zones and sardine grounds.
Coastal demersals (Crustaceans and molluscs included)	105.000 to 110.000	(38.500)	Trawlers: (59.500) Semi-ind. : insignificant	(98.000)	Variable according to species.
Distant pelagics (tunas)	migrant stock difficult to measure. Estimated: 25.000	Nil	18.670 (15.975)	18.670 (15.975)	Availability according to season. Possibility for capture in neighbouring waters in other seasons.
Distant demersals (shrimps, crabs and hake only)	11.000 to 16.000	Nil	(5.500)	(5.500)	Development potentials.
Estuaries : - Fish: - Shrimp (Casamance) :	10.000 to 20.000 800 to 1.700	6.000 (a) 1.700(a)		6.000 (a) 1.700 (a)	
<p>Note (a) : in 1981 Source: - Weber and Fontana (1983), pp. 5-13 ; - Ministry of Rural Development (1986), p. 13 ; - Data for 1984 to 1987, CRODT.</p>					

Aquaculture today

CHANCES AND HAZARDS OF THE BLUE REVOLUTION

Passing from the stage of fish capture to fish farming and learning how to progressively control the various phases in the reproduction cycle of living organisms in an aquatic environment are the enormous upheavals that aquaculture has introduced in the fisheries sector. We can truly talk about a "blue revolution" because this kind of change involves a major change in the mentality within the profession. But this revolution is also awakening transnational appetites at the very time that it is modifying the balance of ecosystems and often carrying with it damage to the environment.

Hector Luis Morales, a Chilean sociologist, specialist on aquacultural issues and coordinator of a support organisation for Chilean fishermen (*), here describes the positive and negative aspects of the "blue revolution" and the repercussions they create in fishing communities.

Fisheries throughout the world have experienced an impressive increase in their catches, surging from 19.6 million tonnes in 1948 to a total of 91.4 million tonnes in 1986, representing 4.6 times more tonnage over a period of 40 years. This increase is primarily due to the emergence of fishing fleets from industrialised countries, especially Japan, the USSR, Spain and Norway, along with anchovy and sardine fishing on the coasts of South America, in particular those of Peru and Chile.

It is estimated that half of the catches are for industrial use, especially for fish meal and oils that are later reincorporated in the production of foods for human and animal consumption. Major instability has also been noted in the

landings of some species (anchovies and sardines), as was the case in Peruvian fisheries which had an average production of 10 million tonnes between 1968 and 1971, and which dropped to 1.5 million tonnes in 1984.

We have seen that some species of high commercial value, like the sea prawn or "penaeus", represent close to 20% of the total value of the worldwide fish trade: in 1985 Japan, the U.S.A. and Europe imported nearly 500,000 tonnes of this product. India, Indonesia, Thailand and Mexico are the major prawn producers, with 70% of the total international trade in this product (FAO 1987). Fisheries in certain areas are tending to stagnate or decline due to over-fishing and a lack of respect for reproduction periods or standards for the protection of resources. Numerous regions which have large fisheries exercise no control or do not achieve multilateral accords which would allow for the establishment of legislation regarding catches.

Aquaculture, or the production of organisms of aquatic origin, is a complement to fishing and is perceived as a very specific activity according to regions and needs. In certain places, the cultivation has been developed of species with a high commercial value on an international level, as is the case with the sea prawn or "penaeus". In other places priority has been given to the intensive raising of fish for popular consumption, such as carp (Cyprinidae), the so-called "mojarras" or tilapia (Cichlidae) in fresh water.

The increase in demand has also stirred interest in cultivating sea plants for the extraction of gelatin and other industrial inputs. Intensive extraction has nearly depleted natural beds of "gracilaria" seaweed in Chile, a fact which has stimulated its cultivation.

This article gives some data on advances in aquaculture, as well as an analysis of its principal positive and negative aspects, and the challenges posed to its development and consolidation.

Repercussions on the socio-ecological environment

The name "blue revolution" was given to the massive creation of the cultivation of living organisms in an aquatic environment. It is viewed as a very important change in production systems linked to fishing, which exclusively involves the extraction of fish and is not directly concerned with breeding or cultivating the organisms which are, by nature, the resources that maintain the activity. From this fact comes the reference to the neolithic revolution, a period during which man initiated the cultivation of the soil that we call agriculture. We have passed the stage of gathering in favour of one of cultivating. A new type of relationship is being established between the productive group and the ecosystems in which the species and resources exist and develop for fishing and cultivation. New relationships between man and nature are appearing. It is vital to know not only the displacement of wildlife species, but also how to manage the progressive control of the various phases of the reproduction cycle, birth and growth. It is a question of a new system of production. (Moraes, H.L., 1978).

We can also speak of the "blue revolution" in comparison with what we call the "green revolution", which is characterised by the development of agricultural crops bringing about the use of improved varieties of grains or plants with high yields that have been obtained through the use of chemical fertilizers and pesticides to avoid epidemics. In the same line of thinking, we have developed intensive breeding of certain animals for the production of beef, poultry and pork based on genetic manipulation and feeding composed of balanced diets based on grain, fish meal and other food-industry inputs. (Gomez, G. and Perez, A., 1979). The "blue revolution" is a replica of this type of modernisation, especially in terms of the improvement of some species, their use in capital-intensive production systems and their marketing at the international level.

This technical change has enormous impact on traditional aquatic production systems and its repercussions affect not only economic or technical aspects of the productive base; they also introduce issues and challenges that touch on the social conditions of fishing populations, as well as on certain surrounding aspects of the ecosystems in which the activity is carried out.

In the modernisation of agriculture, or the "green revolution", social and economic impact appear primarily in the sudden breakdown of peasant economic structures. The rural way of life has a very specific rationality distinguished by communities of traditional agricultural producers, as well as by being in direct relation to its own local characteristics and the productive capacity of the soil and native species. Its management is generally carried out on the basis of priority needs for self-maintenance and the reproduction of the group. Outside exchange comes about through excess production and contributes a complement to food supplies, health and other needs. It is customary for these communities to be relatively closed, with a great capacity for long-term subsistence, thanks to internal resources.

The rationality of the "green revolution" has transformed the condition of producers by making them dependent on the outside world for the very basics of their work: seeds, fertilizers and consumption. Moreover, it has led to demands for financing with the resulting debts owed to private or state intermediaries. This situation was widely illustrated within the context of tropical crops (coffee, cocoa beans, sugar cane, market garden crops, flowers and intensive farming production). (Schejtman, A., 1983; R. and F. Rello, 1980).

The breakdown of the peasant economy had serious consequences on the impoverishment of the rural environment, urban exodus, the concentration of land suitable for export crops, and the emergence of a peasant proletariat generally living in conditions of extreme poverty. This revolution often had a predatory effect on the natural resources which should have been protected for their ecological importance. The modernisation of agriculture has not improved the living conditions of the country populations in Latin America (Brignol, R. and Crispi, J., 1982. Ortega, E., 1983).

Various experiments in the "blue revolution" are gradually showing the same tendencies and contradictions that produced the "green revolution". The great demand for certain products in European, U.S. and Japanese markets,

especially in the case of the sea prawn or "penaeus", has turned a number of countries into producers and exporters of this species. Such was the case in India where for fifty years prawns were used as meal to fertilize coconut trees and are now selling on the beach for \$15 for a kilo of tails. The pressure on fishing resources has led to their being virtually depleted, and the search is now on to establish cultivating areas on the coasts by destroying mangroves and occupying regions which were destined for food crops, such as fields for producing rice (ICSF, 1986).

We can also see that this phenomenon has created genuine poles of rural development on the coasts, as was the case in the estuary zones of Southern Ecuador. Over 100,000 hectares have been devoted to the production of the "penaeus", and more than 120,000 rural jobs were created to gather the post-larvae which serve to seed the growing basins (Snedaker). In Bangladesh, truly Herculean work is being carried out. More than 5,000 km of dams are being built by hand to create 200,000 hectares of polders to serve as a basis for the production of rice, salt and, of course, the prawns which serve as the principal source of currency for one of the world's poorest countries. Prawn production is gradually invading paddy fields, and the traditional peasant is being replaced by the modern export contractor, by creating a considerable number of jobs for gathering the post-larvae prawns in the streams and on the beaches. More than 200,000 workers would be handling these jobs, besides the manual labour building dams in these tropical areas with monsoon climate. (Huk, K., 1986).

The cultivation of species primarily destined for the domestic consumption of local populations seems to lose importance in the face of more profitable aquaculture. The origins of aquaculture throughout the world, and especially in China, Japan and Europe, were related to the specific conditions of the peasant economy: the "cultivation" of a species begins as a response to the increase in the human population when and where the catch of fish is no longer sufficient. This was how the Japanese peasants initiated the cultivation of oysters. The Chinese introduced extensive carp breeding in all waters integrated of all major water control systems (Noriega, P., 1980).

Into a number of countries, small-scale fisheries assimilated the characteristics of the rationality of the peasant economy. The activity is maintained with a balance between fishing, the subsistence of the group and the outside sales of the excess. These characteristics are being rapidly modified with the appearance of capital-intensive cultivation and with the objective being export. Salmon breeding in Chile began on the basis of an external demand, with the bulk of the technology, capital and inputs coming from outside. The producers are rapidly becoming employees. Economic bases of a rural type are breaking up and new production relationships are being established that are changing the forms of the communities' social structure. The demand and interest in obtaining concessions on the coastal zones are rapidly growing all along the coasts, especially those which are the most protected.

Transnational companies are participating in the acquisition of these concessions, as well as in the tasks involving the search for resources and their incorporation into markets of high commercial value. New economic, social

and technical sites which are being opened have very serious repercussions on the social life of the rural populations.

Some significant examples

Aquaculture has no tradition in Latin American countries, unlike in Asia, and especially in China, where the multi-cultivation of various species of carp has been known since the 4th century B.C., and where its modern-day expansion was possible thanks to this traditional knowledge. Pre-Hispanic cultures have left just a few traces and one cannot truly recognise aquaculture, as one can in the case of agriculture in the lacustrine or marshy zones of Central and South America. The cultivation in the "chinampas" of the Mexico Valley, especially in Xochimilco and Mixquic, were based on an integration of aquatic areas and agricultural fields and some species of aquatic plants, fish, reptiles and insects developed within the framework of a primitive type of management (Gomez Pompa, A., 1978).

Similarly, studies on the manipulation and use of living organisms in a salty environment, as was practiced in the "Vaso de Texcoco", have illustrated the knowledge the Aztecs had of the nutritional value of the seaweed "spirulin" and numerous edible insects which reproduced and grew in this environment. This goes to prove that aquaculture was used in these cultures and has been pursued up to today. Its widespread application, however, produces a number of effects that have to be taken into consideration.

Salmon breeding in Chile

The fish farming of salmon in closed systems has been recently developed in Chile, reaching a total production of 5,475 tonnes in 1988. The main species being silver salmon (coho), the royal salmon (chinook), pacific salmon, the "salar" or atlantic salmon and the sea trout (*salmo trutta*) (R. Mendez, 1997). This production system is based on budding sea lettuce (*ulva*) and rearing fingerlings in fresh water till their sea migration phase, and later rearing them in floating cages in estuaries providing a balanced diet. At first, we thought of using a closed marine system (sea ranching) or freeing individuals in the hope that they would return through the species' genetic conditioning, but few returned (only 1% in certain fish farms). Sea ranching systems used in Sweden witnessed a ratio of recovery of 12% in fish captured by sport fishermen after being tagged and released (Salmon Swedish Institute, 1975). The system of fattening in floating cages has shown itself to be more effective, while the feeding costs can exceed 50% of the total cost of production. The FOB (free on board) cost of fresh salmon ready for export is estimated at between \$2.80 in 300-tonne production modules and \$3.30 in 100-tonne modules. In any event, these costs are absorbed by the price paid at export which is around \$4.40 per kilo (C. Wurmman, 1987). The major difficulties result from the dependence on sea lettuce (*ulva*) from outside sources, given the need to import 75% of the total from Canada, the United States and the Scandinavian countries (R. Mendez, 1987). The cost of feed has a strong effect on the total

cost price. From the standpoint of job creation, these aquacultural industries employ over a thousand people in a total of 30 centres. Among them are 134 biologists and scientists specialising in aquaculture (R. Mendez, 1987). Current salaries in Chile represent about 1/20th of those in force in Norway and other European countries, for example, while the human exploitation enables companies to earn enormous profits. The possible repercussions on the environment are increased due to effects yet unknown as to what extend the freeing of these species may have on other species and on relationships between species, either directly or through diseases that can be transmitted and propagated in intensive breeding systems, and of which we have little information at present (Clara Munita, May 1987).

The cultivation of the seaweed "gracilaria"

Cultivation of the seaweed "gracilaria" was experimented with in various places in Chile. This product serves as a basis in the production of gelatin, especially "agar agar" whose extraction procedures have long been known in Japan and which at present are industrialised under the technological control of Japanese and transnational companies. "Gracilaria" is harvested in Chile by small-scale collectors, some of whom have been organised in a cooperative movement since 1970. A large number of people laid off by industries or farms have moved towards the coast to work collecting the seaweed, making up transitory communities and pushing the harvest to the point where the natural "gracilaria" beds are depleted. Harvests of this resource have gone from 20,275 tonnes in 1980 to 117,521 tonnes in 1985. The harvest fell to 52,700 tonnes in 1986, including the 2,800 tonnes from cultivation centres, which means a drop of 30.2% in the total export value of this resource. However, a significant part of the product was gathered and transformed into "agar agar" in plants operating in Chile, representing a 31.8% increase in the export of this product. (Chile Pesquero, March 1987, p. 52, Morales, H.L., 1986).

Experiments and the study of seaweed cultivation systems with the objectives of protecting the resource and achieving greater profitability were primarily initiated by cooperative and private groups. Such cultivation can be carried out in tidal areas or directly into the sea. The "gracilaria" plants or thalli are transplanted on the seabed using various plantation techniques which allow for the later care of the plants during their growth. In the case of seabed cultivation, diving is required. Harvesting is done by pruning or cutting and not by pulling up the plants, thus allowing for the long term maintenance of the resource. Unauthorised harvesting and theft of the seaweed is frequent; the perpetrators are motivated by the high value the product represents for the harvesters. One can note the importance of having the actual producers cultivate and care for their own seaweed beds.

The cultivation of "gracilaria" seaweed in Chile has awakened interest in marine concessions with the goal of creating aquaculture beds. In the process, we have been able to observe the rivalry between private producers, in many cases foreign companies, and the coastal residents, especially the seaweed farmers, the harvesters and the small-scale fishermen who have traditionally lived from the products of the sea.



Cultivation of algae "gracilaria" in Puerto Montt, Chile (photo: Pierre Gillet)

Legislation tends to be very liberal in this regard and we have begun to grant concessions to companies and individuals who, in many cases, are foreign to the local population. Moreover, there are a number of problems in determining the exact borders of the concessions, those requesting them have to pay high costs to obtain definitive rights, remaining simply exploiters of the concessions for a limited time, and dependent on the decisions of the respective public authorities. There is no updated and suitable law for the establishment of socially structured units in Chile. This is the situation for the cooperative groups of the coastal residents who earn their living by the cultivation of algae (Clara Munita, March 1987).

Prawn Culture

Prawn culture is without doubt the most important aquacultural activity in Latin America and for this purpose vast basin tracts have been created, mainly affecting the mangrove forests and natural larvae populations in the rivers and estuaries. Prawn culture has been developed primarily in Ecuador, Mexico and Panama. This system is structured in a range of variable intensity. Ranging from systems with a minimal infrastructure that benefit from natural feed production, with an annual yield of 300 to 600 pounds of whole prawns per hectare and a construction cost of US\$1000 per hectare; to semi-intensive systems applying stricter management (water supply pumped in, post-larvae seeding, fertilising the basins), with yields reaching 1000 pounds per hectare for each harvest, and with construction costs varying from US\$5000 to 7,500 per hectare.

In Panama sea prawn production has been monitored in more advanced systems. Operations are carried out in 10 hectare units, with water control through pumping; production can be continuous and specific. In this case the species called "penaeus vanamaei" is used. Yields can reach up to 1000 pounds per hectare per month, and the costs for constructing an operation amount to US\$120,000. Lastly, there remains the possibility of producing these prawns in systems where "penaeus vanamaei" larvae are produced. They are fed special diets in basins with running water through a pumping system. Their costs can vary according to the country. (FAO.RED., 1987).

Fish breeding in fresh water

The production of fish in fresh water, especially "mojarras" or tilapias (cichlidae) and carp (cyprinidae) is widely developed in tropical countries and it is of great importance in feeding rural populations and small communities. In certain cases, it can be a food source for urban centres (FAO). Mexico was probably one of the first countries to set up tropical fish farming systems in Latin America, with the introduction of carp and other species for their diffusion in a rural environment. With the goal of stocking a reservoir of a dam under construction, one million fingerlings were bred for the Miguel Aleman Reservoir which covers a surface of 50 km². A fishery was set up that in 1976 caught close to 6,000 tonnes. (Morales, H.L., 1978). The system for stocking tilapia was thus repeated in an number of dams and is being widely extended

throughout the country. Fish farming acts as a link, up to the constitution of a fishery in which the rationality of management is distinct from aquaculture. Floating cages including a balanced diet have also been used, as well as cultivating operations in which the fertilisation of the basins is carried out with waste from piggeries or bio-digesters, or by associating chickens or ducks with the fish. In certain cases yields reach a total of 6 tonnes/ha/year in integrated systems with fertilisation by depositing chicken or duck manure on the surface of the basins. (Garcia, H.E., INEREB. 1987).

Tilapias are like miraculous fish which reproduce every two months but which, as a result of this, sometimes develop problems of dwarfism. Current efforts are being directed towards achieving population control by selecting males destined exclusively for fattening. Selection can be carried out on a small-scale basis or by applying methods for rearing fingerlings with of hormones (metiltesteron). In this case there are a number of experimental sites for research, especially for subjects relating to the management of species in integrated systems, for the efficiency of fish farming units in the production of proteins, especially through the use of organic waste, and for organic food chains. On the other hand, ethnology should open up fields of application and the adaptation of these cases to the benefit of the most marginalised communities, especially the indigenous communities which often do not know the national language (Spanish, Portuguese or English) (Morales, H.L., 1985).

Challenges of the blue revolution

The blue revolution will be gradually faced with challenges and in its turn conditioned by the economic and social structure of Third World countries and by its international relations. It is essential to resolve the problems relating to obtaining concessions and the capital to build infrastructures or to pay the costs of operations linked to these systems. Dependence with regard to technology or inputs is ever more important given that for several years now transnational companies have been concerned with carrying out research on the most salient aspects of technology. Moreover, we are witnessing commercial conflicts for the selling of know-how through the projects of major international banks and development agencies. Once the production units are established, the issue is one of marketing the products, which in many cases requires special installations for freezing and transporting them, because these activities are generally carried out in tropical regions with hot climates.

These aspects may appear perfectly ordinary to those who implement major water engineering projects, such as dams, canals, hydro-electric stations or drainage, or who realise agricultural infrastructures or development in tropical or desert regions, or who undertake major mining or oil drilling projects. Today, everything is easy thanks to technological progress and the use of modern machinery. But in the case of aquaculture, it is a question of managing living organisms which involves demands that are quite distinct from those of mining or other activities. In addition, there are the social and cultural issues which face fish farmers of peasant origins. They are required to implement relatively complex systems which are often beyond their capacities due to the lack of an adequate education.

Some of the questions which must be examined in the context of the social development of aquaculture can be summarised as follows:

The first and most important point is to know how to select the species or resources to be used for an operation. The predominating trend is generally for the diffusion and generalisation of some species in a form that is relatively akin to that which has been implemented in farming or livestock breeding where we have seen the propagation of the varieties or breeds that best respond to the commercial demands. The best species of prawns or fish must be sought and efforts must be concentrated on only a few of them. This responds to the many problems of management in more or less intensive systems, but it leaves many questions open in terms of the economic or social impact that might arise in a crisis situation, as for example, during an epidemic, a drop in prices, a break in commercial relations with important market centres in regard to these products, or a shortage of feed or inputs for their development. The proper selection of resources must rely on a preliminary evaluation of potential problems inherent in this domain and room must always be left for some alternatives. For example, in the lagoons in the Languedoc-Roussillon in Southern France, fishing was concentrated on eels. Port construction largely modified the salinity of a lagoon (Salses-Leucate), which was converted to oyster farming since the eels almost completely disappeared. In the face of this change, they were able to establish oyster cultivation systems.

Another major challenge is the choice of the technology to be used in cultivating the resource selected. For this, one must always count on a range of technological alternatives which can be compared with the environmental conditions of social characteristics of the areas in which cultivation is implemented. The production of "penaeus" prawns in intensive breeding systems with water pumped in and a balanced diet can be ensured in locations where markets are nearby; the sales of fresh prawns can compensate for the costs of preservation, refrigeration and transport. But it is also possible for markets to be saturated with certain products and for prices to drop in such a way that intensive systems will prove to be uneconomic. This could be the case with prawns in which numerous Asian and African countries have invested in thousands of hectares of extensive cultivation, profiting by tides and natural productivity. Their production will not only lower the international market price, but it will also "demystify" a range of principles on the intensification of aquaculture of a capitalist nature. The choice of technology must not be established simply by a break or separation between the traditional and the modern since on many occasions a coexistence can be established by setting up extensive systems in which one of the elements will be modern and supervised by competent staff while leaving other extensive production tasks to rural sectors.

Similarly, it is important to know where to work in order to protect the ecology and the environment. Most often, corporate and capitalistic aquaculture seeks the best conditions for profitability, without considering aspects relating to the preservation of the species' germoplasm banks. At this juncture, we find ourselves in a special situation because modern ecology has proved that species do not live isolated from their surrounding environment, in other words from their ecosystems; in the same way that human beings do

not live outside of the society in which they find themselves and which conditions them to numerous points of view. Plants, fish, mollusks and crustaceans, as well as all micro-organisms will interfere in terms of their functions and needs and the depletion of one species can contribute to the disappearance of others, transforming certain "ocean oases" into deserts. It is starting from this observation that planners should reflect in accordance with the widest criteria and turn towards establishing a balance between zones for construction, controlled management zones and farming or fishing zones. Aquaculture can be a factor in major pollution if, unfortunately, appropriate controls are not set up. Salmon breeding can produce wastes which lead to the eutrophication of rivers. The rafts used for oyster or mussel farming can wind up filling in the beds of certain streams and estuaries. And then, of course there are the health risks that flow out of the installation of these centres.

You have to know who you are producing for. Many aquaculture systems are established for purposes of export and the local inhabitants of coastal regions see the outflow of products which were once a part of their regular diets. In Chile, a type of shellfish called "loco" (*concholepas concholepas*) is exported. This is a resource which, due to its high price, is being depleted, and a viable system for its cultivation has not yet been implemented. In other countries, aquacultural products compete with the production of food for local consumption, such as rice. This gives rise to the need to plan according to a regional balance between production for export and production for domestic consumption. In Panama, General Torrijos forced through a major agro-aquacultural programme under which hundreds of fish farming basins were built and integrated with animals and market gardens. Although its evaluation demonstrated the contribution of these systems to feeding the people, there was a tendency to give priority to commercial projects. There are States that establish priorities and in certain cases, like in Mexico, the priority went from species for popular consumption under the government of President Lopez Portillo to prawn production under President de la Madrid.

Knowing for whom you produce is just as important as knowing for whom you work. The door must be left open for a wide range of possibilities for the implementation of aquacultural production. Modern companies with a great deal of capital and technology can prove appropriate under certain circumstances and in accordance with certain resources, but the door must not be closed to cooperative or communal organisations. In Mexico, cooperatives benefit from the exclusive exploitation of over ten different species. The law was modified in part and it is now possible to create cooperative groups, not only of fishermen, but also of common lands on a community basis, or simply a small number of technicians united as a production cooperative. Recently in Lower California and in Sonora, a number of cooperatives were created for the production of prawn larvae (BIOTECMAR, Guaymas, Sonora) and for fattening prawns in basins fed by salt water (6%) in the Colorado River (Coahuila Station Cooperative, Lower California). In Chile there is a growing interest in aquaculture and the range has been extended from commercial companies using American techniques which have set up production incubators for big oysters, including union syndicates and cooperatives which have obtained concessions for seaweed production, to public and limited liability companies of all kinds.

In conclusion, the challenges are related to the need to seek a balance between capacity and the vocation of each region and each group of human beings, the demands for foreign trade and financial undertakings. The "blue revolution" must not be a new way of exploiting people, resources and coastal ecosystems. Rather it must be an occasion for rational and integrated management of their potential with the objective of ensuring the right of future generations to enjoy the products that nature has provided as a legacy to their countries.

In the perspective of "eco-development" (Sachs, I., 1974) we must fix a goal of planning, discovering appropriate technology for maximum natural productivity, respecting the right of other species to survive within ecosystems, and managing waste within the capacity for recycling nutritive elements and organic matter. Thus, we must seek the consolidation of local communities and their technical development so that they may be the first to benefit from new production systems. Participation in technical and economic development is also the foundation for the responsible social and political participation of all human groups in the development of the Third World.

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(Translated from Spanish - title and sub-titles by the editor)

(*) CEDIPAC: Centre for the Study, Development and Research of Small-Scale Fisheries in Chile.

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SMALL-SCALE FISHERMEN AND THE THREAT OF OUTSIDE OWNER-INVESTORS

Faced with the problems of access to credit and insurance, small-scale fishermen are being threatened by finance capital in their sector. The appearance of outside investors in a field which offers them a good return on their investments can possibly lead to the marginalisation and proletarianisation of fishworkers.

Having analysed the mechanism involved, Jean-Marie Baland and Jean-Philippe Platteau, both economists of Notre Dame de la Paix University in Namur (Belgium), focus on the determining role of fishermen's organisations in the search for alternatives to this takeover attempt.

Studies analysing the changes in the small-scale fishing sector are often centred on issues involving the technological division between this sector and so-called modern fishing, together with the tensions and contradictions created by this division. The question of renewing fishing resources in the context of the significant modernisation of fishing techniques has received priority attention in so far as the competition from industrial fleets very often threatens the very survival of communities of small-scale fishermen. This potentially explosive situation has stirred up violent opposition more or less throughout the world and has contributed to the creation of associations for the defence of small-scale fishing.

Another part of the literature tends to focus on the conflictual relations between fishermen and fishmerchants. Its main point is usually that communities of small-scale fishermen would significantly improve their lot by taking control of the marketing channels of fish products off the hands of the merchants.

The analysis we wish to conduct here focuses on another type of tension which places communities of small-scale fishermen in opposition to the out-

side, namely the growing takeover of productive small-scale fishing assets by investors coming from outside these communities. They may be people from an urban environment wishing to invest part of their savings, businessmen seeking profitable investments, owners of industrial boats concerned with diversifying their assets, and so on.

In one sense the main issue we face today is not so much to know if the small-scale fishing sector will survive – it will probably do it even if the fight to impose stricter discipline on industrial fleets will be hard - but rather under what possibly degenerated form it will survive. After all, the small-scale fishing sector is not a homogeneous and static unit. It is like a living organism likely to differentiate and adapt on technical, economic and social levels. At present, polarisation, exclusion and marginalisation processes are clearly under way. What we wish to stress here is precisely that these processes could be accelerated and strengthened by the emergence of outside owner-investors.

This article is divided into three sections. In the first, we will try to analyse what could attract outsiders to invest in small-scale fishing. This question will naturally lead us to examine the specific assets these investors have in relation to traditional small-scale fishermen. In the second part, we will attempt to highlight the consequences resulting from the appearance of these new owners who come from outside the environment of small-scale fishing. More specifically, we will examine if the intervention of outside owner-investors constitutes a real threat for communities of small-scale fishermen and, if so, what form will this threat take. And lastly, we will trace a number of points that clarify the basic role of informal and decentralised organisations of small-scale fishermen in the context of the outside intervention analysed in the preceding sections.

In general, the objective of this article is first to illustrate the serious dysfunctioning that characterises the factor markets in the small-scale fishing sector and could possibly enable outside owner-investors to increasingly penetrate this sector. Secondly, we will show that this growing intervention will produce negative effects on small-scale fishing communities; and thirdly, that by allowing the dysfunctioning of factor markets to be corrected through informal associations, communities of fishermen can reduce the intervention of outside owner-investors and thereby limit its detrimental effects.

An attractive sector for investors

For an outside investor, the acquisition of equipment in the small-scale fishing sector can represent a highly profitable investment. On the one hand, contrary to industrial fishing, the technical characteristics of the sector are such that the amounts to be invested are generally low. This implies that entering the sector as owner of equipment is relatively easy, especially so because decentralisation of small-scale fishing activities makes exclusion costs prohibitive (which we will discuss further on). The low amount of the investment needed also means that an investor with a large amount of available capital does not have to concentrate his assets in just one fishing unit. He

can easily compensate for the high risks of small-scale fishing by buying several fishing units or by investing a share of his assets in sectors with more assured yields. Moreover, in the event of overfishing, he can easily get out of the sector since the capital invested is very rapidly paid off. Finally, the low level of investment required is partly responsible for the dynamism of this sector at the technical and organisational levels, and for its great capacity to adapt to the changing conditions of the market for fish, as well as to new technical possibilities. Because small-scale fishing is carried out in a multi-species, multi-gear context, and is based on minor technological modifications, it can be redirected towards other fish stocks when certain types are exhausted.

A second important characteristic in the eyes of an investor lies in the legal advantages which small-scale fishing offers and which contribute to making it financially attractive. Firstly, with rare exceptions, this sector is tax exempt, at least as far as the income tax is concerned (personal income tax or tax on commercial profits). We will return to this point later. Secondly, more and more political decisions are being taken in favour of small-scale fishing, focusing for example on the establishment of exclusive fishing zones, the prohibition of certain technical aspects of modern fishing, or on international aid subsidising the purchase of fishing equipment. Finally, and above all, small-scale fishing is part of the informal sector, and because of this, it is not subject to the laws in force in other sectors of the economy. Among them, labour laws and the rigidity they introduce certainly constitute an important legal obstacle to investments in the formal sector. A person wishing to invest in fishing can thus be attracted to small-scale fishing because it enables him to escape the laws which are imposed in the modern sector. In West Africa, for example, the systems and levels of remuneration, as well as the working conditions prevailing in industrial fishing, are fixed during collective conventions whose mechanisms for negotiation are directly inspired by practices in force in developed countries, and France in particular. The regulations resulting from these negotiations lack flexibility and are totally unsuited to the functional needs of fishing and to the level of the overall development of the productive forces of the country. As an illustration, we can cite the example of Senegal where the regulations stipulate that every tuna-seiner, whose crew is limited to twenty members, must have a union delegate.

A third factor that contributes to making small-scale fishing attractive to an investor seeking investments is linked to the advantages he has over small-scale fishermen, such as privileged access to credit and insurance markets. Let's first take a look at the problems which credit and insurance can create for the small-scale fisherman. Somewhat later, we will examine the situation of outside investors in relation to this question.

The basic characteristic of the small-scale sector lies in its decentralisation, which has the immediate effect of making it very difficult for an outside agency to obtain crucial information regarding fishing activities without incurring high or even prohibitive costs. Moreover, fishing in the small-scale sector traditionally involves membership in a social group, a community or a village in which strong ties of solidarity exist vis-a-vis the outside world. Con-

sequently, an outside agency has little recourse for improving its information base at a reasonable cost.

Hence, as for industrial fishing, taxing the incomes of small-scale fishermen is an extremely difficult undertaking because the possibilities for fraud, such as output underreporting or input cost overreporting are extremely difficult to control. And the decentralisation that characterises small-scale fishing makes it equally difficult to tax equipment through such devices as fishing licences, registration taxes, etc... The information to be gathered on fishing units and the control methods to be applied are extremely costly. Thus, how can it be determined if a pirogue is used or not? How can the exact number of pirogues in a given village be counted? How can it be ascertained that all fishing units have paid the taxes due?

For similar reasons, the formal insurance sector finds it impossible to insure small-scale fishermen against the risk of accident at sea or damage to equipment. In the economic theory of insurance, there are two types of problems normally confronting an insurer: the problems of "adverse selection" and those of "moral hazard". By adverse selection we mean a situation in which only people with high risks are attracted by an insurance policy given that insurance companies must offer everyone the same policy. In effect, the problem lies in the impossibility of distinguishing good from bad risks. It can therefore be expected that the insurance will attract only bad risks, since good risks will not subscribe a policy whose terms are calculated on the basis of an overall average risk. There is moral hazard when people, once insured, tend to be less concerned with avoiding the damage for which they are insured, than if they were to bear the costs involved.

In the small-scale fishing sector, the problems of adverse selection (only the less reliable fishermen subscribe an insurance), and especially the problem of moral hazard (less care is taken in the management of insured equipment) are considerable. As an agent for the CSAR (Senegalese Insurance and Reinsurance Company) said, "in this sector, the risks are certainties!" The premiums to be applied would be so high that no fisherman would be willing to pay them. One could envisage, as was the case in Sri Lanka, a state-subsidised scheme for insuring fishing equipment. However, even in this case, the experiment rapidly ended in failure. In order to limit operational deficits, the Sri Lankan state had to restrict insurance coverage to such a point that the fishermen lost interest in the programme. In particular, engine damage was covered only in the case of the wreckage of the entire fishing unit, a contingency that was indeed relatively easy to monitor.

On the contrary, in the industrial fishing sector, it is possible for the insurance company to appraise boats, estimate damage and identify responsibilities at reasonable costs. In effect, the administrative costs per monetary unit insured are much lower and the boats are easily identifiable and located (in determined ports).

For the small-scale fisherman, a frequent means used to overcome the insurance problem consists in establishing privileged relations with a dealer who, based on his personal knowledge of the fisherman, agrees to cover

certain risks at a reasonable price, usually, the exclusive right to sell the fishermen's catches. In case he grants credit, repayment will be obtained from a predetermined share of the daily catches, so that the length of repayment will vary according to changes in the future economic situation of the fisherman. In the case of damage to the latter's equipment (loss of nets, engine trouble, and so on) on which he has borrowed, the fisherman is not necessarily held to repay the amounts remaining due; or again, repayments are suspended and new credits can be obtained should the boat be immobilised. When the catches are small, the dealer can waive his own intermediary profit. The property, credit and insurance markets are thus interrelated; they interact amongst themselves, so that agreements in some of them simultaneously involve agreements in others.

On the other hand, the small-scale fishing sector also offers possibilities for self-insurance. Certain types of risks can be insured against at the individual level when an owner has a sufficient number of fishing units. In this case, the risks arising from fluctuations in the daily income of all the fishing units are shared. Moreover, when one of his boats is in difficulty, he can organise sea rescue operations with the rest of his fleet. He can also ensure the replacement income of the crew from a destroyed pirogue by temporarily allocating them to other pirogues. Similar methods for insuring against risks within individual economic entities can be observed in extended families which seem to be a crucial institution for the collective management of risks in certain regions. Family self-insurance strategies are also possible in the labour market when one family places its members in different crews in order to be insured of a continuing income in the event of an accident. As we will see further on, here too fishermen's associations have an essential role to play.

A crucial problem with the productive assets used by small-scale fishermen is that they can never constitute a guarantee that is acceptable to creditors or bankers who want to reduce the risk of default on the part of the debtors. Here, too, problems of moral hazard and adverse selection arise, the imperfection of the insurance market having the effect of transferring these problems to the credit market. This explains the difficulty a small-scale fisherman has in having access to the formal or institutional credit market.

There are usually two types of solutions to this problem. On the one hand, the fisherman can possibly call for the financial help of relatives, for example, in the context of an extended family network when the elders of the family have accumulated enough assets to make loans to the younger members. More generally, the younger members must patiently wait to inherit the family capital before becoming an owner, as can be observed throughout West Africa, particularly in Ghana and Senegal. On the other hand, the fisherman can finance his investment by resorting to a local dealer who will agree to a loan because his personal knowledge of the fisherman serves as a substitute guarantee against the lender's risk. However, not all fishermen-owners in the small-scale sector have access to these two solutions.

An outside investor, on the other hand, finds himself in a much more favourable situation, not only because he probably has numerous and diversified assets (particularly in the real estate sector) which are easily accepted as

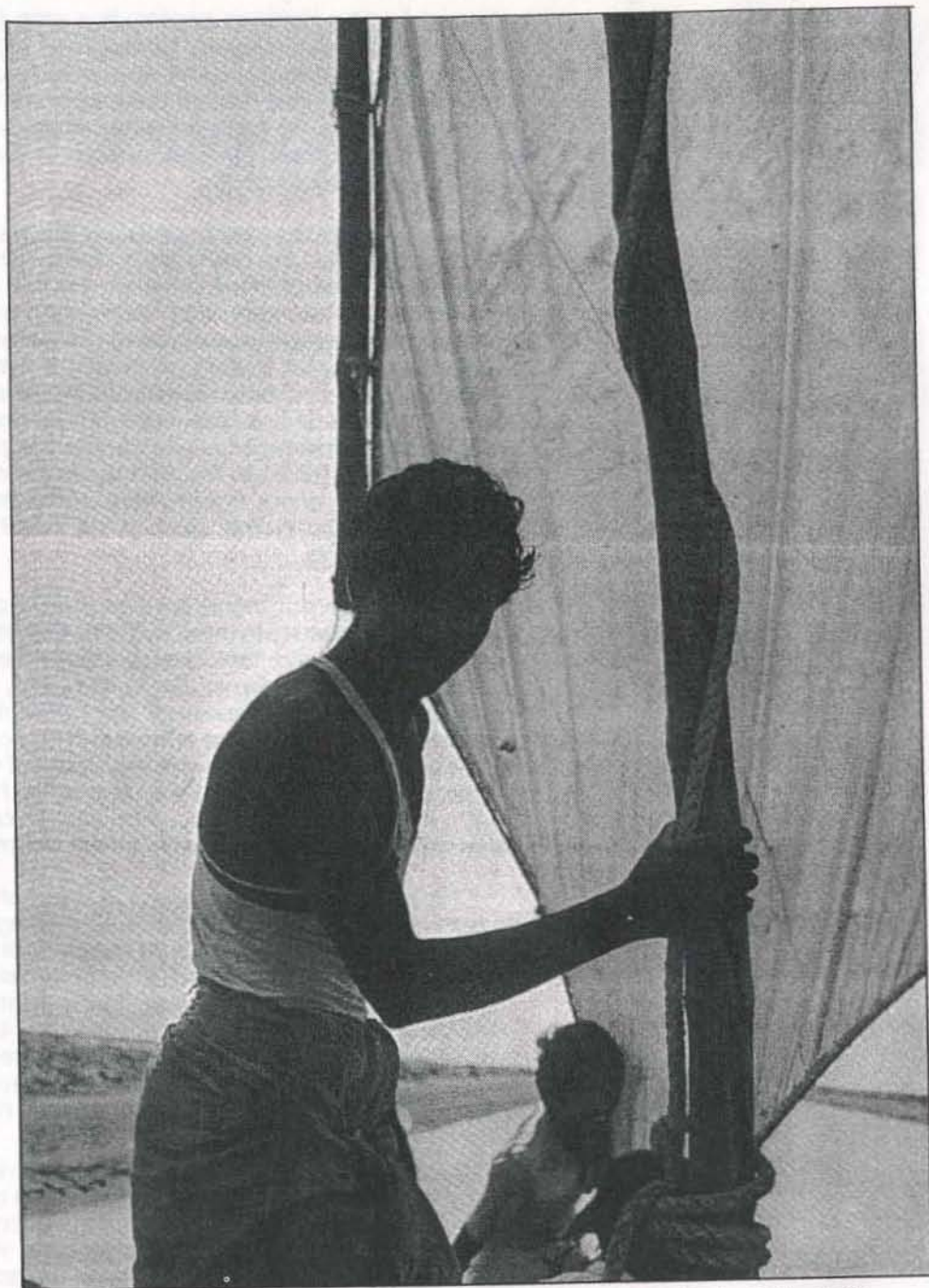
collateral by the banking sector, but also because he enjoys a privileged access to the financial sector (through his reputation, acquaintances, political support, etc.). Similarly, while he certainly cannot be insured in the formal sector against all risks related to small-scale fishing, he has good possibilities for self-insurance. He can take precautions against certain categories of risks by acquiring a sufficiently high number of fishing units, or by diversifying the assets in his possession (1).

While an outside investor probably enjoys a privileged access to credit and insurance markets, the same is not true in the labour market. His ignorance (2) of the social environment in which he has invested takes on fundamental importance: he has very little information and, as a result, the problems of adverse selection and moral hazard are generally very serious. When it comes to selecting his crew, it is very difficult for him to know the exact quality of the people he hires and could therefore easily end up with a team of mediocre fishermen. Even with a highly competent crew, an outside owner could find himself facing major difficulties due to the persistence of moral hazard problems. In effect, the crew may not put in the same amount of effort they would do if the owner, or his agent, were on board and directly participated in the fishing operations in the spirit of partnership that characterises traditional small-scale fishing.

The risk of moral hazard is reduced to a certain degree through the use of a proportional share payment system: with this system, members of the crew are motivated to give their best because their personal payment depends on the size of the catch. However, in this case, and even if he supervises fishing operations from land, the owner can still be swindled by his crew in two ways. The crew can cheat on the real size of the catch, particularly by selling some fish at sea or by secretly unloading a part of it. On the other hand, it is difficult for the owner to ensure that the crew uses the equipment, and particularly the boat's motor, judiciously and with enough care and caution to catch an optimum yield and ensure the satisfactory lifetime of the equipment.

This explains why many outside investors often prefer to limit themselves to commercial purchasing, transport, packaging and resale of fish, rather than getting directly involved in actual fishing operations. However, especially in the case of strong competition in the commercial sector, they can be led to finance fishing equipment against the exclusive rights to sell the catches of the fishing units thus financed. Here again, however, they can be cheated since fishermen may be incited to underreport the value of their catches. The only way to control for this risk is to impose a fixed repayment schedule, which the fishermen are likely to oppose owing to the high risks involved.

Considerations of moral hazard and adverse selection can also be applied to explain the persistence of decentralised organisational forms in the fishing sector as well as the emergence of functional combinations of industrial and small-scale fishing activities in the stead of vertical integration by fishing trade companies. Local owners or captains, in fact, have much more complete and reliable information on crew members, their capacities, honesty, good will,



Artisanal fishermen aboard their "vallam" in the South of India (photo: Guido Graft)

courage, etc...than outside employers. If the crew is well chosen (if the problems of adverse selection are satisfactorily controlled), the need for supervision and control will be less. This argument applies particularly well to the case of the owner-fisherman who goes out to sea with his crew or is linked to them, and especially to their captain, by close family, ethnic or other ties.

A strategy frequently used by the outside owner to circumvent the problems of moral hazard consists in naming as part of the crew, preferably as captain, a reliable agent, sometimes from outside the village. This solution is not, however, without its dangers, because either this person ends up being rejected by the crew or he comes to terms with them, even though this involves collective behaviour detrimental to the owner's interests. In Senegal, boat owners hire people from different and sometimes rival families in the same crew, with the avowed purpose of preventing the crew from forming a coalition to undertake collective action that may increase their income at the owner's expense. Of course, this type of solution gives rise to conflicts and can even become potentially explosive. Moreover, in hiring a heterogeneous crew in order to make it more difficult for them to carry out opportunist collective actions, the owner may not be able to obtain from the various members of the crew the cooperation needed to make the fishing operations effective or to create the consensus required regarding important decisions (fishing strategy, length of a trip, etc.). Efficiency losses therefore seem inevitable for owners who do not come from a fishing background.

Risks of exclusion or proletarianisation of fishermen

From the viewpoint of communities of small-scale fishermen, the entry of owner-investors into their field of activity has a number of negative consequences. These are found at the levels of the distribution of income, economic efficiency, and traditional social norms or practices. From the point of view of distribution, the entry of an owner-investor, especially in fisheries already threatened by overexploitation, directly involves a redistribution of income: a part of the capital income escapes the small-scale fisherman. On the other hand, because they have privileged access to the capital market, outside owners can acquire more sophisticated units and more effective fishing technology than can small-scale fishermen. In the competition for the resource, they can thereby catch an increasingly large share of the total harvestable stock to the detriment of fishermen-owners faced with greater constraints on the capital market. As a result, the latter must be content with lower incomes and may become unable to amortise their equipment while seeing their crews desert them to be taken on by more effective fishing units. If competition is stiff, the appearance of outside investors can thus eventually cause the exclusion or proletarianisation of small-scale fishermen-owners who find themselves deprived of an essential part of their incomes and obliged to abandon their traditional sector of activity, or, at the least, to occupy in it an inferior position as a simple crew member.

The intervention of these outside owner-investors is also likely to accelerate, indeed cause, the disintegration of the traditional standards of fairness

and solidarity. According to the capitalist logic of the separation of capital and labour, not only does the outside investor not share in the daily life of his crew, but he even tends to develop an antagonistic relationship with them by breaking the traditional ties which unite the owner of the boat with his crew. This is evident when, in order to insure against the risk of collusion of the members of the crew at his own expense, he appoints as captain a person who comes from outside the village or he hires as crew members people from different families.

The owner-investor is decidedly less inclined to respect the traditional standards of solidarity towards his crew. In particular, he is reluctant to provide them with informal mechanisms of insurance against the risks of income fluctuations and emergency expenses: free consumer credit, foregoing the capital share in the event of poor fishing, special trips organized with a view to financing social expenses, contribution to local social projects, etc. The working relationships which were traditionally personal and involve a diffuse set of mutual obligations are becoming more and more contractual.

On the other side, the crew show themselves to be less and less sensitive to the problems that can affect the owner: for example, they may refuse to obey the custom which, in certain countries, consists of making special fishing trips with a view to helping the owner cover the expenses of equipment repairs in the case of major damage. In addition, fishing units belonging to the outside investor are operated on the logic of profit (short term) and accumulation of capital from which all considerations of mutual help and social assistance to the needy are banned. Thus, for example, unless they have a direct interest in doing so, they are reticent to allow for traditional practices of income sharing through work spreading, to enter into local sea rescue associations, etc..

For these various reasons, the intervention of outside owners represents a major obstacle in the way of collective organisation of fishermen towards the collective management of the sea resources, as well as the representation of their interests. Let us note in passing that the heterogeneity of the small-scale fishing sector, which is actually enhanced by outside investors creates difficult problems and internal contradictions that may impinge on the efficacy of the fishermen's movements. This being said, it must be stressed that, even apart from the intervention of outside investors, processes of socio-economic differentiation are under way in the artisanal fishing sector that may be traced back to growing market penetration and increasing individualization of the agent's behaviour. Our main contention is therefore that the basic effect of outside investment in artisanal fisheries is to accelerate or accentuate the above processes.

Finally, it is not certain that the entry of new fishing units financed by outside owners entails a more efficient exploitation of the resource. The crew, if poorly supervised, are likely to inefficiently manage the equipment entrusted to them. Moreover, as we pointed out previously, if in order to overcome moral hazard problems, the owner consciously encourages the heterogeneity of his crew, coordination efforts will be impaired and the consensus required for the success of fishing operations will be lacking. Third, the indogenous dynamics of innovation which characterizes the small-scale fishing sector is very likely to

be stifled when it comes to fishing units owned by non fishermen. As a matter of fact, since the relationship between the owner and his crew is less stable than that which exists, or used to exist, in artisanal owner-operated units, the crew members are hardly incited to conceive, suggest, or even implement improvements that may not benefit them. In addition, their incentive to innovate can be discouraged by the fact that the outside owner, not being from a fishing background, may not perceive the value of their ideas, suggestions or initiatives. Four, a large percentage of these owner-investors are particularly concerned with maximising the short and medium term returns on their investments. For them, fishing is not a way of life but a financial investment. As a result, they are rather insensitive to the long term viability of small-scale fishing and, in particular, the issue of overfishing may not concern them much, all the more so if there are numerous alternative investment opportunities.

Organisations of fishermen must take initiatives

The entry of outside investors, therefore, constitutes a factor whose consequences can prove detrimental to the future of small-scale fishing. The threat they constitute does not, however, prevail throughout the world in the same fashion and to the same degree. In this respect, it is interesting to note that, at least in some countries, there is a high proportion of outside investors who go bankrupt or pull out of the sector (or would like to) as soon as possible. In Senegal, the experiment of the "maîtrisards" (3) shows not only that there are few candidates for investing in the small-scale fishing sector, but also that a large percentage of them fail in their undertaking or else leave fishing once they have accumulated enough savings to invest in less risky sectors.

Action can be undertaken at various levels. At the political level, direct control measures (licences, quotas, etc.) can be envisaged that, among other things, focus on limiting the access of outside agents to the small-scale fishing sector. The costs of these measures, however, might well prove to be prohibitive. Moreover, they would probably have limited effectiveness: how could a government prevent outside agents from investing through dummies, or how could it avoid the pressure of powerful lobbies or personal interests to circumvent the law?

As our analysis tries to illustrate, the solution is obviously to be found elsewhere, namely in actions attacking the problem at its source, that is in actions aiming to remedy the imperfections in the credit and insurance market. The government can play an active role in such a policy through programmes to insure fishing equipment or to subsidise loans to small-scale fishermen (reduced interest rates, State guarantees on credit risk, etc.). But such measures involve high costs and it is not to be assumed that the government would want to incur them, especially if the fishermen's bargaining strength is weak.

On the other hand, because their situation is privileged in terms of information, local small-scale fishermen's organisations are ideally placed to take the initiative to develop informal and original mechanisms for credit and

insurance. One possible route consists of creating institutions allowing the increased mobilisation of savings for investment within communities of fishermen, for example, by encouraging weekly or monthly rather than daily income payments. In fact, various accounts suggest that this method of payment may be a powerful factor encouraging the immediate consumption of income. Collective saving schemes could be established within communities of small-scale fishermen in which, for example, a fixed share of the catch would be automatically set aside for savings. An essential factor for success would be the flexibility of the system to adapt to violent fluctuations in the income of its members. Fishermen's associations can also facilitate their members' access to institutional credit. An initiative of this kind, called PAPEC (4), was recently set up in Senegal. This organisation grants credit to small-scale fishermen-owners to replace their equipment on condition that the borrower is part of a group whose members collectively guarantee the repayment of all the individual loans. In addition, these loans are granted in turns to members of a group so that the guarantee system can be effective (if loans were not sequentially disbursed, borrowers would be incited to default collectively). Here is thus an institution conceived after the model of the celebrated "Grameen Bank" in Bangladesh.

Informal associations can also play an important role in mutual assistance. In Senegal, for example, there are two types of sea rescue associations operating at the initiative of certain communities of fishermen. In the first case (as in the village of Hahn near Dakar), those insured pay regular dues (in varying amounts according to their daily incomes) to a common fund which finances the purchase of fuel for a pirogue specialised in sea rescue operations. In the second case (as in Joal on the Petite Côte), the insurance mechanism is totally decentralised, with the result that all the problems inherent in the management of a centralised common fund can be avoided. The system functions in the following informal manner. Each fisherman participating in the scheme agrees to provide assistance with his own boat to any colleague presumed to be in difficulty because he has not returned from his fishing trip at an appointed hour. Moreover, he agrees to support the costs of fuel resulting from such rescue operations. These expenditures in time and money act as an insurance premium in that they are incurred by the rescuer with a view to insuring against the risk of finding himself lost at sea and in need of the help of fellow fishermen.

The extension of this kind of practice in the case of equipment damage could be envisaged. For example, fishermen's associations could create a reserve of pirogues which would be loaned to unfortunate owners during the period required to repair damage to their boats. In the event of the death or physical incapacity of a fisherman, a system of special trips destined to support the needs of the family could be set up. Different types of organisations also focus on reducing the risks linked to daily variations in income so that an unfortunate owner would not have to sell his equipment to deal with a temporary cash problem. In West Africa, boat owners sometimes form groups that pool the catches of their respective fishing units so as to share the risks of income fluctuations. However, the problems of moral hazard limit the possibilities of following this type of practice to small groups of owners who are

united by very close ties (brothers, for example). In several countries, there also exist decentralized informal credit networks through which fishermen can effectively insure themselves against the risks of daily income fluctuations. Indeed, short-term credit with flexible dates of repayment enable the fishermen to achieve a relatively stable consumption stream, thereby preventing fluctuating incomes from translating into fluctuating consumption levels. Such a system may work well in as much as fishing incomes are largely independent of each other and a community structure exists to smooth things over when conflicts of interest develop.

Finally, fishermen's associations have a fundamental role to play in the organisation of the management of territorial waters. As this last point is well known, we will not probe into it. Our objective was rather to open new perspectives for collective action and to suggest ways by which small-scale fishermen communities could counter the threat arising from the penetration into their sector of a growing number of outside owner-investors.

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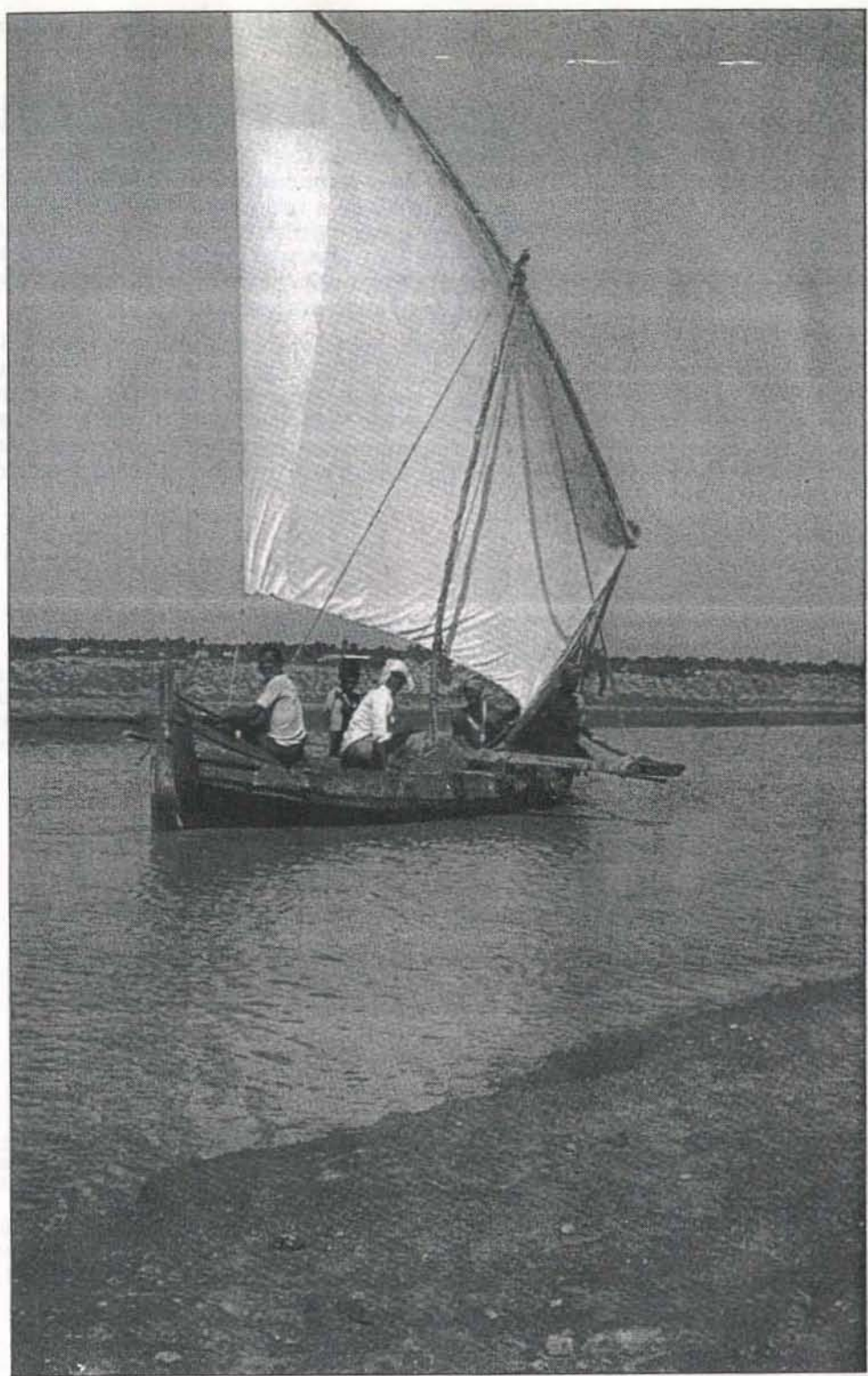
We wish to express our sincerest thanks to all those who, knowingly or otherwise, helped us to develop the ideas presented in this article. In particular, our gratitude goes to those who have taken part in our research on subjects connected to those treated here, namely Anita Abraham, Etienne Marot, Véronique Migeaux, Jeffrey Nugent and Aliou Sall.

(1) It should also be noted that he cannot insure himself by demanding the payment of a fixed rent for the hire of his pirogue. Fishermen refuse such a system because it requires them to absorb all risks. And even if they were to accept it, the risk of massive repairs following an accident at sea would continue to be borne by the owner-investor.

(2) His ignorance of the fishing environment might be such that his undertaking fails through an inappropriate choice of equipment or techniques to be used.

(3) Unemployed university graduates who can benefit from a special government programme enabling them to invest in fishing.

(4) Small-scale Fishing Programme on the Petite Côte.



THE INTERNATIONAL COLLECTIVE IN SUPPORT OF FISHWORKERS

The International Collective in Support of Fishworkers (ICSF) is an international network founded in India in 1986, with the objective of providing the fishworkers (men, women and children) with a platform to make their voice heard at the international level so that the numerous problems they face both at land and at sea may be taken into consideration by their governments and the international organisations.

In its search for cooperation and solidarity, the Collective joins hands with fishworkers' organisations and unions. Its characteristic feature lays in its close cooperation between scientists and social workers on the one hand and fishworkers, both from Southern as well as from Northern countries, on the other.

The goals of the Collective can be considered as providing the basis of three long-term programs:

Regional and international monitoring programs

This program will provide the basis for various development studies in close collaboration with scientists and workers of the fishing profession (trends of external assistance and investments in small-scale fisheries, comparative study of the impact of fishing legislations in Asia, study on the Lome agreements...)

Alternative development exchange programs

This program will undertake the essential task of exchanging experiences and culminated knowledge. This will include the sharing of findings on new and appropriate technologies, learning from new organisational structures and interaction between the scientific community and workers, with the objective of demarginalising artisanal fisheries. The interaction is twofold on the one hand the exchange between fishworkers and scientists and on the other hand the communication between various countries (various workshops in Dakar in 1987 and Atakpame in 1988, exchanges between fishworkers from Chile and Europe in 1988, international symposium in Lisbon in 1989, conference of Bangkok in 1990...).

Communication programs

The Collective has devised various means of communication: SAMUDRA Report, SAMUDRA Dossier, SAMUDRA Monograph (*); a collection of video tapes, etc...

The international secretariate-cum-liaison office is presently located in Brussels.

Four 'antennas' operate regionally: Bangkok (Thailand), Trivandrum (India), Dakar (Senegal) and Valparaiso (Chile).

Founded in the Third World the Collective endeavours, although with limited means, to view the problems faced by the small-scale fisheries sector in a global context. The present trends in fisheries trade, for example, instead of supplying the much needed proteins for the starving masses in Southern countries, divert more and more fish towards the rich countries of the North to feed their people, cattle and domestic animals.

* The word "samudra" signifies "ocean" in many Asian languages and thus invoke the vastness of the problems that face the fishworkers.



GLOBAL FISHERIES TRENDS AND THE FUTURE OF FISHWORKERS

The redeployment of industrial fishing, the conquest of new fishing zones in Third World countries, the industrial development of aquaculture, the emergence of outside investors in the small-scale fishing sector, new directions in the marketing of fish ... these are some of the trends which characterise the changes seen in the global fishing sector over the past ten years.

These upheavals are not without their repercussions on the living conditions of fishworkers and their families. They entail a depletion of resources, the deterioration of the environment, the marginalisation and proletarianisation of fishermen, the flight of fish products towards wealthy countries, and so on.

In the face of this structural change, an analysis is essential. For this reason, the International Collective in Support of Fishworkers (ICSF) has organised a Conference to be held in Bangkok (Thailand), January 22-27, 1990, which will assemble scientists, fishworkers, social activists and decision makers to examine the subject of "Global Fisheries Trends and the Future of Fishworkers".

This issue features some contributions from scientists and fishworkers made in preparation for the Conference. At a later date, SAMUDRA Publications will issue the reports and recommendations that result from this meeting.