

The European fish price stabilization system

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Abstract

The European Community plays an especially important role with the management of fishery resources.

In the Common Market System, the sales standardization system and the pricing system for marine products are established with a view to stabilizing fishermen's incomes and the steady supply to consumers.

The pricing policy was the main objective of the Common Market System until 1982, when the fishery resources management policy was implemented. Since 1983, price standardization has gained more importance as a means of resource management.

Le système européen de stabilisation des prix du poisson

Résumé

L'organisation de la CEE joue un rôle spécialement important dans la gestion des ressources halieutiques. La normalisation des ventes et le mécanisme des prix pour les produits de la mer doivent viser à stabiliser les revenus des pêcheurs et assurer un approvisionnement régulier aux consommateurs.

La politique des prix a été le principal objectif de la CEE jusqu'en 1982, date à laquelle une politique de gestion des ressources halieutiques a été mise en œuvre. Depuis 1983, la stabilisation des prix a gagné de l'importance en tant que moyen de gestion des ressources.

Introduction

First of all, I would like to specify that I will not deal with frozen fish. Its price system is radically different from the fresh fish system and is based on international trade.

Since 1968, the European Community has intervened more and more in different industries in order to prepare a full-scale European Economic System in 1992. Among various common policies, the common market policy for agricultural products is well known. Knowledge of fishery policy is not so developed ; nevertheless blue Europe is as much a reality as the green one.

Since 1970, when the market system and the pricing system were established for the first time in the European fishery industry, member states have progressively given the Commission control of their own fisheries. The Commission's power was enhanced with the creation of the Exclusive Economic Zone which entered into effect in 1977. As a result, the EEC adapted full scale common policy on resource management within the economic zone.

As a balance must be found between the European fishing fleet and the catch possibilities, with priority given to the fishing-industry for human consumption, the EEC has created the pluriannual orientation plan for the administration of ships in an attempt to regu-

late the fish market. That is why today the EEC assumes responsibility for the control of the resources, the structural policy and the marketing policy.

Fishermen are not directly involved in resource management and ships plans, and are merely present in an advisory capacity. However, they play a great part in fish marketing policy. With a view to encouraging them to take charge of it themselves, the EEC has created the producers organization.

The producers organizations

According to the market organization, the producers organization means any recognized organization or association of such organizations, established on the producers own initiative for the purpose of taking such measures as will ensure that fishing is carried out along rational lines and that conditions for the sale of their products are improved. These measures are chiefly aimed at promoting the implementation of catch plans, the concentration of supply and the regularization of prices (rule n° 3796/81, p. 5).

Today, there are 148 producers organizations in Europe which are divided into local and inshore fishing (53 of them), offshore fishing (36), high sea and deep sea fishing (34), specialized fishing (22) like tuna fishing and an association of such organizations (4).

Just a word about this last type of PO. They do not play a normal role like other POs in the ports, they are federations in charge of national policy representation. Nevertheless, they are regarded as POs by the Commission and can fix marketing rules. For this reason, the rules are the same for all the fishermen in the country to which the federation belongs.

The recognition of an association of fishermen may be granted by their own administration. Depending on various conditions, the PO may be recognized for inshore, offshore or high sea fishing. If its members make trips of less than 2 days and the minimum annual catch (landed weight) is more than 1,000 tons, it may be recognized as an inshore fishing PO. If the average time out is 2 to 9 days and the minimum annual catch more than 2,500 tons, it is an offshore fishing PO. It is a high sea fishing PO if the average time out is 10 to 23 days and the annual catch higher than 15,000 tons. The deep sea POs are only interested in frozen fish.

Spain is the country where the POs (37) are the most numerous (Table I). The Spanish fishermen have quickly understood how to turn the EEC market regulation to account. The POs output represents 91 % of the national output (Table II). This percentage may be considered as a record. Only our smaller neighbour, Belgium achieves a better percentage with 100 %, but its 186 fishermen are assembled in a single PO.

The second country is France where there are 32 POs. One may find them in most harbours from the North, along the English Channel, the Atlantic Ocean, and to the South along the Mediterranean Sea (Fig. 1). Their output represents 62.9 % of the national output. That is an average figure but Brittany and Vendée, for instance, are better organized than the south coast. Every major harbour has a PO head office, e.g. Lorient, Les Sables d'Olonne or Le Guilvinec.

Not all POs are the same size. Some of them are very strong like PROMA and OPOB and group together more than 500 ships. They intervene on many ports (from Concarneau to Saint-Nazaire for PROMA, from Concarneau to Roscoff for OPOB). They play a leading role in each port and are very involved in market regulations owing to their marketing co-operatives and processing plants. On the contrary, some of them number no more than 10 members

member states	local inshore fishing	offshore fishing	high sea & deep sea f.	specialized or other fish.	asso- ciations	total
Germany	-	9	2	8	2	21
Belgium	-	1	-	-	-	1
Denmark	2	-	1	-	-	3
France	9	9	8	4	2	32
Ireland	2	-	-	1	-	3
Italy	16	1	1	1	-	19
Netherlands	-	-	3	-	-	3
United Kingdom	7	5	2	-	-	14
Greece	3	-	-	-	-	3
Spain	6	8	16	7	-	37
Portugal	8	3	1	-	-	12
EEC (total)	53	36	34	22	4	148

source: EEC.

Table I - The producer organizations in Europe (1989).
- *Les organisations de producteurs en Europe (1989).*

member state	membership*	national output** (tonnes)	PO output as % of national.
Germany	694	152 847	61.9
Belgium	186	37 200	100.0
Denmark	2247	316 972	64.0
France	2960	771 000	62.9
Ireland	506	254 109	64.0
Italy	1663	388 147	15.0
Netherlands	521	430 000	20.6
United Kingdom	2036	838 712	77.0
Greece	99	151 600	1.6
Spain	27028	991 716	91.0
Portugal	641	314 931	44.0

* 1989

** 1988

source: EEC

Table II - Share of producer organizations.
- *Contribution des organisations de producteurs.*

in the same port. Their interventions are strictly limited respecting the EEC regulations and they have no wish to interfere too much on the market.

The third country is Germany with 21 POs. This is also a record because there POs comprise only 694 members. If we except the PO federation, the average membership is only about 36 which is very low. Meanwhile, the PO output represents 61.9 % of the national output and that is far from negligible.

Portugal may be compared to Germany for membership is also very low (641 members in 12 POs); nevertheless, the PO output represents 44 % of the national output. The United Kingdom is more comparable to France in spite of a lower number of POs (14). The average membership is about the same size (more than 2 000 members) and the PO output is very high (77 %).

Most countries where POs represent a large part of the fishing industry may be considered as very well organised. This is not the case though for three of them : Greece, Italy and

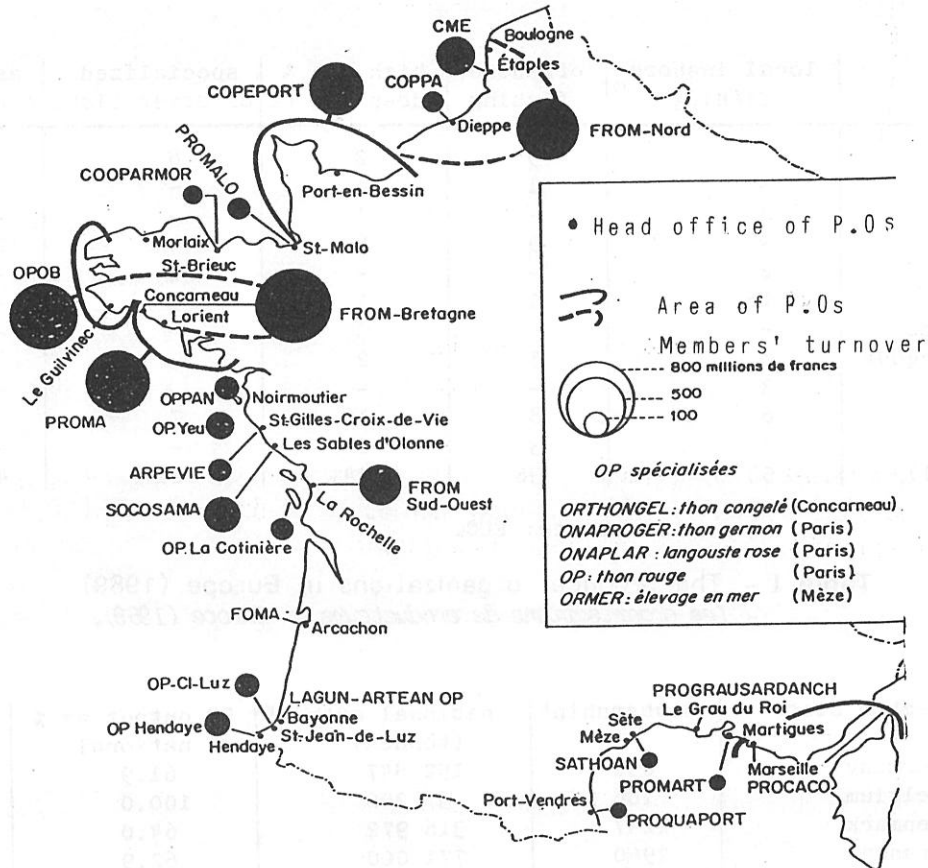


Fig. 1 - The producer organizations in France (1989).

- Les organisations de producteurs en France (1989)

Source : Atlas des Pêches, 1990, France.

the Netherlands. Their POs represent less than 21 % of their national output, and for Greece this percentage falls under 2 %. The Greek fishing industry is not developed, so we can understand this deficiency. This is not the case for the other ones. The PO does not seem to interest.

There is also a European federation of POs : the European Association of Producers Organizations (EAPO) which provides the opportunity for POs to propose to the EEC the projects which could improve our market policy. This association, considering the increasing importance played by the EEC in fishery, is bound to become more and more powerful and will soon be the best go-between to reach the civil servants in Brussels.

If the EAPO is the direct line to Brussels for the PO's policy amendments, it needs another way, an administrative one, for the withdrawals to provide financial compensation. In France, this part is played by the FIOM (Funds for the Intervention and Organization of Markets). In the beginning, it was directly interested in the market. It gave POs help for the French regional species. But since there is a new regional system and the direct help has been forbidden by the regulations of the Community, it can no longer play a direct part in the POs. It is still an intermediary for the FEOPA and has a financial part only as far as promotion and development projects are concerned, which is not negligible.

The fact that a great number of producers cooperate on the planning of their fishing and marketing activity helps to stabilize the market. As in the agricultural sector, the sharing of the market organization provides a special system for regulating the market, namely the system of withdrawal prices. This enables producers organizations to fix prices below which they do not sell the products supplied by their members, but withdraw them from the market.

The price stabilization system

The withdrawal price system is the key to the common market regulation. At the beginning of every fishing year, the EEC determines guide prices. They are proposed by the EEC Committee on the management of fishery products. Then the Council of Ministers, acting by qualified majority on this proposal, determines the level of the guide prices which is valid for the whole Community. The guide price is based on :

- the average of the prices recorded for a significant proportion of the Community output and a product with given commercial characteristics on representative wholesale markets or in representative ports during the three fishing years immediately preceding the year for which the price is fixed ;
- an assessment of production and demand prospects.

To fix the prices, other needs are also taken into account :

- to stabilize market prices and avoid the formation of surpluses in the Community ;
- to help support producers' incomes ;
- to consider consumers' interests.

A producer organization must prohibit producers from marketing at lower prices than withdrawal prices at markets or fishery harbours. If the marketing price is lower than the withdrawal price, such an organization may purchase the production and destroy it. That is the simplest way to adapt the offer to the demand.

Recourse to the system is left to the discretion of the POs which are also free to support the species or not.

There are three different systems of withdrawal prices : the EEC price called the Community Withdrawal Price (CWP), the Regional Withdrawal Price (RWP) and the Autonomous Withdrawal Price (AWP).

The Community Withdrawal Price

A list of species with a strong internal EEC trade may be concerned by this system (see Table III). This system takes into account cod, saithe, red bream, haddock, whiting, sardine, seabream, monkfish, shrimp, anchovy, herring, mackerel, hake, plaice, ling, megrim, spotted dogfish and spur dogfish. All of them represent a large part of EEC fishermen's turnover.

When an auction does not reach the withdrawal price, the fish must be destroyed and the PO must play a financial compensation to their members. Member states grant this compensation (paid by the FEOGA, the European Funds for the Organization of Agricultural and Fishery Markets) to the PO. The FEOGA intervenes on condition that a degressive and restrictive system is established for the payment (Fig. 2).

In case of CWP, the financial support is provided as follows :

EEC SPECIES		REGIONAL SPECIES	
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1	-cod	1	-dab
2	-saithe	2	-lemon
3	-red bream	3	-albacore
4	-hadock	4	-bluefin tuna
5	-whiting	5	-big eye tuna
6	-sardine	6	-whiting pout
7	-seabream	7	-bogue
8	-monkfish	8	-conger
9	-shrimp	9	-gurnard
10	-anchovy	10	-pollack
11	-herring	11	-blue whiting
12	-mackerel	12	-grey mullet
13	-hake	13	-horse mackerel
14	-plaice	14	-skate
15	-ling	15	-picarel
16	-megrim		
17	-spotted dogfish		
18	-spur dogfish		

Table III - List of species
- Liste des espèces.

- 85 % of the withdrawal price for quantities withdrawn from the market by the PO which do not exceed 5 % of the annual quantities of the product concerned ;
- 70 % if the quantities do not exceed 10 % ;
- 55 % if the quantities do not exceed 15 % ;
- 40 % if the quantities do not exceed 20 % ;
- 0 % if the quantities exceed 20 %.

This restrictive system (no more than 20 % withdrawals) is made to encourage POs to adjust supplies more closely to market requirements.

Member states are not in charge of all the financial compensation. To make producers more aware of the intervention policy, a system of financial joint responsibility has been established. POs have to participate in it, therefore they must create an intervention funds consisting of contributions assessed on the quantities offered for sale by their members. In the case of the CWP, the share paid by the intervention funds is at least 2.5 % of the contribution by the member state.

To take into account the seasonal fluctuations in market prices, a margin of tolerance extending 10 % below and 10 % above the withdrawal price is allowed (Fig. 2). This price is the real minimum price used in the auction hall. Consequently, the basis for the auction is the withdrawal price with a margin, and the basis for the financial compensation is the withdrawal price without a margin.

It is for the PO to choose whether to intervene or not. If it does not do so, the fish is paid at the market price without restriction. If it does, in case of withdrawal, it may pay a full compensation (not more than 85 % by the EEC plus 2.5 % by the POs funds). But it may also choose not to pay. In that case, the system functions and the fish are withdrawn, but the PO is not granted any compensation by the EEC. This option is taken only in case of crisis when,

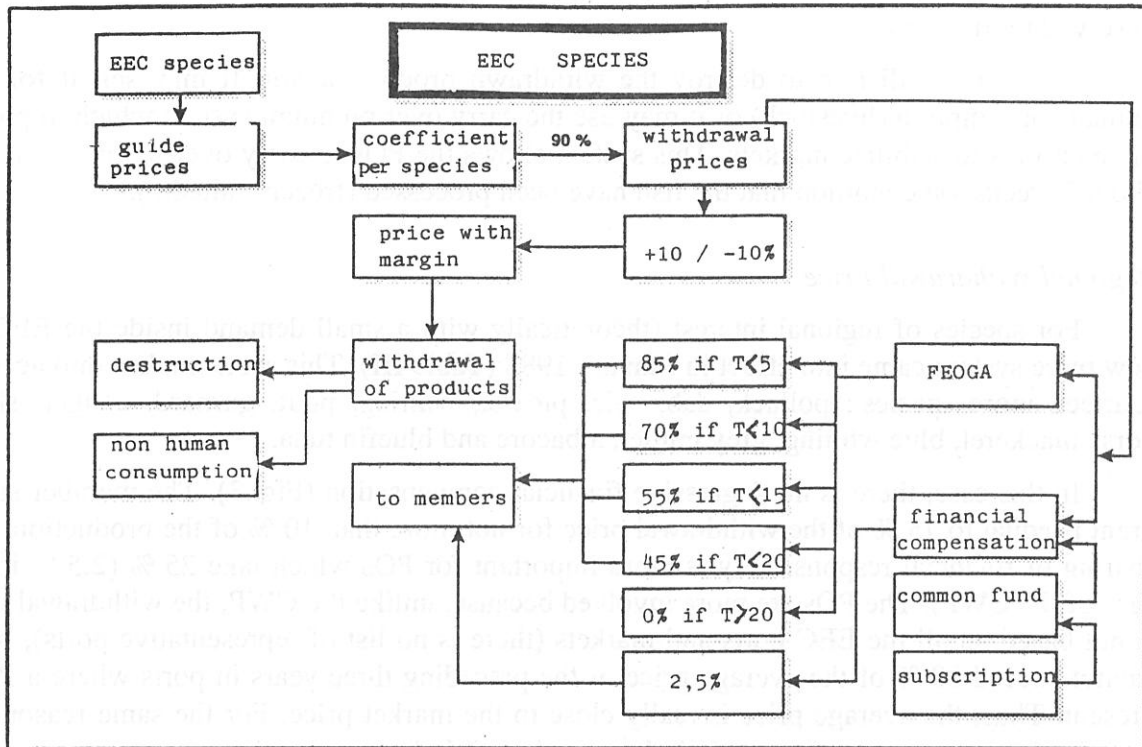


Fig. 2

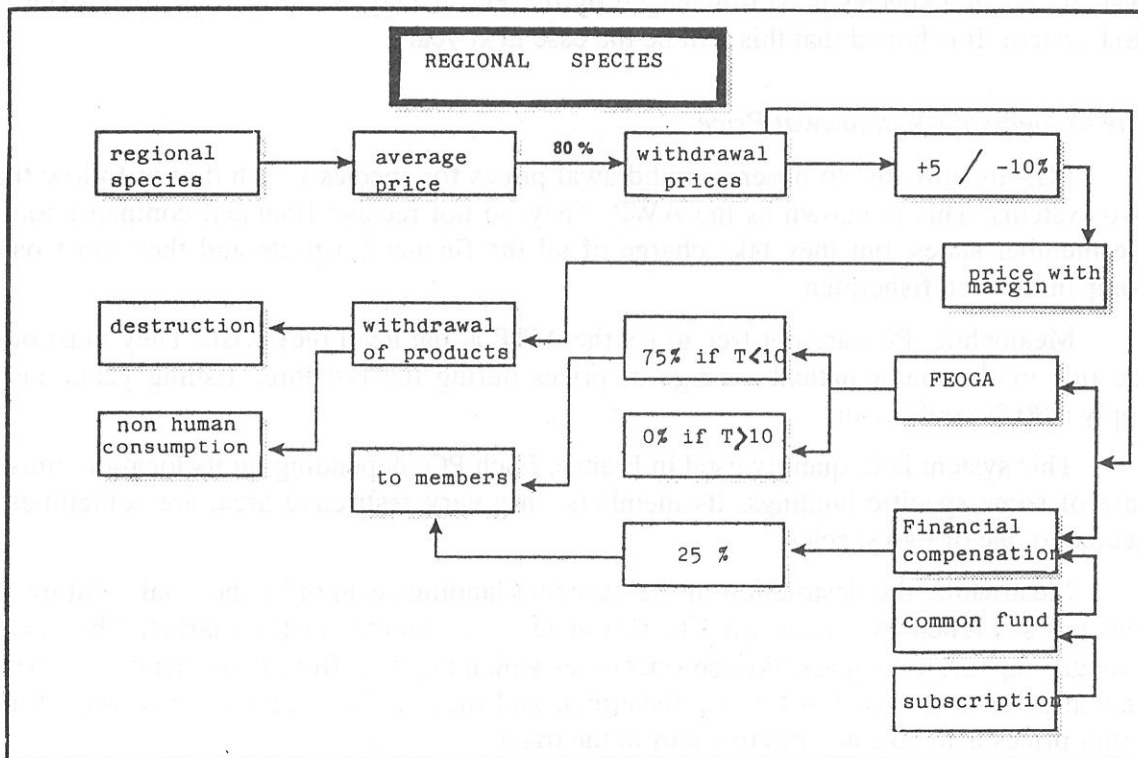


Fig. 3

for instance, the output of one particular species is too high and no landing plan can be observed by fishermen.

The PO is still free to destroy the withdrawn product or not. It may sell it for non human consumption (livestock) or it may use the carry over premium system which improves the measures to stabilize markets. This system allows the POs to carry over the product after about 3 weeks, on condition that the fish have been processed (frozen, salted...).

Regional Withdrawal Price

For species of regional interest (theoretically with a small demand inside the EEC), a new price system came into effect in January 1988 (Table III). This system takes into account fourteen more species : pollack, dab, sole, picarel, whiting, pout, gurnard, conger, skate, horse mackerel, blue whiting, grey mullet, albacore and bluefin tuna.

In this case, there is no degressive financial compensation (Fig. 3). The member state's grant is equal to 75 % of the withdrawal price for not more than 10 % of the production. The sharing of financial responsibility is more important for POs which take 25 % (2.5 % in the case of the CWP). The POs are more involved because, unlike the CWP, the withdrawal price is not based on all the EEC ports and markets (there is no list of representative ports), but it cannot exceed 80 % of the average price of the preceding three years in ports where a PO is present. Thus, the average price is really close to the market price. For the same reason, the margin of tolerance extends only 5 % above and 10 % below.

Except for the degressive system and the assessment of withdrawal prices, this system works like the first one. According to EEC civil servants, it should be used as a temporary system. When a species is well managed by the PO, it may be allowed to participate in the first system. It is hoped that this will be the case next year.

The Autonomous Withdrawal Price

POs are still free to observe withdrawal prices for species which do not follow the last two systems. This is known as the AWP. They do not receive financial compensation from the member states, but they take charge of all the financial aspects and they must pay full compensation to fishermen.

Meanwhile, POs are not free to fix the AWP at the level they wish. They must observe the rule of the mathematical average of prices during the last three fishing years and then apply a 80 % coefficient.

This system is frequently used in France. Each PO, depending on its location, must take care of some specific landings. Its members, in a very restrictive area, are sometimes very geared to one or two species.

Meanwhile, the destruction of the excedent landings cannot be the final solution. For a few years, French POs have tried to intervene more directly in the market. They are now strongly supported by marketing co-operatives which buy fish from their members. The withdrawal price is judged too low by fishermen and they realise that the only way to obtain better prices is to take an effective part in the trade.

Market organization as a means of resource management

The rule of the PO is strictly limited by regulations to the market and prices, but for some years the fishing conditions have been changing. The quota system and the drastic pluri-annual orientation plan restrict the potential landing. The impact of the landing restriction on the PO market policy is really crucial.

The EEC relieves the producers organizations of the management of quotas. This is an important problem to contend with. If quotas are sufficient, there is assuredly no problem, but if we have to deal with a shortage, we will have to take heed that it does not result in strikes, for everyone would then suffer from the situation. There is no denying that a conflict, whatever its nature, cannot be solved in a durable way by force. Some day, agreements will have to be found.

Resource management would be a lot more effective if the problem were approached from the point of view of marketing rules. Because there are less fish to catch, we have to increase prices in the auction hall. This is the only way for fishermen to improve their turnover. This target may be reached by catch plans for species in danger of exceeding their quota. It could be, for instance, a maximum landing per boat depending on the boat's size, the number of men in the crew and the number of days at sea. With the help of a catch plan and because the campaign runs from January to December, fishermen could guarantee continuous supplies of high quality products on the market.

As a matter of fact, in some countries such as France, POs are responsible for the observance of implementing rules by their members, but only for them. The extension of the PO's rules to non members exists in the regulation. To strengthen the hand of the PO and thus help to stabilize the market, member states may on certain conditions extend this control to cover all non-members' marketing produce. Therefore, the regulation may be made compulsory. Nevertheless the application is too hard to set up and that is why no member state has ever used it. In addition, it could only work on a price system (community withdrawal prices) and never for a catch plan.

The success of a catch plan depends on its observance by every fisherman. Whatever his status, a member or non member of a PO, he would have to follow the same rule. The same discipline for everybody is the key to success and the only way, according to PO executives, to manage the fishery in the future, considering all its aspects and the fish production chain : resources, fleet and market.

That is why French POs ask for more responsibility in quota management and clamour for the amendment of a regulation which does not seem adapted. Producers favour the rational exploitation of fishing resources, but current rules do not govern the fisherman's profession realistically.

A branch and chain of market analysis applied to the fishing sector

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Key words : economic features, fishing sector, chain of market.

Mots-clés : données économiques, secteur pêche, filière.

Abstract

An analysis of the economic features of the fishing segment can be made by using data provided by the French public accounts.

When using the input-output table, one can obtain data which are consistent with those of the other segments of the national economy and analyse the impact of possible modifications in the value of certain fishing aggregates on the level of the aggregates of the whole national economy, or conversely the modification in the value of the aggregates of the other segments on those of the fishing one.

The input-output table is a set of matrixes which describes the inter-industrial relationships in the national economy, the structure of the final demand and that of the final jobs.

Data contained in the input-output table (IOT) allow the features of the fishing sector to be better appreciated, yet they are not sufficient for a precise analysis to be made of the economic effects entailed by fishing and fish-farming activities. An additional approach in terms of branch analysis is required to reach this objective.

Analyse en termes de branche et de filière appliquée au secteur des pêches

Résumé

L'analyse des caractéristiques économiques de la branche pêche peut être effectuée grâce à l'utilisation des données de la comptabilité nationale française.

L'utilisation du tableau entrées-sorties permet d'obtenir des données cohérentes avec celles des autres branches de l'économie nationale et d'analyser l'impact d'éventuelles modifications de la valeur de certains agrégats pêches sur le niveau des agrégats de l'ensemble de l'économie nationale, ou, à l'inverse, les modifications de la valeur des agrégats des autres branches sur ceux de la pêche.

Le tableau entrées-sorties (T.E.S.) est un ensemble de matrices qui décrivent les relations inter-industrielles de l'économie nationale, la structure de la demande finale et celle des emplois finale.

Les données contenues dans le T.E.S. permettent une bonne appréciation des caractéristiques de la branche pêche, mais ne sont pas suffisantes pour analyser de façon précise les effets économiques induits par les activités de pêche et d'aquaculture. Une approche complémentaire en termes d'analyse de filière est nécessaire pour atteindre cet objectif.

The features of the French fishing sector from the input-output table

The principles of the IOT

The input-output table (IOT) is a double entry table. It presents the balance between resources for each segment of the economy, as well as the number of usages in the agricultural,

industrial and service sectors. Products are defined from an official nomenclature which is set up according to production processes. By definition, each segment of the national economy produces a category of products. Therefore, there is a close segment-product connection. This table thus permits a simple approach to the inter-relationships which exist between the fishing segment and the other segments of the national economy to be made.

Fishing products allow a fishing segment to be defined, the activity of which is perfectly delimited. Similarly, this table enables one to study where these products are used within the national economy (line reading) and how a segment utilizes the products of another segment so as to market its own production (column reading), as well as the financial compensation which will make up its own resources. Assuming that every item produced by the national economy is used, then by definition the entirety of the economy's resources equals the total number of usages produced by this economy. The same applies to each individual segment. Therefore resources of the fishing segment are equivalent to usages in the field of fishing products.

The balance of the fishing segment

In order to use statistical data related to the French fishing segment more easily, one must use the IOT editions which correspond to the usual classification of activities and services into 100 segments. The fishing segment corresponds to the 03 prefix and it comprises :

- products of sea fishing
- shellfish farming products
- products of fish-farming and fresh-water fishing
- various sea products, and especially wrack and kelp.

Data dating from 1987 show that the segment reaches a point of balance at a level of FF 25,579 million.

In 1987, usages in the field of fishing products were distributed as follows :

- intermediate consumptions, which amounted to FF 4,974 million. They derive from the following segments, which are listed in a decreasing order of significance : canned food (FF 2,150 million), hotels-bars-restaurants (FF 1,489 million), non trade services (FF 688 million), organic chemistry (FF 160 million),
- final household consumption reached FF 17,830 million,
- exports represented FF 2,775 million.

One outstanding feature is that 70 % of the fishing products are consumed by households, and this explains why the issues of the valorization and marketing of products are very important, inasmuch as when food intermediate consumptions are added (agrofood industries excepted), more than 85% of the fishing products are consumed directly and are not processed by the agrofood industries.

Resources from fishing products are shared as follows :

- Intermediate consumptions in the branch amount to FF 3,339 million. Major intermediate consumptions are distributed as follows (in a decreasing order of significance) : oil products (FF 1,428 million), woodwork (FF 408 million), fishing nets (FF 322 million), hotel services (FF 257 million), metal-work (FF 195 million), plastic materials (FF 163 million).
- The added value amounts to FF 5,150 million.
- Transfers represent +92 millions French Francs (in fact, this corresponds to the re-insertion of the production of the research services, carried out by government institutions for

example).

- Imports amount to FF 5,060 million.
- Customs fees amount to FF 86 million.
- VAT on products amounts to FF 142 million.
- Total commercial margins amount to FF 11,710 million (among which : commercial margins on household consumptions : FF 7,438 million, commercial margins on intermediate consumptions : FF 749 million, commercial margins on exported products : FF 489 million).

Some points are worth noticing : half of the resources (i.e. : 46 %) derive from commercial margins; marine product imports are quite significant (20 %), and finally the added value (out of VAT, margins and imports) of the halieutic activity is quite important, compared with the value of the production : it represents almost 61 % of the value of the disembarked production. Finally, intermediate consumptions in the segment account only for 13 % of the resources.

A priori, it seems that when a comparison is made between all these figures and the figures of the entire national economy, or with those of other segments, the fishing sector only plays a minor role in the French economy. The resources of the fishing sector only represent 0.3 % of the whole national resources, and the same applies to all the other major features which never represent more than 0.6 % of the national figures, in particular the produced added value only represents 0.1 % of the I.O.P.

Although it is true that the fishing sector represents only a small part of the national economy, it does not mean that this segment has no economic significance. As a matter of fact, when the analysis is refined, some figures are far from being insignificant both from an economic and a political point of view.

The deficit of the fishing balance of trade is quite important : it is the most deficitary item for animal foodstuffs. This deficit is very difficult to overcome as it mainly concerns species which can be caught in the Community waters, and the volume of capture is limited. On the other hand, these imports are connected to food habits which are not likely to be modified, or to the supplies of our fish-food industries.

The final consumption tends to develop, and households purchase of marine products increase regularly. Yet this progression varies a lot depending on the species, and it is greater regarding processed fish.

The added value as compared with intermediate consumptions is quite high and represents almost 61% of the value of the production. In comparison, the national average is of 53 %, 43 % for electric industries, 47 % for agriculture. Furthermore, half of this added value is devoted to staff expenses plus the social security charges item.

Evolution over a 10-year period : 1977 - 1987 (see appended graphs)

The major aggregates which characterize the segments evolved in a very significant way over the period considered. In fact, they almost all evolved more rapidly in value, than inflation did.

Consumption of intermediate goods increased very rapidly, given the relative stagnation of inputs, and this is mainly due to a price effect. Yet, the respective shares of each client did not evolve in a significant way.

Households consumption increased threefold over the considered period. This increase occurred very regularly owing to the double effect of an increase in demand and of an increase in prices. Over the same period, the consumption price index only increased by 1.3 %.

Intermediate consumptions in the segment almost doubled between 1977 and 1985 and then decreased very rapidly to stabilize to the 1983 level. Structural changes are mainly due to the evolution of fuel and ship maintenance prices.

These features permit the major trends observed for a longer period of time to be confirmed, and more especially the fast evolution in the balance level of the sector, which rocketed up to FF 25.6 billions from FF 8.7 billions over a 10-year period (i.e. a 2.8 multiplication coefficient). This is due to the double effect of the price evolution and the volume of imports.

Analysis of the chain of market

The IOT does not permit the entire branch to be correctly analysed, from production to the final consumption, as in fact these statistical data are not sufficient to allow this type of analysis to be made. For example, it is not possible to make an individual analysis of fish-based cooked dishes when fish is not the major activity of the companies concerned. The same applies to transports or to the shipbuilding industry.

The chain of market notion

A chain of market (in French : *filière*) is defined as the set of steps in the production and valorization process of a product or of a set of products. Its analysis aims at pinpointing the strategy of this set by an analysis of the external constraints of the development of each step in the entire process, thanks to an analysis of the internal and external behaviour of the agents concerned.

Thus, we should go farther than the mere picture of a set of activities which is only a first step in the study. However, this step is quite complex because it requires refined statistical data which can often be obtained by on-site surveys only. Nevertheless, this step is not sufficient and the analysis of constraints can be carried out by means of a structural-type analysis which takes the features of the market, the technological requirements and the market requirements into account. This can only be achieved by a technico-economic approach. Similarly, the behaviour analysis must be carried out through an understanding of the product valorization and capital accumulation process. Tools deriving from the industrial economy should be used to obtain reliable results.

Concerning marine products in France, some studies have been carried out on certain specific products (seaweeds, sharks, cephalopods, etc.).

Analysis of the economic effects inferred by a fishing activity

The method used for the analysis of chains of market and the French public accountancy procedures can be used so as to assess the economic effects inferred by fishing or fish-farming activities. The method is based on the reconstitution of the branch balance, from a sample of the operating accounts of a ship and on the determination of the commercial margins and added

values of the various agents in the chain of market. The first stage consists of a description of the chain of market from prior knowledge of the sector and from on-site surveys, so as to take a census of the actors and of the financial and real flows which put them in relation. From this basis, a study sample can be determined and the required economic data can be collected. The most tricky part of the work consists in sampling the fleet. The processing of the operating accounts and of the collected data then restore production accounts at different levels : harbour stations, departments, regions, or on a ship category basis. Once this first step has been made, a precise table of all the economic flows generated by the fleet is obtained.

Inferred relations can then be studied from this structural approach and on the principles of the chain of market analysis. When it proves impossible to obtain accurate results from the direct survey, assessments can be made from national data provided by INSEE⁽¹⁾.

The data obtained allow two structural models of the regional fishing sector to be suggested :

- One of them is in terms of the balance of the regional fishing activity as compared with the national balance (for example, the Basse Normandie region, with a balance established at FF 900 million in 1985).

- The other one is in terms of the inferred economic effects regarding : upstream flows, downstream flows, and the institutional framework.

In each case it was possible to establish specific multiplication factors for jobs and income, and to determine the benefits of the fishing activities for the region.

The recreational value of leisure fishing

On the same principle, a strict and rigorous method permits an assessment of the recreational value of leisure fishing to be obtained. The aim is to carry out survey assessments of the expenditure and activities of a certain category of fishermen. The example we present here is that of people fishing migrating species in the rivers of Basse Normandie in 1990.

The computation of inferred economic effects has been carried out by splitting up fishing offer and demand expenditure according to the classification of the IOT and by applying the obtained multiplication factors on a segment per segment basis (multiplication factors must be adjusted so that they take the specific features of the regional economy into account).

Total expenditure by people fishing migrating salmons who fished in the area in 1990 have been assessed. They amounted to FF 17.5 million for the entire fishing season. The first item corresponds to transports (44 %), the second corresponds to accommodation (22 %), the remaining 34 % are evenly shared between the purchasing of fishing rights (licences, etc.) and the amortization of the equipment. Part of these expenses are incurred by people living outside the region. Finally, about FF 14.2 million remain in the region, with FF 6.3 million paid by people who do not live in the region.

These assessments give a rough estimate of expenditure in the field of leisure fishing (restocking rivers, etc.), which amounted to FF 4.4 million in 1990. Thus the net profit in terms of turnover exceeded by far the costs incurred by river valorization schemes for migrating salmon.

(1) INSEE : Institut national de statistiques et d'études économiques (National Institute of Statistics and Economic Studies).

A further economic computation can be made and these assessments can integrate the inferred effects of this expenditure so as to measure the impact on the regional added value. According to our study, it amounted to at least FF 10 million in 1990. Yet this figure is certainly underestimated, first because only part of the inferred effects is taken into account, second because computations only integrate the accommodation expenses of the fisher people themselves, although they are often accompanied by their families during the summer, and third, valorization favours tourism and this aspect has not been taken into account.

Leisure fishing of migrating species thus creates a total economic flow in the region which almost amounted to FF 28 million, when direct and indirect expenditure are added together. Expenditure by fishermen gives an indication of their willingness to invest in order to practise this activity. Last but not least, when the value of the offer is matched with that of demand, it is possible to see that this activity is worth developing.

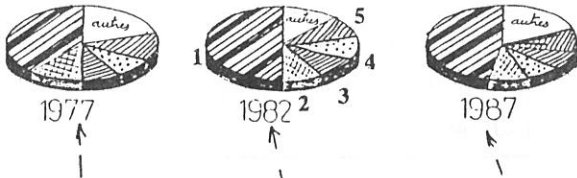
Conclusion

This presentation enabled us to approach the features of the French fishing activities on the one hand, and on the other hand to go beyond the problems related to catches by using through the methodologies presented.

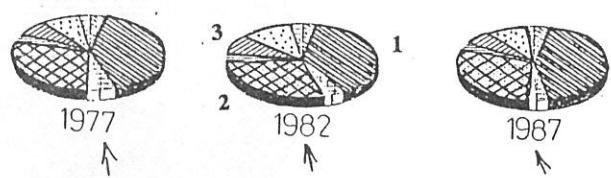
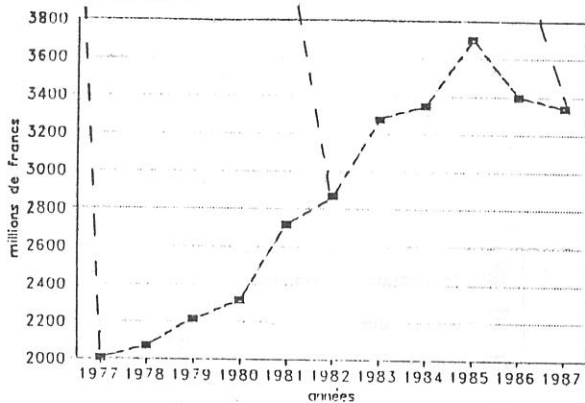
The balanced development of halieutic activities can only be achieved by maintaining a triple balance : a production balance (definition of a resource exploitation rate), a valorization balance (appropriate job and income multiplication factors), a patrimony balance (preservation of patrimonial values). The illustrations we present are in agreement with this research, although the last example is very marginal and partial regarding the definition of a broadened approach to the value of halieutic activities.

- 1=oil products
2=woodwork
3=ship building (less investments)
4=fishing nets
5=hotel -restaurant services

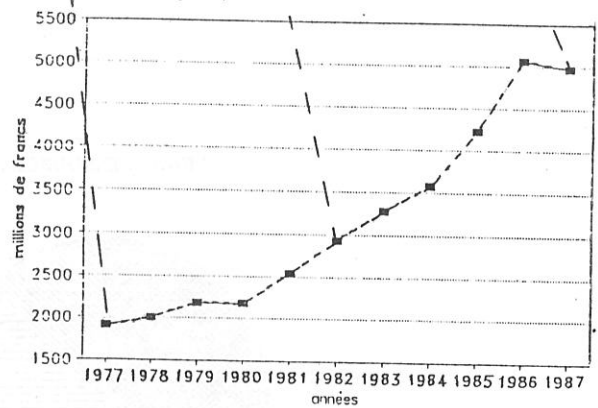
- 1=canned food
2=hotel-restaurant
3=non-merchant services



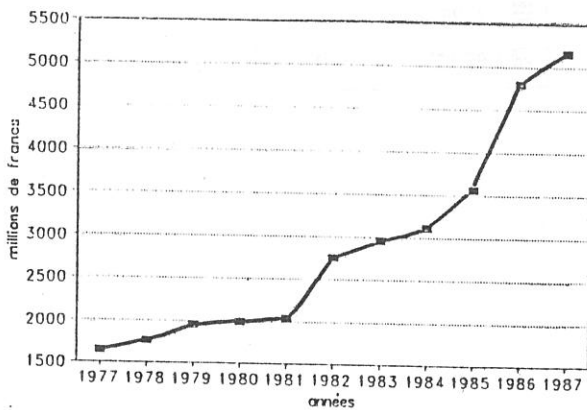
EVOLUTION OF THE INTERMEDIATE CONSUMPTIONS OF THE SEGMENT.
(current prices)



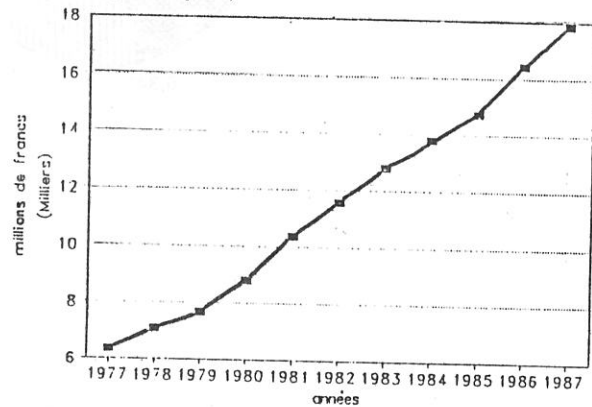
EVOLUTION OF THE INTERMEDIATE CONSUMPTIONS OF PRODUCTS
(current prices)



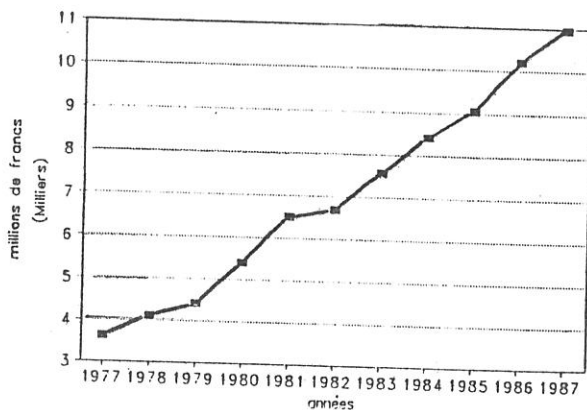
EVOLUTION OF THE ADDED VALUE.
(current prices)



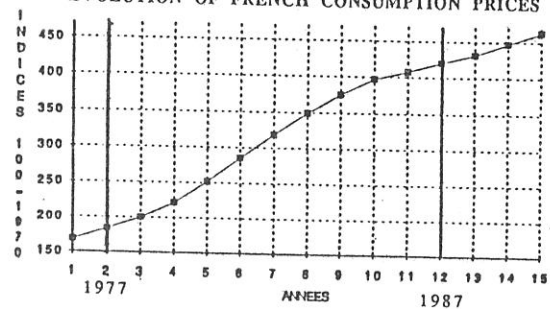
EVOLUTION OF FINAL HOUSEHOLD CONSUMPTION
(current prices)



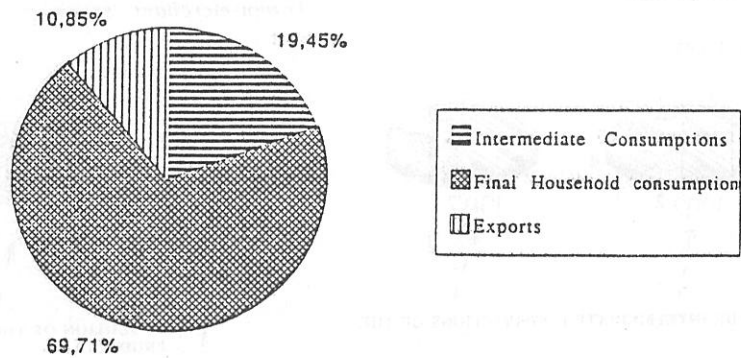
EVOLUTION OF COMMERCIAL MARGINS.
(current prices)



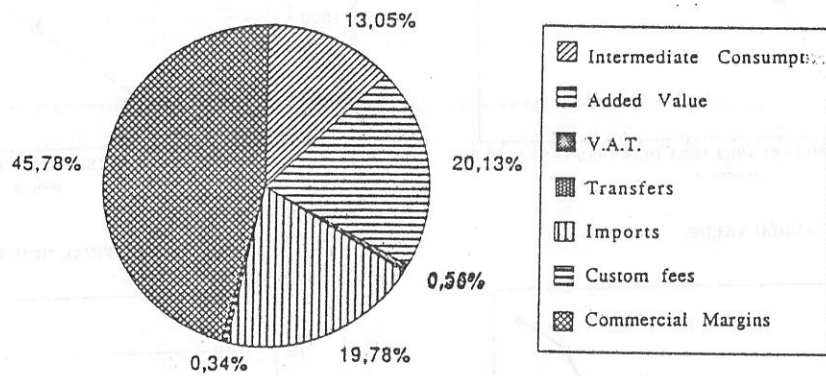
EVOLUTION OF FRENCH CONSUMPTION PRICES



FINAL USAGES 1987



FINAL RESSOURCES 1987



Cooperative fisheries management in Japan : the example of abalone and topshell fisheries in southern Izu Peninsula

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Key words : "Netsuke", Izu Peninsula, fishery cooperative.

Mots-clés : "Netsuke", péninsule d'Izu, coopérative de pêche.

Abstract

The southern area of Izu Peninsula is one of rich production of "Netsuke" resources such as sedentary species : shellfish, lobsters, as well as seaweeds containing agar-agar, Arame (*Eisenia bicyclis*) and Kajime (*Ecklonia cava*). These "Netsuke" resources are protected by strict fishery regulations and managed by cooperatives.

The aim of this study is to analyse conservation, management, joint collecting and distribution systems in the hands of local fishery cooperatives and to assess their efficiency.

Gestion de la pêche par les coopératives au Japon : les pêcheries d'ormeaux et de caracol gris sur le littoral méridional de la péninsule d'Izu

Résumé

Le littoral méridional de la péninsule d'Izu abonde en "Netsuke", espèces sédentaires telles que coquillages, homards et algues contenant de l'agar-agar, Arame et Kajime. Ces ressources de "Netsuke" sont protégées par des réglementations strictes concernant la pêche et sont gérées par des coopératives.

Cette étude a pour but d'exposer les méthodes de conservation, de gestion, de collecte commune et de distribution employées par les coopératives locales de pêche et d'apprécier leur efficacité.

"Netsuke" products at Shimoda City and Minami-Izu Cho

Izu Peninsula enjoys a warm climate owing to the Kuroshio Current, and has many hot springs and tourist attractions. In the south Shimoda City and Minami-Izu Cho (Fig. 1) are centres for growing vegetables and flowers and this is the main area for "Netsuke" fisheries and the tourist trade.

These "Netsuke" fisheries had long been submitted to strict regulations by each community with regard to the exploitation of fishing grounds, compulsory collection of catches, equal distribution of sales, etc. After World War II, in accordance with the general process of democratisation, fisheries management was transferred into the hands of fishery cooperatives.

A study has been made of the structure of fisheries at Shimoda City in recent years (Table I). The number of establishments gradually decreased from 338 in 1981 to 271 in 1989. However, regarding vessel classification, the number of establishments with no vessels or

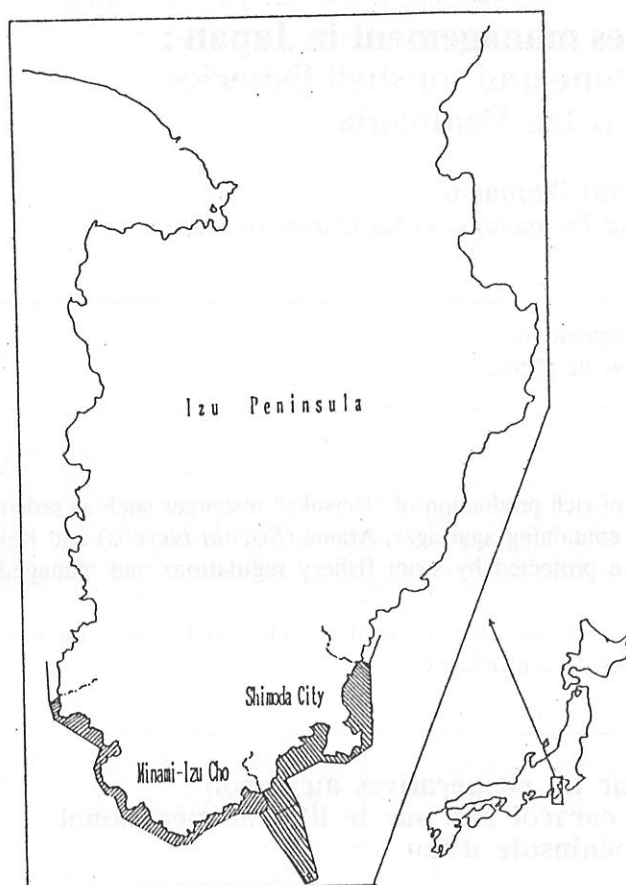


Fig. 1 - Location of Shimoda City and Minami-Izu Cho in Izu Peninsula (area with hachures: fishing ground for shellfish).

- Situation de Shimoda et de Minami-Izu-Cho sur la péninsule d'Izu (zone hachurée : zone de pêche de crustacés).

Year	1975	1977	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
No. of establishment by vessel													
Non use	72	78	59	57	51	39	18	18	18	36	35	26	28
Non-powered vessel	0	0	0	0	0	0	0	0	0	0	0	0	0
Powered vessel													
Less than 10t	221	231	242	258	277	247	241	241	237	212	223	219	202
10-100t	9	10	12	17	25	28	30	24	30	33	31	27	26
100t and over	1	1	3	2	2	2	0	3	2	2	3	2	4
Set net	1	1	1	1	1	0	2	0	0	0	0	0	0
Marine culture	3	3	0	0	0	0	1	1	1	1	2	1	1
No. of establishment by management													
Individual	299	314	302	317	320	301	281	280	279	274	285	267	262
Company	2	1	2	3	6	6	7	6	8	10	9	8	9
Fishery cooperative	1	1	0	0	0	0	0	0	0	0	0	0	0
(Self management)													
Fishery production association	0	0	0	0	0	0	0	0	0	0	0	0	0
Joint management	8	8	13	15	12	9	4	1	1	0	0	0	0
Total	310	324	317	335	338	316	292	287	288	284	294	275	271

Source: Kanto Agriculture Administration Bureau, Shizuoka Office of Statistics and Information, Annual report of agriculture, forest and fishery, 1976, 1978, 1980-1990.

Table 1 - The structure of Shimoda City fisheries in recent years.
- Structure des pêcheries de Shimoda de 1975 à 1989.

equipped with low-powered vessels under 10 t has declined, whereas those with vessels over 10 t has increased. Concerning management, more and more individual establishments are being merged into larger companies. Nevertheless, Shimoda City fisheries are generally small-scale and coastal (Ikematsu & Kusakawa, 1990).

The structure of fisheries at Minami-Izu Cho is very similar to that in Shimoda City. Trends in shellfish catches and processing at Shimoda City Fishery Cooperative and at Minami-Izu Cho Fishery Cooperative have been compared (Table II). The total treatment of shellfish at Shimoda City Fishery Cooperative fell from 136.4 t in 1972 to 45.8 t in 1990, after many fluctuations. At Minami-Izu Cho Fishery Cooperative, total treatment also decreased from 402.8 t in 1972 to 72.9 t in 1990. These fluctuations and tendencies to decrease suggest that the release of young shellfish and resources management by national and regional authorities and by fisheries cooperatives are highly significant. In terms of species, catches fluctuated considerably, especially between 1977 and 1981 when low catches were due to colder waters.

Fisheries in this area are also submitted to natural disasters such as earthquakes. The variation coefficient of total catches is about 0.5 in both cooperatives, but the variation coefficients, species by species, for topshell (*Turbo cornutus*), Japanese abalone (*Sulculus supertexta*), Bateira (*Omphalius pfeifferi*) differ greatly, showing the impact of changes in natural conditions on catches. Meanwhile, the variation coefficient of abalones is small and production increases reflect the benefits of good production management.

"Netsuke" resources are not only susceptible to changes in natural conditions but also to hazards such as poaching, overfishing, etc. It is therefore essential that all fishermen who are members of a cooperative should adhere to the operating rules and preserve young shellfish.

Species & area Year	Abalones		Top shell		Japanese abalone		Bateira		Total	
	Shimoda	Minamiizu	Shimoda	Minamiizu	Shimoda	Minamiizu	Shimoda	Minamiizu	Shimoda	Minamiizu
1972	15,515	18,097	116,534	374,800	4,308	9,929	0	8,105	136,357	402,826
1973	17,041	15,442	187,855	430,181	5,666	15,385	0	25,987	210,562	461,008
1974	16,531	13,449	167,512	329,373	4,743	8,469	0	11,433	188,786	351,341
1975	16,797	13,870	208,568	283,999	2,977	8,577	0	14,749	228,342	306,446
1976	17,233	14,699	228,654	176,449	2,192	5,985	393	22,874	248,049	220,007
1977	4,064	9,587	215,239	189,378	2,182	10,214	12,140	23,054	233,625	209,179
1978	4,585	12,721	109,164	100,077	7,219	14,085	39,331	33,646	160,299	160,529
1979	4,932	16,286	55,224	31,248	12,597	16,497	30,870	32,615	103,623	97,048
1980	4,846	18,850	41,317	158,371	5,159	13,385	30,275	52,424	81,597	243,030
1981	7,888	14,994	36,617	133,787	7,096	14,378	17,320	27,767	68,921	185,926
1982	10,682	18,186	28,598	36,857	5,082	10,214	15,126	27,224	59,488	92,481
1983	13,445	16,856	25,946	91,250	6,638	4,884	17,713	32,771	63,742	145,761
1984	15,304	17,587	32,503	82,107	5,132	4,710	11,176	22,794	64,115	127,198
1985	21,699	19,525	51,219	89,808	5,354	5,898	6,682	23,564	84,954	138,796
1986	20,935	18,945	96,397	166,295	3,917	2,310	3,746	12,252	124,995	199,802
1987	21,525	19,834	100,939	175,703	5,278	2,859	5,774	12,834	133,516	211,230
1988	20,937	20,735	75,227	105,177	5,173	3,264	9,985	16,676	111,322	145,852
1989	19,845	23,496	46,363	87,105	7,421	6,649	8,939	10,769	82,568	128,019
1990	17,725	23,553	16,925	38,599	6,025	5,652	5,096	5,053	45,771	72,857

Source: Shimoda City Fishery Cooperative, Annual report of landings, 1990, Minamiizu Cho Fishery Cooperative, Annual report of landings, 1990.

Table II - Comparison of trends in shellfish catches and processing at Shimoda City Fishery Cooperative and at Minami-Izu Cho Fishery Cooperative (unit: kg).

- Comparaison de l'évolution de la pêche et de l'industrie de transformation des coquillages dans les coopératives de Shimoda et de Minami-Izu Cho (unité : kg).

Between 1979 and 1982, Shimoda City Fishery Cooperative promoted the improvement of fishing grounds, the transplantation of Kajime, the release of young shellfish and the implementation of fishery management regulations. It also set up the Shimoda District Fishery Management Cooperative in 1983 in Shirama District. The result has been that the main fisheries in this area have shifted from algae containing agar-agar to abalones. The following regulations have been imposed on the management of the abalone fishery:

1. Operation days - 8 days, from April to September, for divers using simple equipment and 16 days for divers without equipment. Operation days are fixed by the executive committee.
2. Operation time - from 9h to 14h 30.
3. Size - minimum 11 cm.
4. Inspection - executives and staff have the right to inspect without prior notice.
5. Surveillance - each community requires all its members to watch out for poachers.
6. Shipment - each member is responsible for shipping shellfish to the fishery cooperative.

The fishery cooperative carries out careful surveys on shellfish fisheries and resources to encourage members' entrepreneurial activities. Nonaka (1983) and Hirasawa (1986) stress the importance of this role played by fisheries cooperatives in the control of "Netsuke" fisheries.

An example of price transactions for shellfish at Shimoda City Fishery Cooperative in July 1989 is given (Table III). Purchase prices are fixed the day before each fishing day, per species and per size, by representatives of the cooperative, with reference to prices on the wholesale markets in the consumer areas, especially in Tokyo. Here the purchase price fixed by the Fishery Cooperative for abalones bought from fishermen is 3,800 yen/kg, but the net amount received by fishermen is 3,040 ($3,800 \times 0.8$) yen/kg (production cost) and the remaining 740 yen/kg (20 %) is the fee for the use of facilities. When fishermen purchase abalone from the fishery cooperative, the repurchase price is 3,285 yen/kg (production cost $\times (1 + 0.08)$).

Two types of selling prices are fixed by the fishery cooperative:

- 1) for members, small-volume transactions (less than 10 kg) are priced at 4,180 yen/kg (purchase price of fishery cooperative $\times 1.1$);
- 2) for catering services, etc., large-volume transactions (over 10 kg) are priced at 4,560 yen/kg (purchase price of fishery cooperative $\times 1.2$).

Conservation of abalone resources and production control in this district are managed jointly by both fishery cooperatives which purchase young shellfish from the Shizuoka Prefecture Fish Farming Centre in Numazu City. Research on and development of young abalone production in the Shizuoka Prefecture started in 1959 at the Izu branch of Shizuoka Fisheries Experimental Centre and, in 1976, this unit raised the production of young shells to 100,000. In 1978 the Shizuoka Prefecture set up a Fish Farming Centre for the production of young fish and shellfish.

Until 1982 the Centre produced and shipped only seedlings of Kuroawabi (*Notohalic tis discus*) and the volume reached 30,000 to 32,000. After 1983 the Centre started to produce seedlings of Mekaiawabi (*Notohaliotis sieboldi*) to meet the needs of fishermen.

In 1988 Shimoda City Fishery Cooperative released 29,000 Kuroawabi seedlings and 226,000 Mekaiawabi seedlings, while the Minami-Izu Cho Fishery Cooperative released 52,000 seedlings of Kuroawabi and 129,000 seedlings of Mekaiawabi.

Item Species	Purchase price ¥	Production cost ¥=¥×(1-0.2)	Repurchase price ¥=¥×(1+0.08)	Cooperative member's price ¥=¥×(1+0.1)	Retail price ¥=¥×(1+0.2)
Abalones	3,800	3,040	3,285	4,180	4,560
Abalones (Wounded)	3,402	2,735	2,955	3,760	4,100
Japanese abalone	2,500	2,000	2,160	2,750	3,000
Top shell (Large)	1,400	1,120	1,210	1,540	1,700
Top shell (Small)	1,190	950	1,025	1,310	1,450
Bateira	1,000	800	865	1,100	1,300

Source: Shimoda City Fishery Cooperative, Table of selling price of shellfishes, 1987.

Table III - An example of price transactions for shellfish at Shimoda City Fishery Cooperative in July 1987 (unit: yen/kg).

- *Exemple de transactions sur les prix des coquillages à la coopérative de pêche de Shimoda (juillet 1987).*

Collection, shipment and price-fixing of shellfish at Shimoda City and Minami-Izu Cho

At Shimoda City and Minami-Izu Cho, shellfish are collected entirely by the two fishery cooperatives which sell them to middlemen either by negotiated transactions or at auctions. The middlemen ship the shellfish to the wholesale market in the consumer area in the form of consignment sales. In addition, the fishery cooperatives sell to homes rented by tourists and to hotels. In the off-season middlemen purchase from other production areas to supply hotels.

Each fishery cooperative decides on the collection day and the collected shellfish are measured per species and size; fishermen receive their earnings from sales on a monthly basis.

Transactions are of two kinds: one for large quantities (over 10 kg) and the other for small quantities sold to tourist homes owned by fishermen and fish retail shops. Figure 2 gives the distribution flow chart.

Eight middlemen operate in this area, three at Shimoda City and five at Minami-Izu Cho. The transaction ratio in value for shellfish is roughly 60 % for topshell, 30 % for abalones and 10 % for other products. The annual sales made by middlemen total over 500 million yen.

During the off-season (September to December), they purchase shellfish from other production areas such as the Republic of Korea and Kyushu Island to supply hotels, etc. Annual distribution by middlemen amounts to about 70 % at wholesale markets in the consumer areas, while the remaining 30 % go to local hotels. It may happen too that fishery cooperatives

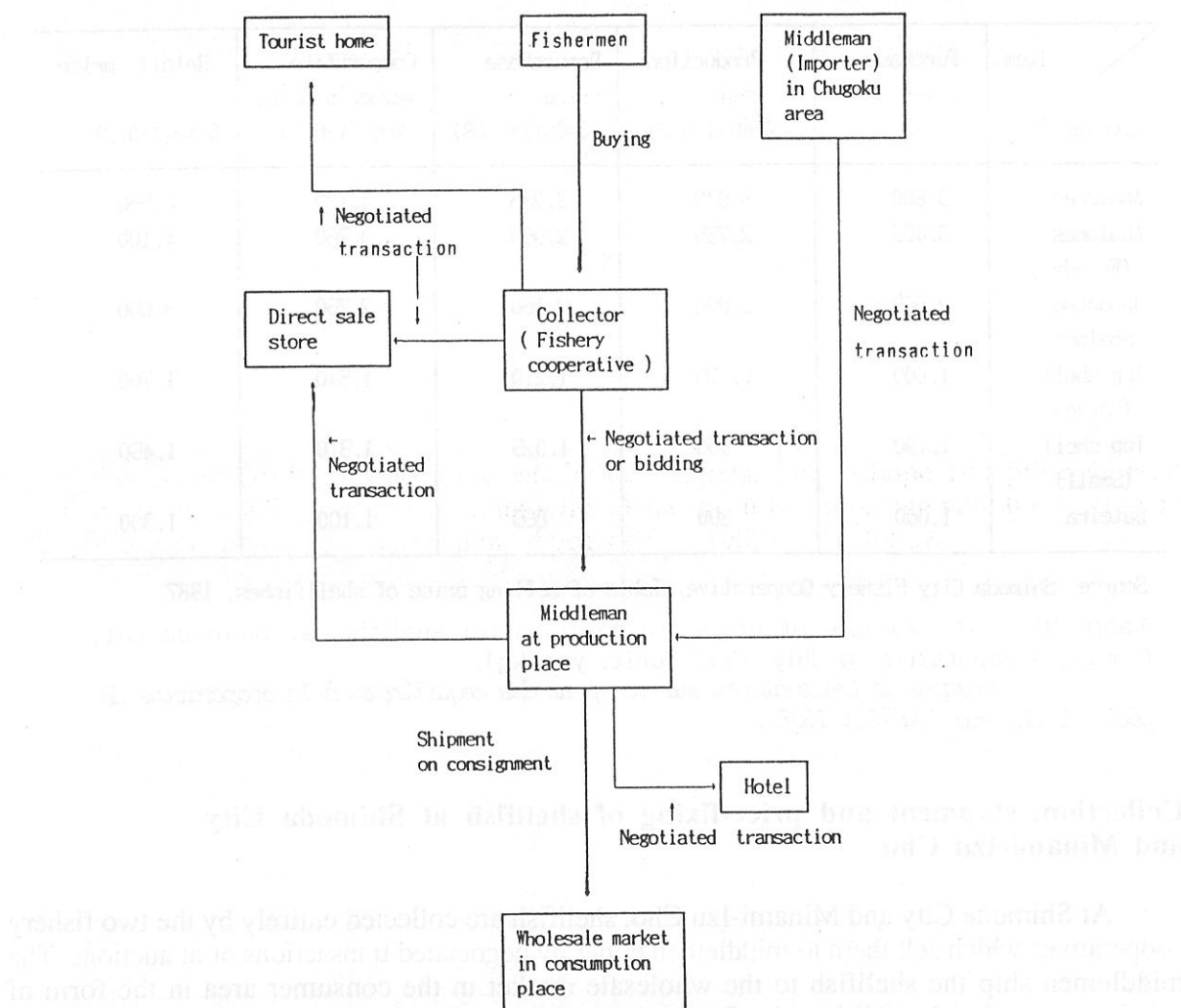


Fig. 2 - Chart of the flow distribution.
- Schéma des circuits de distribution.

send their produce directly to these wholesale markets. The volume and price variation coefficients for shellfish (purchase transactions) and fresh fish (consignment transactions) at each fishery cooperative for a period of 14 years (1976-1989) are as follows:

- Variation coefficient for fresh fish:
volume - 0.39 to 1.14; annual average price - 0.11 to 0.67.
- Variation coefficient for shellfish:
volume - 0.46 to 0.77; annual average price - 0.11 to 0.24.

Thus the variation coefficient for shellfish is small, with a variation similar to that of high-priced fish. Moreover, in comparison with high-priced fish, the price varies less but the volume varies more. This is probably due to the fact that the price of shellfish is fixed by purchasing transactions.

Figure 3 shows the correlation in power between transaction volume and real value of abalones at Shimoda City Fishery Cooperative from 1972 to 1989. 0.8979 for the exponent and 0.9893 for the correlation coefficient mean that demand is stable. Thus a 10 % increase in volume means a 9 % increase in real value in this formula.

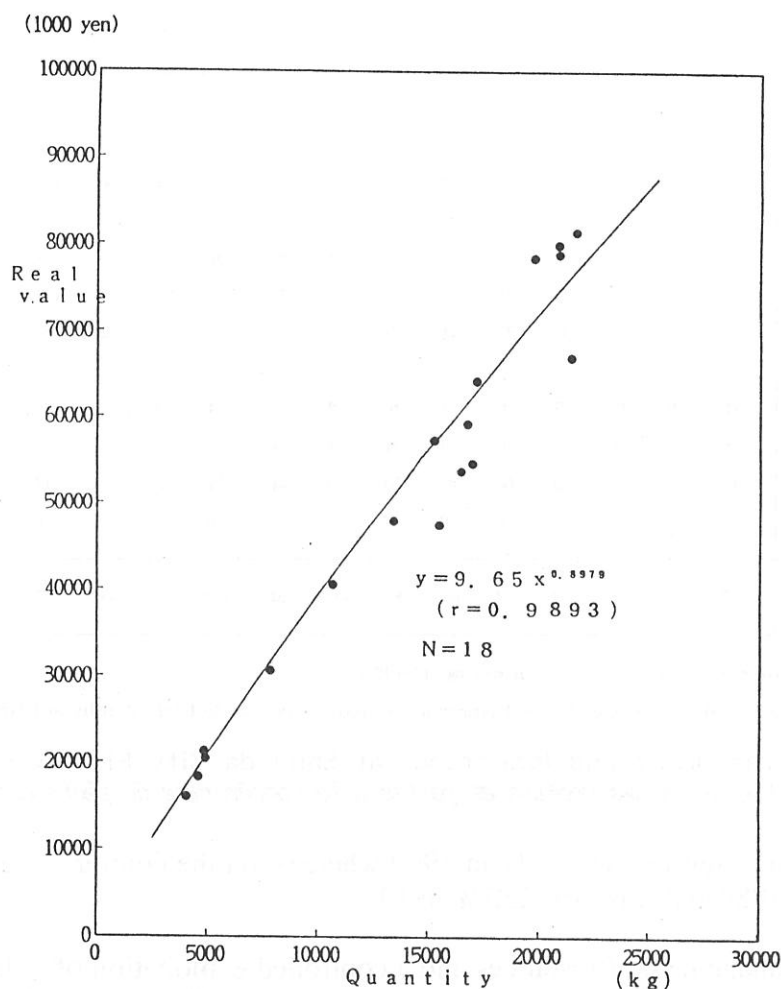


Fig. 3 - The correlation in power between transaction volume and real value of abalones at Shimoda Fishery Cooperative from 1972 to 1989.

- *Correlation entre les quantités et les prix pour les débarquements d'ormeaux à la coopérative de Shimoda de 1972 à 1989.*

The power correlation formulae for topshell at Shimoda City Fishery Cooperative and for abalones at Minami-Izu Cho Fishery Cooperative are as follows:

Topshell at Shimoda - $y = 6.94 x^{0.8480}$ ($r = 0.9801$)

Abalones at Minami-Izu - $y = 0.68 x^{1.1856}$ ($r = 0.8883$)

Activities at Shimoda City Fishery Cooperative

The profit and loss trends at Shimoda City Fishery Cooperative have been assessed (Table IV). The most profitable undertaking is that of sales which represent about 50 % of the total profit. Other profitable activities are credit, purchasing, ice-making and cold storage. The total profit shows an increase from 235 million yen in 1975 to 402 million yen in 1982; after 1983 it stabilized at a level of around 430 million yen, though sales showed a relative increase.

Since 1988 the fishery cooperative is working on a sound basis, owing to less repayment. The joint collection of shellfish also contributes largely to the smooth running of the cooperative.

Kind of business	Fiscal year															
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Credit	44	49	69	88	81	69	69	97	110	112	126	147	158	109	123	135
Mutual aid	0	0	0	0	0	0	0	0	0	3	5	5	5	6	6	8
Purchasing	21	21	24	28	34	37	36	35	38	37	34	39	39	39	41	51
Selling	108	131	73	70	93	114	138	176	177	165	198	197	190	208	215	193
Ice making, cold storage and freezing	26	24	35	36	39	34	38	32	37	45	39	28	31	31	37	37
Processing	11	9	10	5	6	7	10	8	4	4	0	0	-3	-2	-4	-3
Use and guidance	14	8	8	9	10	10	11	15	14	14	0	5	1	6	0	10
Fishery self-management	18	27	77	65	64	49	50	43	44	51	11	9	17	17	13	2
Wire-less	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	242	269	297	300	327	321	352	402	424	432	413	431	439	414	431	434

Source: Shimoda City Fishery Cooperative, Bill book of general meeting, 1976-1991.

Note: Digits below the unit are rounded. Therefore, the total figures are not necessarily equal to totals of individual figure.

Table IV' - The profit and loss trends at Shimoda City Fishery Cooperative.
- *Evolution des profits et pertes à la Coopérative de pêche de Shimoda.*

The fixed ratio fell below 100 % in 1990 whereas, on the contrary, the usual ratio was over 100 % after 1989 and was over 250 % in 1990.

Efficient management of resources and a controlled exploitation of fishing grounds are fundamentally important if cooperatives are to run smoothly. This is true of the Shimado City Fishery Cooperative, where sound economy has proved particularly profitable.

Conclusion

"Netsuke" fisheries at Shimoda City and Minami-Izu Cho are run entirely by the cooperative system, including production and exploitation of resources, the release of young shellfish, the regulation of fishing operations, joint collecting, etc. Problems exist though, such as water pollution due to tourist activities, lack of labour forces, aging of some fishermen, natural disasters, poaching, etc. Competition has become much fiercer between the different production areas. Fishery cooperatives play an important role in fishermen's affairs but also in those of middlemen. Moreover they contribute largely to the development of the local community.

It is therefore essential that the fishery cooperatives strive for a sound management of "Netsuke" resources, with particular attention paid to the economy. They must also ensure that friendly relations are maintained between fishery cooperatives and the middlemen.

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Aquaculture, restocking and stock enhancement as an answer to the scallop fisheries management crisis in the areas of Brest and Saint-Brieuc (Brittany)

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Key words : aquaculture, fishing licence, scallop, restocking, stock enhancement.

Mots-clefs : aquaculture, licence de pêche, coquille Saint-Jacques, repeuplement, surpeuplement.

Abstract

Since the beginning of the century, scallop fisheries in France have known successive phases of expansion and recession. Although a system of fishing licences has been implemented, the number of fishermen involved in the scallop fishery has increased and huge investments have been made. The important fishing effort during this period has induced a serious stock depletion, and output has dropped to less than 2 000 m.t. per year since 1986. Hence, the remunerations of capital and labour have dramatically decreased. As early as 1973, attempts have been made to use aquaculture methods for the management of this stock, following the successful Japanese model. Because of insufficient amounts of spat available from the wild, hatchery and nursery techniques have been improved to support restocking operations in the harbour of Brest, stock enhancement on delimited areas in St Brieuc Bay and aquaculture on specialized leases involving fishermen or oyster-farmers. It is interesting to compare the advantages and the costs of these different approaches in France and to assess the difficulties of scallop aquaculture implementation.

Aquaculture, repeuplement et surpeuplement comme solution à la crise des pêcheries de coquilles Saint-Jacques dans les régions de Brest et de Saint-Brieuc

Résumé

Depuis le début du siècle, les pêcheries de coquilles Saint-Jacques en France ont connu des phases successives d'expansion et de récession. Malgré la mise en place d'un système de licences de pêche, le nombre de pêcheurs pratiquant cette activité a augmenté et d'importants investissements ont été effectués. L'augmentation de l'effort de pêche au cours de cette période a entraîné une sérieuse chute des stocks, avec une production tombée à moins de 2 000 tonnes par an depuis 1986. En conséquence, les rémunérations du capital et du travail ont considérablement chuté. Dès 1973, des tentatives ont été faites pour utiliser les méthodes d'aquaculture pour la gestion de ces stocks, en suivant le modèle japonais. A cause de l'insuffisance du captage naturel, des techniques d'écloserie et de nurserie ont été mises au point comme support à des opérations de repeuplement en rade de Brest, de surpeuplement sur certaines zones de la baie de Saint-Brieuc et d'aquaculture sur des concessions spécialisées pour des pêcheurs et des ostréiculteurs. Il est intéressant de comparer les avantages et les coûts de ces différentes approches et d'évaluer les difficultés à mettre en place une aquaculture de coquilles Saint-Jacques.

Introduction

IFREMER has been carrying out an important research program in scallop aquaculture in France since 1973. We can now say that scallop cultivation is technically feasible, but practical development is still in embryo. This paper will try to define a global approach to the scallop production chain, to show how scallop aquaculture can be integrated into this chain, despite certain constraints and limiting factors. This kind of analysis has to take into account not only

the technical and economic aspects of the production sector but also the historical, sociological and marketing aspects. Here we present the first results of an investigation which will continue in the future, in order to help scallop aquaculture develop at minimum public expense.

Characterization of the production sector

The fleet operating in the St Brieuc region is a small-scale fleet (Berthou *et al.*, 1990) characterized by heterogeneity in the types of boat and fishing gear; polyvalency of the fishing units; multispecificity of the resources and flexibility of the exploitation strategies.

At any time, the fishermen are free to choose a particular fishing technique and to look for certain species in one area or another. The principal fishing gear is the scallop drag-net, followed by the bottom trawl within the twelve-mile limit, the clam drag-net and lobster traps. Scallop dredging represents about 20 to 25 % of the fishermen's activity in St Brieuc Bay, but it is seasonal, carried out mainly in winter and strictly regulated as will be shown below. Trawling competes with dredging by damaging the young scallops (by the mechanical action of the trawl) or by illegal catches. The bay provides a little less than half the French scallop production and has yielded between 2 000 and 3 000 m.t. per year in recent years. The species concerned is *Pecten maximus*.

The history of scallop fisheries in Brittany

The evolution of the fleet and landings

Like most scallop fisheries in the world, French fisheries of *Pecten maximus* have experienced successive phases of expansion and recession since the beginning of the century. Whereas the stocks disappeared in the Brest region in the late 1960s (after reaching a maximum of 20 000 m.t. in 1959), production in St Brieuc Bay increased until 1973, then slowed down, particularly after 1986 (Fig. 1). Nevertheless, 1990 was a little better and the two following years should be years of relative abundance. The annual value of the landings has followed the same pattern (Fig. 2), but the decrease was slightly less at the beginning of the 1980s, because the product reached higher prices. However, during the entire period under study, supply has had no direct effect on prices.

The total number of boats involved in this activity, coming from either St Brieuc Bay itself or elsewhere, increased until 1973 (Fig. 3). During this early period, the average growth rate of the fleet was 20 % per year. The number of boats remained stable between 1973 and 1980, then began to decrease a few years after the decline in output, especially because of the departure of fishermen who came from elsewhere. From 1962 to 1973, the number of fishermen increased from 125 to 1000, the power of the boats from 25 hp to 100 hp, and the replacement value of the fleet from 10 to 175 MF (Meuriot *et al.*, 1987). With the reduction of the resources and the stable prices, landings per boat have decreased dramatically both in quantity (Fig. 4) and in value (Fig. 5).

Thanks to the flexibility of this multispecies-multigear fishery, most fishermen have concentrated their activity on other species and the importance of scallop dredging has been decreasing for several years, particularly since the serious depletion of the stock in the 1980s (Fig. 6). More recently, among the population of St Brieuc fishermen, scallop fishing activity

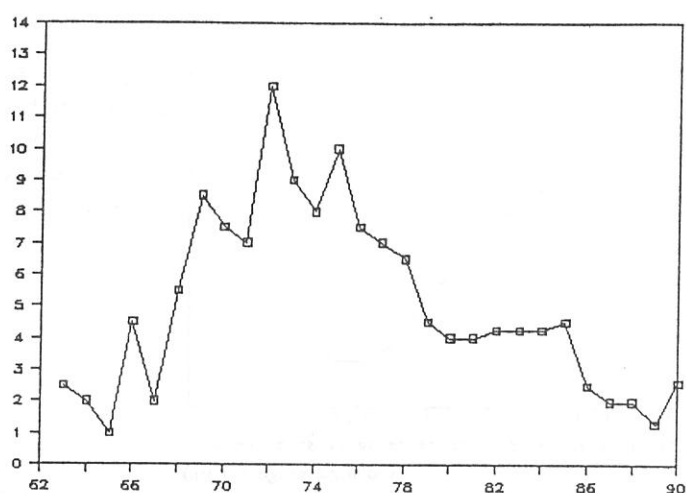


Fig. 1 - Scallop (*Pecten maximus*) landings in St Brieuc Bay (1000 m.t.) (after Comité central des pêches maritimes).

-Quantité de coquilles St Jacques débarquées dans la baie de St Brieuc (en tonnes). (Source : Comité central des pêches maritimes.)

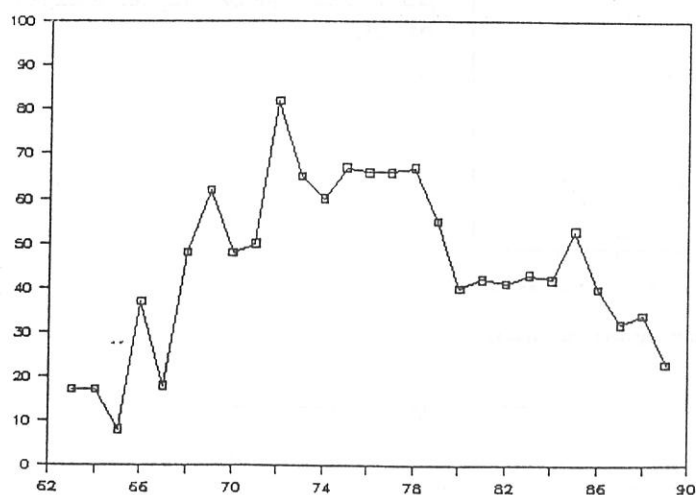


Fig. 2 - Scallop (*Pecten maximus*) landings value in St Brieuc Bay (MF 89).

-Valeur des captures de coquilles Saint-Jacques (*Pecten maximus*) dans la baie de St Brieuc (MF 89). (Source : Comité central des pêches maritimes.)

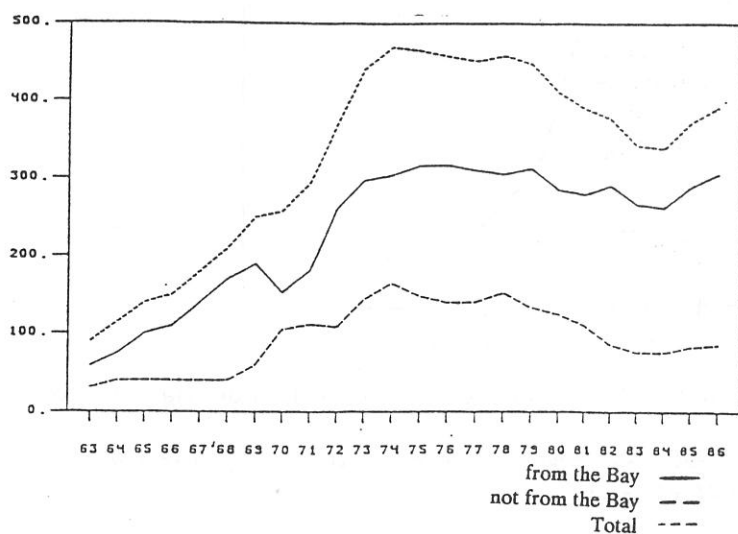


Fig. 3 - Evolution of the number of boats (after Meuriot et al.)

- Evolution du nombre des bateaux (d'après Meuriot et al.).

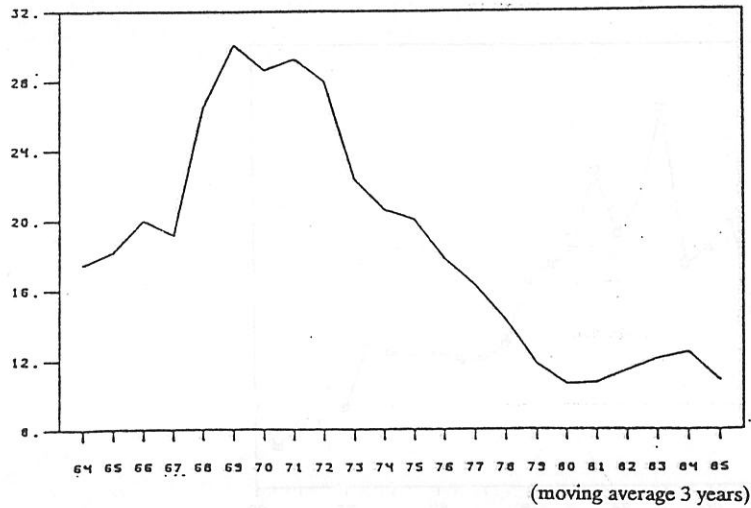


Fig. 4 - Average landings per boat (m.t.) (after Meuriot *et al.*)
- *Moyenne des captures par bateau (en tonnes) (d'après Meuriot et al.).*

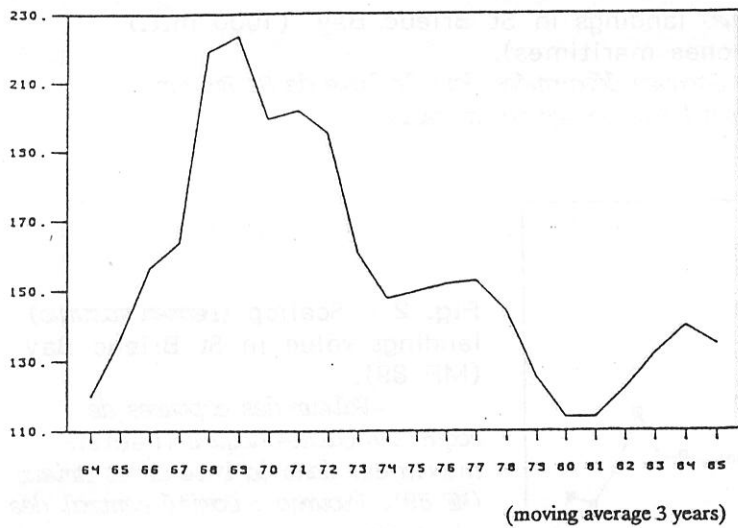


Fig. 5 - Average landings value per boat (MF 87).
- *Valeur moyenne des captures par bateau (MF 87) (after Meuriot et al.).*

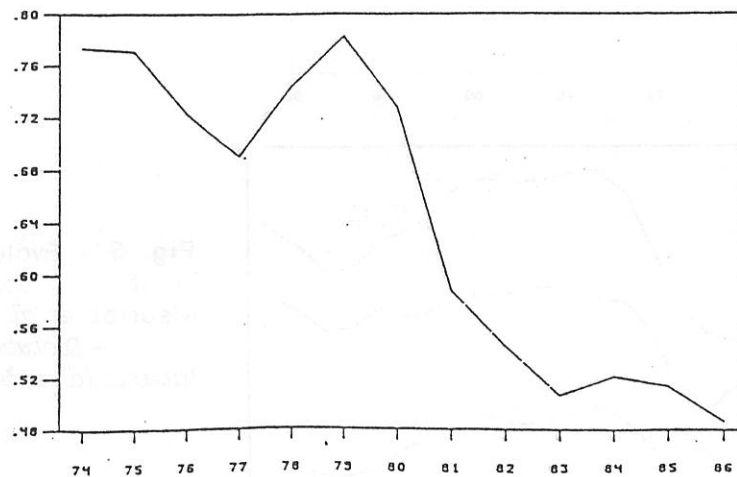


Fig. 6 - Share of scallops in total landings value in St Brieuc Bay. (after Meuriot *et al.*).
- *Part des coquilles Saint-Jacques dans la valeur totale des captures dans la baie de St Brieuc (d'après Meuriot et al.).*

has been reduced by 16 % between 1986 and 1989 (Berthou *et al.*, 1990) while landings were down by 43 %.

Scallop fisheries management : which measures have been taken and with what results ?

As the resource is located within a well delimited area (St Brieuc Bay), it has been easy to define a management unit to which different regulatory measures can be applied. Until 1980, regulation sought to maintain the profitability of the activity (minimum efficiency criterion) and to keep fishermen from other locations from having access to the resources of the Bay (allocation criterion) by restricting the number of boats, the total investment and the fishing effort.

The first regulation affected the fishing time : every year, the number of months in the fishing season, the number of fishing days per week and the number of fishing hours per day are decided jointly by the administration and the profession. These numbers have been continually reduced (Fig. 7) which until 1973 made it possible to limit the global landings and to avoid lower prices, which was the aim at that time.

However, given a stable resource and no limit on fishing capacity, the main effect of this kind of measure was to induce the fishermen to maintain income by using more and more costly equipments during fewer and fewer fishing days. Huge investments have been made during the period of good catches and high earnings, because specific long-term loans were very attractive to fishermen (Fig. 8).

To try to restrict the number of boats, a system of fishing licences, attributed simultaneously to the boat and the captain, was introduced in St Brieuc Bay in 1973, but only for the scallop fishery. These licences have to be bought, and the money collected in this way is used by the local fishermen's organization for management and survey expenditures. This scheme has never been very constraining and the number of attributed licences has remained stable at about 400 (Meuriot *et al.*, 1987).

As for the restrictions concerning the technical characteristics of the boats, their aim was more the eviction of boats not belonging to the Bay than the limitation of the fishing capacity. Indeed, regulations imposed a maximum length of 16 metres, while the average boat measured only ten metres, and a maximum power of 400 hp, which was well above the average of 100 hp. Another reason for these flexible norms was to keep fishermen from becoming too specialized. Thus, in order to avoid some of the difficulties of the scallop fishery, several fishermen have been able to buy boats big enough for winter trawling, for instance.

Although the licensing system kept the value of total output at a higher level until 1978-1979, the economic situation of the fishermen in St Brieuc Bay continued to decline even after the implementation of the licences. The falling return on capital investment can be illustrated by the decreasing ratio of the value of the landings to boat replacement value (Fig. 9). Even with the departure of some boats after 1981, this ratio remained very low, which indicates that only the old boats have been withdrawn. The labour costs has also decreased during the period but recovered after 1981, thanks to the departure of some boats (Fig. 10) (Meuriot *et al.*, 1987).

In fact, it is more the economic evolution of the fisheries than the regulation scheme which induced a reduction in the number of boats from 1979. After 1981, the decrease in the number of boats involved in this fishery has induced a recovery in the profitability of the activity. But it is mainly the possibility these fishermen have to carry on other kinds of fishing which has enabled them to improve their economic situation. The system of licences has not

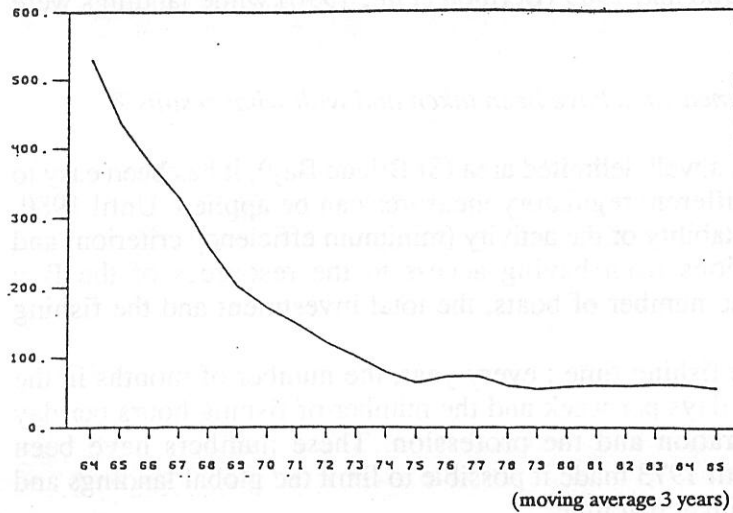


Fig. 7 - Average yearly number of fishing days per boat (after Meuriot et al.).

- Moyenne annuelle des journées de pêche par bateau (d'après Meuriot et al.).

Fig. 8 - Average boat replacement value (MF 87) (after Meuriot et al.).

- Valeur moyenne de remplacement des bateaux (MF 87) (d'après Meuriot et al.).

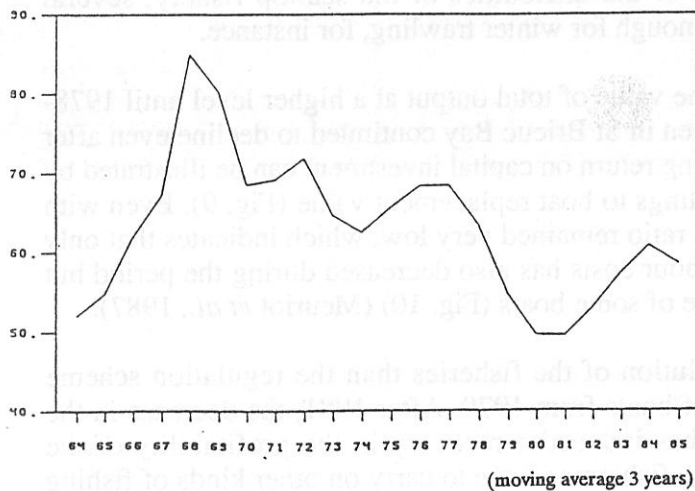
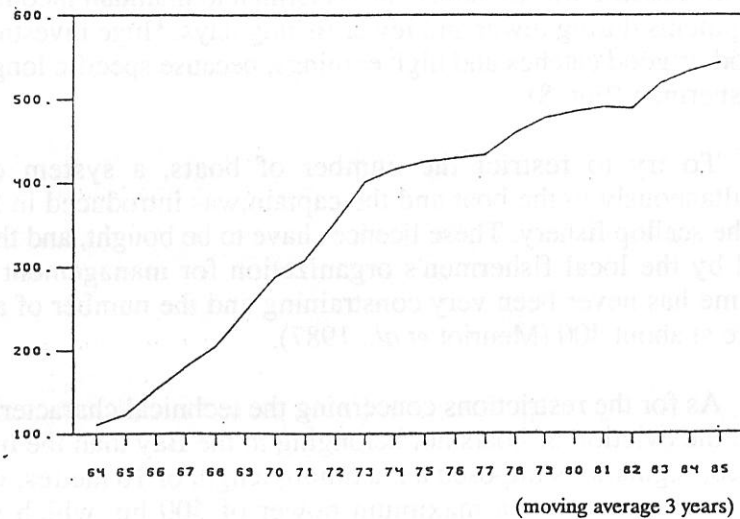


Fig. 9 - Total scallop landings value versus fleet replacement value ratio (after Meuriot et al.).

- Ratio de la valeur totale des captures de coquilles Saint-Jacques par rapport à la valeur de remplacement de la flotte (d'après Meuriot et al.).

played a role in the evolution of the global fishing effort and has not been able to adjust fishing capacity to the decrease in stock in St Brieuc Bay. Licences have only marginally reduced the entry of new fishermen.

In order to reduce the exploitation of the stock, some other measures have been adopted, but they have not prevented stock depletion : a global quota from 1978; a minimum size (10,2 cm); a new auction hall since 1977 and an immediate interruption of landings when the price is too low.

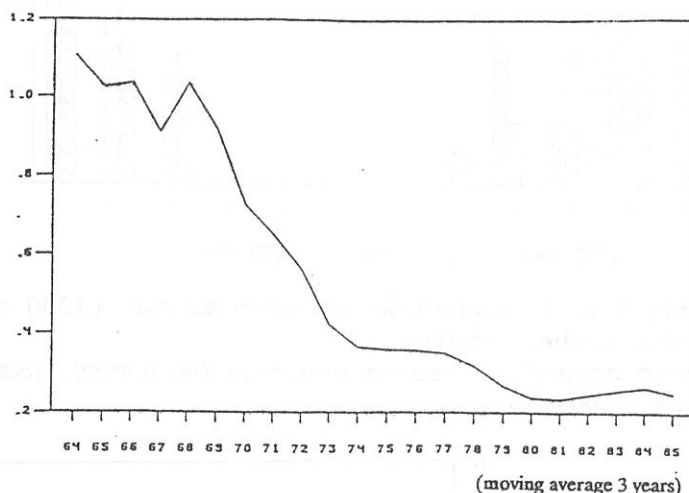


Fig. 10 - Average turnover per crew member (MF 87) (after Meuriot *et al.*).
- Moyenne du chiffre d'affaires par membre d'équipage (MF 87) (d'après Meuriot *et al.*).

Brief analysis of the French scallop market

First of all, the market for the scallops from French fisheries is characterized by distinct seasonality and by irregularity due to the regulation scheme and the fragility of the scallop in warm temperatures : there is no production at all from June through September and there is a peak in December due to traditional French consumer habits (Fig. 11).

We do not however observe the usual rule of $dQ/dP < 0$. In May, for instance, the landings are very low and the prices too. On the other hand, both price and landings are high in December. In these conditions, we can reckon that supply is exogeneous, as a renewable resource, the catches being strictly regulated. The heavy restrictions on the number of fishing days have so disorganized the distribution channel that the market can now absorb only small quantities of scallops at any one time. Particularly at the beginning of the season, fishing often has to be interrupted when prices suddenly drop.

Among the bivalve molluscs, scallop has the particularity of being considered as an expensive, top quality sea-food in only a small number of countries which consume the bulk of the supply. France is one of these countries and individual consumption there reaches 150 g per year. Given the decrease in the domestic supply, there has been a regular increase in imports (Fig. 12), especially of frozen or shelled fresh meat from many countries (United Kingdom, Norway, New Zealand, Japan, Chile). The decrease in imports in 1990 is due to sanitary problems (PSP) concerning some imports from Japan. We can observe also a certain seasonality in the imports, with a maximum at the end of the year and a low consumption in January but there is no noticeable reduction in summer (Fig. 13).

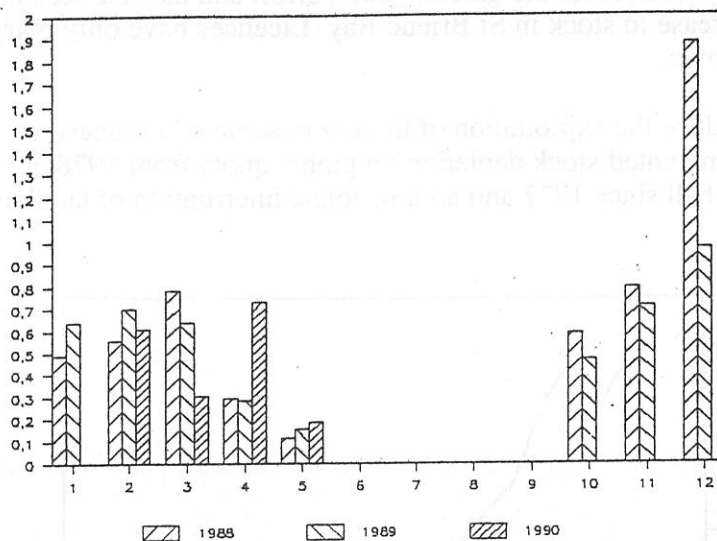


Fig. 11 - Monthly French production of *Pecten maximus* (1000 m.t.). (From the Comité central des pêches maritimes.)

- Production mensuelle de *Pecten maximus* (en tonnes). (Source : Comité central des pêches maritimes.)

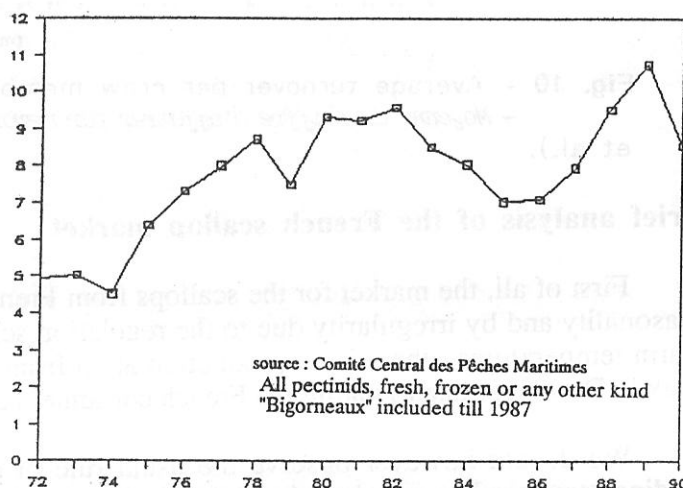


Fig. 12 - Evolution of French scallop imports : meat weight (1000 m.t.). (From the Comité central des pêches maritimes.)

- Evolution des importations françaises de coquilles Saint-Jacques (1000 tonnes de chair).

source : Comité Central des Pêches Maritimes
All pectinids, fresh, frozen or any other kind
"Bigorneaux" included till 1987

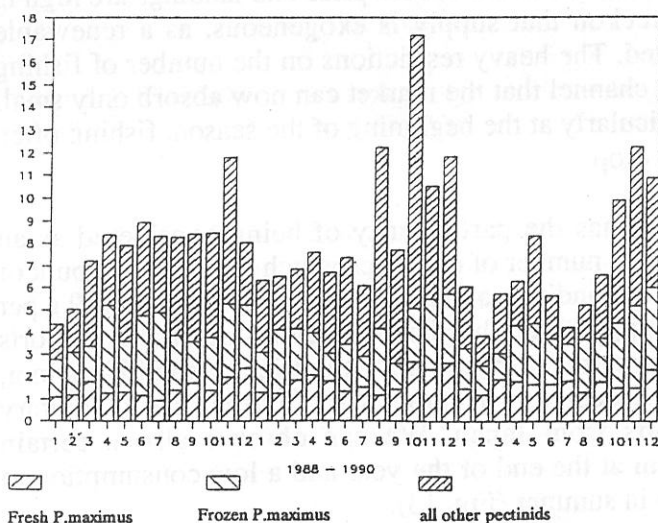


Fig. 13 - Monthly imports of scallops including all pectinid species (100 m.t.). (from the Service des Douanes.)

- Importations mensuelles de coquilles Saint-Jacques, incluant tous les pectinidés.

1988 - 1990
Fresh *P. maximus* Frozen *P. maximus* all other pectinids

	with shell		meat weight	
production	6 000 m.t.	24 F/kg(1)	800 m.t.	185 F/kg
imports	65 000 m.t.	8 F/kg	8 000 m.t.	55 F/kg
exports	14 000 m.t.	(2)	1 800 m.t.	(2)

Table 1 - French scallop market. (1) Average price : -30 F/kg for scallop with roe from Brest Bay; 18 F/kg for scallop without roe. (2) Unreliable data. (Data from the "Service statistique des douanes".)

-- *Le marché français de la coquille Saint-Jacques.* (1) Prix moyen : 30 F/kg pour les coquilles Saint-Jacques avec laitance, venant de la baie de Brest; 18 F/kg pour les coquilles Saint-Jacques sans laitance. (2) Données non fiables.

The French market is influenced a great deal by international trade and can be considered as the hub for Southern Europe : part of the imports are re-exported to Spain or Italy (Table 1).

These figures are very difficult to read because the aggregate data do not distinguish clearly between species (*Pecten*, *Chlamys*, *Patinopecten*...) nor between meat with or without shell (depending on the origin). Furthermore, the price comparison between the French product and imports must take into account all the import expenses (taxes, transaction costs) and the differences in quality (degree of humidity, freshness) within the different origins.

Half the French production is consumed locally, and half goes to the national market in Paris. Only 2% of the production is processed, the bulk is sold fresh in the shell. Half of the production is sold through supermarkets, the other half by direct sale or wholesalers in the same proportion. About one third of the imports is for the processing industry.

Aquaculture opportunities

Since their return from a study trip to Japan in 1973, where they discovered the successful results of scallop (*Patinopecten yessoensis*) aquaculture and fisheries management, French researchers from IFREMER (known as CNEXO until 1984) have tried to adapt these techniques to *Pecten maximus*. But it turned out to be impossible to rely on spat collecting from the wild, because the yield was too low and irregular (Dao 1986). However, all the work focused on natural reproduction has made it possible to enhance our knowledge of scallop population dynamics, to obtain indications on stock evolution and to help the management of the fishery through the implementation of an annual total quota in 1978 (Dao 1985).

Attempts to rear scallops in lantern-nets on long-lines have also been very disappointing and have been abandoned. Sea-bed sowing, in contrast, has been more successful and has contributed to the improvement of hatchery techniques and intermediate culture in bags, in order to produce 30 mm sized young scallops for sowing (CEREOPA, 1987).

Aquaculture as a basis for restocking

The first way in which aquaculture methods were used in scallop fishery management was in the restocking of Brest Bay. The aim was the reconstitution of a depleted stock by sowing 1 to 2 million spats every year until a biomass of 500 m.t. adult animals was reached (Buestel *et al.*, 1987). Such a broodstock should have been able to sustain spat collecting, but this has not yet happened, even though the biomass is already more than 400 m.t. Indeed, the results of a national research program into recruitment determinism, carried out by IFREMER and universities, demonstrate that the biological phenomena determining the natural renewal of

the scallop resource are numerous and complex : 80 % of the recruitment variance is explained by weather conditions (temperature) during the maturation phase and just before spawning, while the role of the broodstock size is marginal (IFREMER, 1991).

Stock enhancement

In the case of St Brieuc Bay where a scallop bed still exists, young scallops produced by aquaculture could be sown in some areas in order to increase the stock and hence the catches. The principal problems arising in the development of such a program are to know how to assess each fisherman's participation in the collective investment (hatchery, intermediate culture) and how to share out among fishermen the extra resource generated (Bailly, 1990). Stock enhancement has not yet proved profitable for this fishery without high public expenditure, mostly because of the difficulty of implementing a common management in the St Brieuc fishing community.

Scallop culture

Although scallop culture is technically feasible, its development has to face many constraints due to the economic environment. Once the technical problems of hatchery have been solved, the first constraint in the rearing of scallops is the availability of sites. Indeed, sea-bed sowing requires specific areas chosen for depth, nature of the substrata and shelter from storms, and most often the attribution of leases for aquaculture has to be done at the expense of fishing spaces. For this reason, the profitability of scallop culture should be demonstrated in order to incite fishermen to invest in a hatchery and in specific equipment for aquaculture rather than in other fisheries. This is why it is important to have, on the one hand, a good knowledge of the current economic situation of the fishermen and, on the other hand, an appraisal of the profitability of the activity, in order to attract private and public investment as well as loans and grants. Additional aspects of common resource management have to be taken into account, like the need to buoy the culture areas and to take protective measures against theft, trawling or illegal dredging.

Other actors have expressed their interest in scallop culture : the French oyster farmers in Brittany who used to practice *Ostrea edulis* sea-bed sowing are looking for ways to diversify their activity, until now limited to *Ostrea gigas* which is difficult to market in France. They are all the more inclined to try mixed cultures of *Ostrea edulis* and *Pecten maximus* on part of their deep sea leases, as they already have the required boats and equipment at their disposal. As for the spat supply, it could be provided by the private mollusc hatcheries, operating in France at a fraction of their capacity because of the difficulties in the clam industry. In this case, too, an economic study is necessary to evaluate the opportunity cost of this new species both for oyster farmers and mollusc hatcheries. Conditions for a good transfer of technology and of technical assistance have to be planned.

Altogether, however scallop culture is carried out, there will be the problem of commercial outlets. Until now, the first aquaculture products have been sold through the fishery distribution chain at a good price (30 F/kg). But without a consolidation of this chain and without a strong marketing operation to promote and differentiate the species *Pecten maximus*, it will certainly be difficult to compete with imports. In the case of the development of the production by oyster farmers, the risks of competition with the traditional scallop fisheries also have to be evaluated.

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Japan's cephalopod industry

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Key words : fishery, cephalopods, production, Japan.

Mots-clés : pêche, céphalopodes, production, Japon.

Abstract

The cephalopod industry is one of the main Japanese fisheries. Not only is Japan the largest producer and consumer of cephalopods in the world, but it also imports about 50 % of the world production.

A detailed survey has been made of this industry concerning every aspect: the organisation and regulation of the fishery often reflecting Japanese tradition; the system of management; the fishing fleet; production per fishing zone and per species; the use and processing of cephalopods; the state and trends of the market; consumer demand; sales methods and imports; problems of overproduction and international trade.

Le marché des céphalopodes au Japon

Résumé

L'industrie des céphalopodes est une des principales activités des pêcheries au Japon, qui est non seulement le plus grand producteur et consommateur de ces mollusques, mais qui également importe 50 % de la production mondiale.

On a procédé à une analyse détaillée de cette industrie sous ses différents aspects : l'organisation et la réglementation des pêches; le système de gestion; la flotte de pêche; la production par zone de pêche et par espèces; l'utilisation et la transformation des céphalopodes; les conditions et les tendances du marché; la demande des consommateurs; les méthodes de vente et les importations; les problèmes de la surproduction et le commerce international.

Introduction

The cephalopod industry is one of the most important fisheries in Japan. Japan is the biggest producer and consumer of cephalopods in the world. About 50% of the world production go to the Japanese market. Japan's domestic production has priority in the supply. Imports only complete the domestic demand and exports are negligible. Thus, when Japan's production is low, international trade tends to increase. Conversely, when Japanese production is sufficient to satisfy the home market, international trade decreases.

In recent years (1987 to 1990), the international cephalopod market went through a period of glut, due to global higher production. As the first world consumer, Japan is a target for international trade, but being the first world producer its squid imports are subjected to the import-quota system.

This organization reflects Japanese tradition : hierarchy, decentralization, commercial interests, stability of the market, professional associations...

Description

The fishing fleet

28 165 boats	>30 T	30 T -139 T Offshore , Medium size 555 boats
		> 100 T High-seas, Large size 400 boats
	< 30 T Coastal, Small size 27 210 boats	

Squid pole and line fishing has been practised in Japan since ancient times. Fishing boats exclusively designed for squid fishing appeared around 1955. At present, 28 165 boats are engaged in squid fishery activities, including multipurpose boats. The size range of the boats is very large, from 2 to 3 tons for coastal operations to 500 tons for high-seas fisheries.

In accordance with fisheries regulations, Japan's squid fishing vessels are divided into 3 categories :

- Small-size vessels, less than 30 gross tons
- Medium size vessels, from 30 to 139 gross tons
- Large size vessels, more than 139 gross tons

Three fishing zones are distinguished :

- Coastal fisheries : the number of boats in coastal fisheries is very difficult to estimate (multipurpose fisheries). It is estimated to be about 27 210 unities.
- Offshore fisheries : 555 medium-size boats were engaged in offshore fisheries in 1991.
- High-seas fisheries : in 1989, 400 boats were engaged in squid high-seas and "foreign 200-mile zone" fisheries. The latter operated mainly in the New-Zealand 200-mile zone and in Argentinian waters (Falklands).

Production per fishing zone in 1989

Foreign 200-mile zone		Japan's 200-mile zone	
HIGH SEAS	- New Zealand - Argentina	OFFSHORE - Coasts of Japan	
		Small-size vessels (27 210) Medium-size vessels (555)	
	Large-size vessels (400)		
PRODUCTION : 68 %		PRODUCTION : 32 %	

68% of Japanese cephalopod production comes from high-seas fisheries. Squid offshore and coastal fisheries operate in Japan's 200-mile zone. The fishing season begins in May and lasts until February of the following year. Fishing is prohibited from 1 March to 31 April. The peak fishing season is in July and August. Octopus are caught in pot-traps along the coasts and are included in the squid catches (drag-gill-net, drift-gill-net).

JAPAN'S CEPHALOPODS INDUSTRY

1989's PRODUCTION

FISHING FLEET

28 165 BOATS

Coastal

27 210 boats

Off-shore

555 boats

High-sea

400 boats

I

I

I

Japan's 200-mile zone

Distant waters

PRODUCTION

32%

68%

IMPORTS

782 903 Tons

226 900 Tons

269*10⁹ ¥ (343 ¥/kg) SQUID & CUTTL.

98,5*10⁹ ¥ (435 ¥/kg)

733 594 Tons

SQUID & CUTTL. (60% *S. officinalis*)

OCTOPUS (6,5%)

115 000 Tons

49 309 Tons

OCTOPUS : 111 700 Tons

MARKET

EXPORTS

30% imports

2 184 Tons

7,5*10⁹ ¥

1 007 619 Tons

(Storage : 285 897 Tons)

CONSUMPTION

719 538 Tons

(SQUID & CUTTL. 84%)

(OCTOPUS 16%)

Fresh : 40%

Processed : 60%

Tokyo's consumer price : 1 200 ¥/kg ex. : Saki-ika 4 000 ¥/kg

Sushi, sashimi

High added-value

Fig. 1 - Japan's Cephalopod industry in 1989.

-Production japonaise de céphalopodes en 1989.

Structure of the offshore and coastal fleets

Size (T)	% Fleet	% Production
-5	80	9
5 to 10	11	9,2
10 to 20	6	15,4
20 to 50	0,4	2,5
50 to 100	1,5	10,9
100 to 200	0,6	9
200 to +	0,5	44

Squid can be fished with a drag gill net or a set net, but in offshore fisheries, the main method is angling. 44 % of the production is caught by 135 boats of the over 200-ton category.

Structure of the distant-water fleet

Size (T)	% Fleet	% Production
-100	11	8
100 to 200	33	22
200 to +	56	70

Squid distant-water fisheries operate essentially in New Zealand and the Falklands. Boats carry automatic squid angling machines and are equipped for freezing and processing the fish.

Boats over 200 gross tons realize 70% of the production of this fleet.

Production per species (1989)

Japan's production : 782 903 tons
World production : 2 536 974 tons

Squid and cuttlefish	Octopus
733 594 tons	49 309 tons
Main species :	Main species :
Tsurume ika (38%) (<i>Todarodes pacificus</i>)	Madako (<i>Octopus vulgaris</i>)
Aka ika (20%) (<i>Illex argentinus</i>)	Mizudako (<i>Octopus hongkongensis</i>)
(<i>Ommastrephes sloani</i>)	Iidako (<i>Octopus ocellatus</i>)
Ko ika (<i>Sepia esculenta</i>)	
(<i>Sepia lycidas gray</i>)	
Mongo ika (<i>Sepia officinalis</i>)	

Cephalopods are divided into three groups : Sepioidae (Cuttlefish), Teuthoidae (Squid), Octopodidae (Octopus). These groups interest different consumers and "parallel" distribution markets in Japan. Japanese statistics do not make a precise distinction between squid and cuttlefish. The name "Ika" refers to Sepioidae as well as to Teuthoidae. "Mongo ika" refers only to *Sepia officinalis* which is much appreciated by Japanese consumers.

Cephalopod imports (1989)

Total : 226 900 tons
Import/Production : 30%

Squid and cuttlefish (Import quota: 53 000 tons/year) 48 000 tons	<i>Sepia officinalis</i> Unlimited import 67 300 tons	Octopus 111 700 tons
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Squid and cuttlefish imports are subject to an import quota which has been fixed at 53 000 tons per year since 1986. *Sepia officinalis* being particularly appreciated in Japan, this species represents around 60 % of the total squid and cuttlefish imports.

The domestic catch of octopus has gradually declined since 1977 with the establishment of the 200-mile zone in West African countries. Now Japan manages to import more than double its own production to satisfy the home market.

The demand for cephalopods (1989)

Production : 782 903 tons
(269 billions yens)

Imports : 226 900 tons
(98.5 billions yens)

Exports : 2 184 tons
(7.5 billions yens)

Storage : 285 897 tons

	Squid and cuttlefish	Octopus
Production :	733 594 tons	49 309 tons
Imports :	115 500 tons	117 700 tons
Exports :	1 684 tons	500 tons
Storage :	259 652 tons	26 245 tons

The overall demand for squid and cuttlefish has ranged from 570 000 tons to 640 000 tons. The volume of imported octopus is around 100 000 tons per year. Both markets are generally stable with low variations.

In the last few years, due to the glut on the international market (higher production), storage, mainly of squid and cuttlefish, has increased considerably. There was a drop in prices, but the professional associations have taken "auto-regulation measures" (cutting the domestic production and processing) to return to a more or less stable market and reduce the storage.

The value of cephalopod imports is higher than that of Japanese production in general :
- imported cephalopods : 435 yens/kg

- domestic cephalopods : 434 yens/kg

It is a fact that Japan imports fish products of high quality and prices. Prices differ according on the species :

- Cuttlefish and Squid : 285 yens/kg
- Octopus : 542 yens/kg
- *Sepia officinalis* : 570 yens/kg

Imports at higher prices than on the domestic market favour the domestic production (fresh consumption mainly), and maintain as stable as possible the prices in the domestic landing ports. Exports concern processed products with high added value. Volumes are negligible.

Cephalopod utilization (1989)

Fresh : 40 % (cuttlefish, *S. officinalis*, octopus)

- Sashimi
- Sushi

Processed : 60 %

- Edible food (squid)
 - Salted
 - Smoked
 - Salted and dried
 - Dried
 - Canned
 - Fermented, vinegared
 - Paste (sausage)
 - Boiled with soy sauce or others
 - Delicacies (shredded, dried squid (Saki Ika), flat, rolled and dried squid (Noshi Ika)
- Non edible
 - Eyes : vitamin B
 - Liver : fish sauce, cuttlefish oil (Ika Abura)
 - Ink filled sac : sepia pigment (Sumi Bukuro)

Trade in processed cephalopods

There is an import-quota for processed squid and cuttlefish (4 500 tons per year). In 1989, Japan imported 4 341 tons of processed cephalopods at 1 670 yens/kg, mainly from Asian countries. Exports from Japan are negligible, but prices of processed cephalopods reach more than 3 000 yens/kg. For example, the delicacy "Saki Ika" is sold at more than 4 000 yens/kg. At 285 yens/kg for the raw product, the added value is multiplied by 15.

Japan's cephalopod market is essentially a consumer market. Fresh octopus and cuttlefish are favoured by restaurants and households. Whereas squid is usually processed. Imports only complete the national production to supply the domestic market. Japan has no export goal concerning the fisheries industry. The quality of the products is essential. It does not hesitate to import higher-priced products to ensure higher quality. Thus Japanese importers are responsible for 40 % of the cephalopod trade on the world market (50 % in value).

Actors

Producers

Producers are organized in several professional associations. At the top is the Japan Fishery Agency which sets up the basic rules for a production strategy for fisheries. The government has allotted legal fishing grounds according to the size of the boat. Restricted areas also exist. Light fishing at night is limited and each category of fishery has its own limited season.

Japan's Ministry of Agriculture, Forestry and Fisheries (MAFF) controls the whole fishing industry within the archipelago. The MAFF issues licenses to fit out fishing boats, each clearly specifying the activity of the fishermen (catch method, species caught, fishing zone, catch quota, etc.). This prevents uncontrolled competition between coastal, offshore and long-distant waters fisheries. Harmony between the different actors in the production structure is essential. Freedom to expand or invest in foreign fishing possibilities is not systematic.

The professional associations decide how to put into application the government policy. They have greater control over the fishermen engaged in small-scale fisheries (coastal and offshore) in Japanese waters. They include :

- Fishermen who have changed their small fishing boats for larger models to specialize in offshore squid fishing. They are continuously active, moving from one fishing ground to another, seeking migrating schools of squid. The hauls are sold wholesale at the nearest designated fishing ports every 2 or 3 days. Each vessel exchanges information on fishing conditions with sister vessels covering various areas. They are mainly 15, 20 and 29 gross tons vessels.

- Fishermen who perform multiple operations connected with squid fishing. Squid fishing is the main business of this group of fishermen, but in the off-season or in the event of a poor haul, they also combine other types of fishing, such as angling, long-lining, gill-netting : mainly 5 to 10 gross tons vessels. All these fishermen are members of fishery cooperative associations.

Medium and large size vessels are financed by the professional organizations or by trading companies. This results in a kind of "cartel" in cephalopod industry. Generally, they control the whole channel. The three biggest producer associations are the Japan Large Squid Vessels Anglers Association, the National Squid Angling Association and the Japan Squid Drifting Association.

The goal of the production strategy is to complete the supply for the domestic market with long-distance fisheries (68 % of Japan's cephalopods production). Cephalopod fisheries in Japan's EEZ have priority. This means that long-distance fisheries do not compete with fishing in Japan's EEZ. The key to the success of the economic system is a good relationship between each component of the channel.

Large trading companies with large financial assets are welcome to invest in the long-distance fisheries. They have a good knowledge of international trade and rapidly integrate innovations, the results of scientific experiments and trade informations. They have the capacity to act and react, to prospect new fishing zones or to stop and/or change their activity.

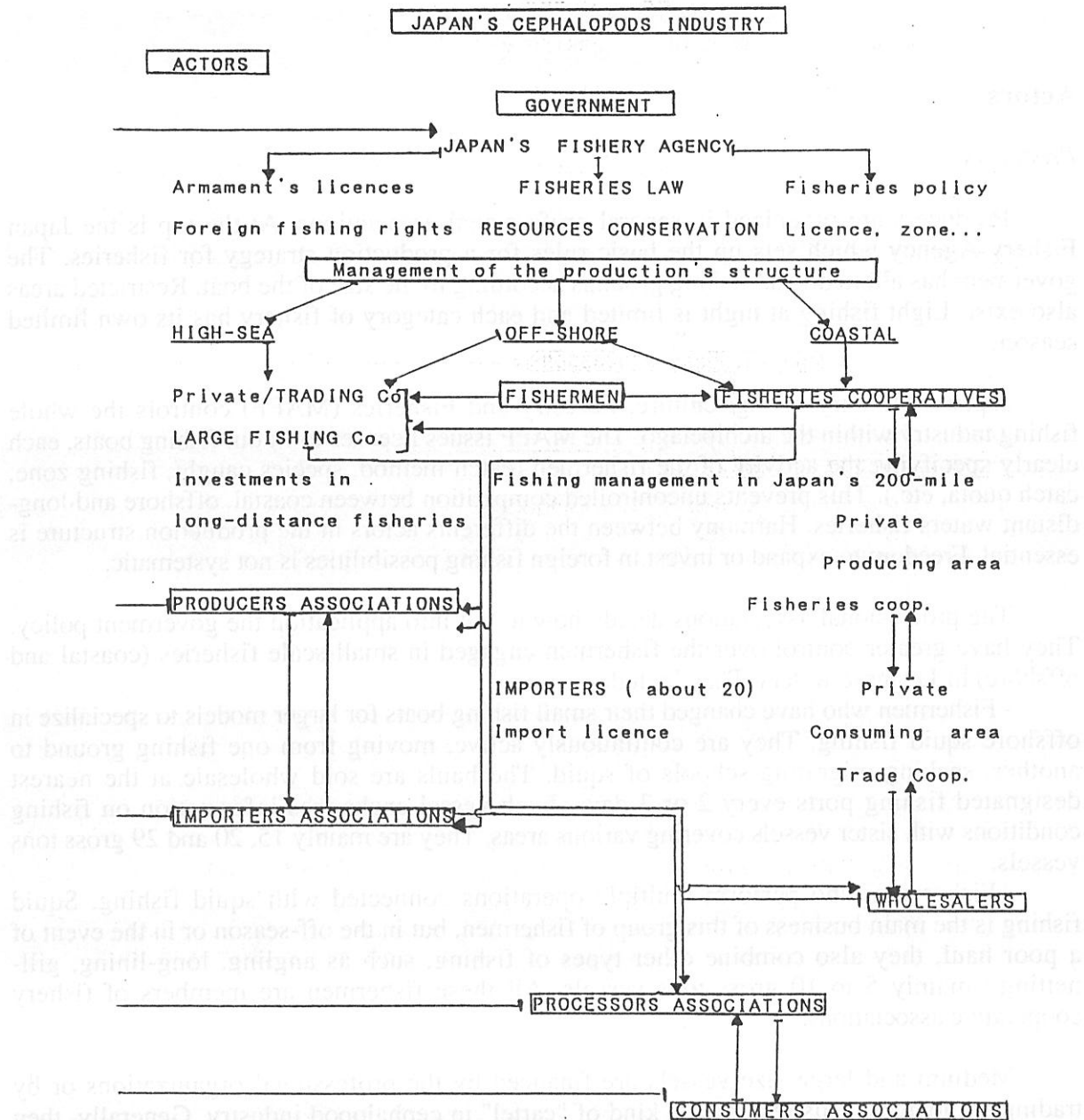


Fig. 2 - Japan's Cephalopod industry : actors.

- *Industrie japonaise de céphalopodes : les acteurs.*

High-seas and foreign 200-mile zone fisheries are orientated first to supply the domestic market. They never compete with foreign fleets (which usually have export goals), nor with the Japanese 200-mile zone of cephalopod fisheries. This gives the whole fishery sector outside Japan great vitality and flexibility. They are bound to their own market, and not to the international export trade.

Importers

The cephalopod trade in Japan concerns 20 importers in trading firms and large off-shore/long-distance fishing companies. Only a small amount of cephalopods is imported directly by supermarkets or large retailers. Cephalopod importers are members of the Japanese Seafood Importers Association.

In 1989, cephalopods were imported from :

Squid		Cuttlefish		Octopus	
Poland	28%	Thailand	27,4%	Mauritania	29%
Bulgaria	21%	Morocco	13%	Morocco	25%
New Zealand	10%	Spain	9%	Spain	20%
Argentina	7,5%	Gambia	6,7%	Gambia	15%
Taiwan	6,5%	Korea Rep	6,5%	Thailand	6%
Germany	6%	Mauritania	5,9%	Korea Rep	3%
Thailand	4%	Ghana	4,5%	Others	2%
Korea Rep	2,6%	Others	27%		
Others	14,4%				

They are various sources. Approximately 38 countries export cephalopods to Japan. Generally large fishing companies, as well as large trading companies, place representatives at the main fishing bases overseas. They provide technical guidance to the fishing vessels on product conditioning and packaging. Fishing vessels in these countries are mostly affiliated with some import companies.

Wholesalers

In the case of domestic production, wholesalers collect and distribute goods in the central market of the producing region and the wholesale market in the consumer region. Imported products are scaled before distribution on the market. After the sorting operation, imported products are handled like the domestic products. Wholesalers' role is to ensure a constant supply of raw materials to processors and to distribute the product to the market. Often they possess their own cold-storage installations.

Processors

There are about 100 processors all over Japan (30 in Tokyo) belonging to the National Federation of Processed Product Cooperatives. There are three types of processors, those specializing in primary conditioning (scalers...), others in seasoning or soaking fish in vinegar for secondary processing, and others who slice the product and pack it for the consumers. Processors usually keep a one to two months supply of raw materials.

Consumers

Everyone knows that the Japanese are fond of fish and eat a large variety of them. Cephalopods are eaten fresh or processed like delicacies. All concerned along the production line pay great attention to the tastes of the consumers, but the commercial aspect is never forgotten. Often consumers are ready to pay high prices for better quality. The fresh product is more expensive than elsewhere, but the processed products are even more expensive. Demand is stable.

Items	PRODUCTION				Total
	Total	Squid	Illex arg. O. sloani	S. escul. S. lycid.	
1982	537,838	385,255	---	152,583	585,80
1983	686,611	331,225	---	355,386	943,75
1984	525,787	173,732	121,388	230,667	1025,81
1985	531,019	132,586	172,709	225,724	1128,83
1986	464,248	90,997	133,570	239,681	1252,14
1987	754,635	182,517	185,008	387,110	1019,21
1988	663,797	156,444	139,084	368,269	1015,94
1989	733,594	211,887	151,908		1154,88

Items	Landing prices (Squid)			Import prices *	
	Fresh	Frozen	Other	S. offici- nalis	Others
1982	322	307		501	
1983	318	286		509	
1984	536	389		557	
1985	610	426		575	
1986	705	429		583	274
1987	502	302		575	341
1988	451	272	174	570	284
1989	325	194	174	680	344

* Frozen products

Table 1 - Squid and cuttlefish statistics (source: Fisheries Agency, Japan).
- Statistiques concernant les calmars et les seiches.

HOKKAIDO : 21,7 %

NORTH PACIFIC OCEAN : 34 %

Aomori : 22,1 %

Iwate

Miyagi

Fukushima

Ibaragi

MID-PACIFIC OCEAN : 12 %

Tokyo

Kanagawa

SOUTH PACIFIC OCEAN : 2,5 %

Ehime

NORTH JAPAN SEA : 9,2 %

Toyama

Ishikawa

WEST JAPAN SEA : 8,3 %

Shimane

Yamaguchi

EAST CHINA SEA : 13 %

Fukuoka

Nagasaki

SETO INLAND SEA : 2,1 %

Hyogo Ehime

Table 2 - The main cephalopod landing ports in Japan.

- Les principaux ports de débarquement de céphalopodes au Japon.

Conclusion

The cephalopod industry in Japan reflects the specificity of the whole fishery sector. It is the most important seafood market half of which depends on international trade, despite the high level of fisheries production. Moreover some developing countries export to Japan. Seafood products play a large role in the traditional eating habits of Japan, which has developed the best technology for fishing, conditioning, marketing, etc. Cooperation and the exchange of information between the different actors enable the whole channel to adjust to any change in the situation.

In the fishery sector, Japan's policy is to supply above all the home market. That is why it is essential to obtain fishing rights from Third-World countries. The whole channel is organized primarily to sustain the domestic production.

What is meant by management of ecosystems ?

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Key words : ecosystem, management, oyster farmers, regulation, Brittany.
Mots-clés : écosystème, gestion, ostréiculteurs, réglementation, Bretagne.

Abstract

At the present time we are confronted with the problem of setting up management policies for coastal ecosystems. Usually a management system is based on regulations which make it possible to control the right to exploit resources.

Data provided by scientists, biologists and economists allow new ways of appropriation to be determined. Yet, in fact, by imposing new standards, many conflicts arise between the people concerned.

In this article we should like to show that conflicts resulting from these management policies are symptomatic of far more complex problems at stake than a simple economic analysis is capable of revealing. We have therefore done a survey in North Brittany (France) among a group of oyster farmers who have been submitted to strict regulations regarding access to resources in Cancale Bay since 1 January 1990. After a statistical study, begun in 1987 and just ended, explaining the internal organisation of this group, we have been able to determine the aspects of and approaches to the notion of ecosystem management from the biologists' point of view.

At the end of this study we have seen that after a systematic investigation on a professional group, the notion of ecosystem management as defined by scientists appears to depend on changes in regulations concerning the exploitation of local resources. In the case we examined, changes were necessary to deal with a problem resulting from the regulations imposed. When a product suffers depredation new actors are called upon: the state and scientific researchers. With the new standards imposed, access has led to increasing complications in management, proving that the former system was no longer rational.

By introducing the notion of management, the local group had to change its former method of organising its activity and they lost control of the new system for the new regulations did not correspond to the true situation.

At another level of our analysis, we also found a further illustration of the different relationships existing between man and nature.

Qu'entend-on par gestion des écosystèmes ?

Résumé

Nous sommes confrontés à l'heure actuelle à la nécessité de mettre en place une politique de gestion ("management") des écosystèmes côtiers. Habituellement, un système de gestion est fondé sur une réglementation permettant de contrôler l'exploitation des ressources.

Les données fournies par les chercheurs, les biologistes et les économistes permettent de déterminer de nouveaux modes d'appropriation. Cependant, en réalité, le fait d'imposer de nouvelles normes provoque de nombreux conflits entre les parties concernées. Nous souhaitons montrer ici que ces conflits, causés par ces politiques de gestion révèlent une situation trop complexe pour être évaluée avec une simple analyse économique. Nous avons donc entrepris une étude en Bretagne du nord, auprès d'un groupe d'aquaculteurs soumis aux strictes réglementations en vigueur depuis le 1er janvier 1990 concernant l'accès aux ressources dans la baie de Cancale. Une étude statistique, commencée en 1987 et terminée à présent, sur l'organisation de ce groupe, nous a permis de déterminer les aspects et les approches de la notion de gestion d'écosystèmes du point de vue des biologistes.

A l'issue de notre enquête, nous avons constaté, après une investigation systématique auprès de ce groupe professionnel, que la notion de gestion d'écosystème, telle qu'elle est définie par les scientifiques, semble dépendre de modifications apportées à la réglementation de l'exploitation des ressources locales. Dans le cas que nous avons examiné, ces modifications étaient indispensables pour résoudre un problème résultant des règles imposées. Lorsqu'une ressource est menacée, on fait appel à de nouveaux acteurs : l'État et les chercheurs

scientifiques. Avec les nouvelles normes imposées aux aquaculteurs, l'accès aux ressources a été une source de complications croissantes, ce qui prouve que le système antérieur n'était plus rationnel.

Avec l'introduction de la notion de gestion, le groupe local a dû modifier l'organisation de ses activités et a ainsi perdu le contrôle du nouveau système, les nouvelles réglementations ne correspondant pas à la situation réelle.

A un autre niveau de notre analyse, nous avons également trouvé d'autres exemples illustrant les différentes relations existant entre l'homme et la nature.

Introduction

In recent years, official regulations have been set up in France in an effort to manage the use of the coastal ecosystem. The notion of ecosystem management relies on data provided primarily by scientists of the Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER). The goal of the regulations is to set limits on the breeding of shellfish stocks in accordance with water trophic capacities determined by the afore-mentioned biologists. Once the limits have been debated and finalized by the professional syndicates of oyster farmers, the trusteeship, referred to as the « Affaires Maritimes », is in charge of their application.

Oysters feed safely on organic particles in suspension or dissolved in sea water. The oyster farmer never intervenes directly in the nutritional process of the shellfish and can do nothing to affect the trophic capacity in an area. The setting of official limits, based on estimates of the present trophic capacity of an area, is therefore the most logical and effective means available for managing a coastal ecosystem. Unfortunately, the introduction of political management, especially in the application and enforcement of regulations, brought about numerous problems and reduced the oyster farmers' autonomy. This helps to explain the farmers' scepticism with respect to the theory of trophic capacity limitations.

The first part of this paper traces the birth of the notion of ecosystem management beginning with the crisis of the Marennes-Oléron Basin in the 1960s. Effects of political management of the ecosystem on the oyster breeding industry are studied in the second part using two significantly different methods : the first corresponding to the global approach of a professional group ; the second representing a stratified approach to one group. Both approaches, however, rely upon the same process of systematic analysis.

The concept of an oyster ecosystem management

The oyster ecosystem management concept was formed with a view to studying the various epizooties which have been depleting the oyster populations in France's coastal waters.

The epizooties

Since the beginning of the century, four epizooties have severely reduced France's oyster population. Each of these illnesses attacked only one type of the oysters presently found in French waters. Three of them affected *Ostrea edulis* while the other developed among *Crassostrea angulata*. During the time prior to the appearance of the epizooty responsible for the annihilation of *C. angulata* on the French coasts, the physiological conditions of the oyster population in the Marennes-Oléron Basin (the only area studied by IFREMER biologists) seemed to have worsened. According to the scientists, there was a

constant increase in the growth period of *C. angulata* from two to four years between 1961 and 1970, while the mortality rate increased from 20 % to 70 %. Nevertheless the oyster population grew from 100 000 tons in 1960 to 150 000 tons in 1969 (1).

Between 1966 and 1969, some of these oysters were victims of an illness which perforated their lungs. In 1970, *C. angulata* died in vast numbers in what scientists suspect was a viral attack (the pathogenic agent was never found again although the IFREMER biologists believe that it had always existed in the basin). All subsequent attempts to breed *C. angulata* resulted in failure as the epizooty grew quickly, soon covering the entire French coasts. In order to combat the effects of the virus, oysters farmers, aided by government reduced loan rates, undertook to import Japanese oyster seed in massive amounts.

Previous to 1970, the major stock depletions had occurred in different basins as early as 1920-21. The pathogenic agent appeared to stay in the Breton waters until the 1950's. With the spread of this epizooty, the breeding of *O. edulis* ceased entirely, except in Brittany. The experimental protocols were considerably different during this period ; today, little reliable information about this agent is available.

The second *O. edulis* epizooty appeared in 1968 in the Aber Wrach oysters farms. The pathogenic agent was a previously unknown protozoid called *Marteilia refringens*. This parasite first affects the oyster's digestive gland cells. Its transmission can only occur when the water is above a specific temperature and as a rule therefore only causes concern in winter. Depending on the climatic and sanitary conditions of the water, the oyster infestation ratio varies between 5 % and 40 % (Balonet *et al.*, 1979). The disease still exists in some Breton oyster banks.

The third *O. edulis* epizooty began in 1980 on Ile Tudy. Its pathogenic agent was also a previously unknown protozoid called *Bonamia ostrea*. It appears to be more dangerous than its predecessors, because just a few cells are enough to kill an oyster and the agent is infectious all year round. Thus, since the appearance of the epizooty, the breeding of *O. edulis* in the intertidal zone is both prohibited and impossible owing to the presence of the protozoid in a majority of the oyster beds existing there.

An oyster's immune system differs from that of vertebrates in that it lacks memory antibodies, and so they cannot be vaccinated. Furthermore, medical prophylaxis, in the form of balneotherapy, is impractical because this requires the operation to be performed several times a year, increasing both production costs and the oysters' mortality rate (Troadec *et al.*, 1990). Currently, the oyster farmers breed *O. edulis* in the open sea, because in large bodies of water it is difficult for the protozoid to contaminate them. They are gathered at the end of two years, as the risk of contamination greatly increases after this time period. The only existing ways of fighting the growth of the epizooties are zoosanitaries.

The government and the IFREMER

Gouvernement intervention in the French oyster industry came in the form of reduced rate loans to help existing enterprises. Scientists were also asked to provide a theory explaining the frequency of the epizooties. Thus, in 1977, IFREMER biologists, studying the ecosystems of the oyster, began to investigate the relationship between the oyster population increase, the death rate and the prolongation of the oyster maturation time period. Finally,

1) IFREMER DRV 86-06 Aq/Trem.

they correlated the physiological degradation of *C. angulata* to the beginning of its epizooty in the Marennes-Oléron Basin.

The appearance and development of the epizooties were found to be linked to the oyster-breeding techniques, at least regarding the viral disease that destroyed *C. angulata*. It should be noted that this theory seems currently to be questioned by some pathologists. They feel that the weakening of the oyster population is not a causal factor ; it is more likely the pathogenic virus found in the oyster seed imported from Japan which explains the appearance of the illness. Research into the third *O. edulis* epizooty investigated an importation of oysters from California which coincided with the outbreak of the disease.

Once the afore-mentioned correlation of the physiological degradation of *C. angulata* had been established, biologists working on the oyster ecosystems held a meeting with professional representatives of the Marennes-Oléron Bay and certain executives of IFREMER and the « Affaires Maritimes ». At this 1986 meeting, the biologists suggested to the representatives of the oysters-farmers that a collective management based on the limitation of the oyster populations, according to the potential feeding capacities of a specific area of water, should be instituted. The scientists were to determine the balance between these feeding capacities and the size of the oyster population, while the professional farmers' organisations agreed to pass legislation limiting the density of breeding. The technicians of the « Affaires Maritimes » were to supervise the application of this agreement.

Today, five years after this meeting, legislation limiting stock has been in effect in almost all of the oyster rearing bays. The rules, slightly different from those of the 1986 conference, were proposed by the professional syndicates and then signed by the maritime prefect on the advice of IFREMER. At Cancale, regulations limit the oyster population to 4 000 pockets per hectare. In the absence of these rules, there would be as many as 10 000 or 12 000 pockets per hectare. As in almost all areas, Cancale simply applied the figure recommended for Marennes-Oléron without attempting to define a specific nutritional value for their own area. The sole region to have studied its own unique balance is that of Bourgneuf Bay which suffered a severe degradation of oyster growth.

To sum up, following its initial financial intervention concerning the oysters farms, in response to the effects of the *C. angulata* epizooty, the state has imposed a general limitation of the individual oyster-farmer's right of access to the coastal oyster beds, in accordance with the results of scientific investigations into resource appropriation.

The meaning of ecosystem management

The imposition of new regulations has created many problems for producers. In order to effectively analyse all of them, research has been divided into two parts. The first study investigates the general response to ecosystem management, whereas the second deals more specifically with the various categories of oyster farmers.

The global approach

This approach was based on a systematic analysis of the response of the professional oyster farmers as a group to the concept of regulation.

The establishment of a political collective to regulate the use of the oyster basin modified the traditional process followed by the farmers. Originally, admission into the

professional group was determined by the oyster-farmers themselves. Passing the oyster claims from father to son was a common practice. A system of self-training acted as a basis for integration in the industry. Established professionals undertook to train the small number of new entrants by giving them practical experience. Novices were employed for several years on an oyster farm as labourers, with a foreman or the head of the enterprise to supervise their apprenticeship. The balanced state of the oyster market created few problems and the oyster farms were financially self-sufficient. The only obstacle facing a new oyster farmer was the construction of a landed reserve. This was also supervised by the professional group. Unfortunately, this style of regulation appears to have been incapable of adapting to the environmental changes imposed by the appearance of the epizooties.

To ensure the future of their enterprises, the professional group asked the state for assistance. As a result, the state launched an inquiry directed and researched by the IFREMER biologists to measure the extent of the intervention needed. The aim of this project was to discover the weaknesses in the existing oyster cultivating system which could have enabled a few diseases to have such a catastrophic effect. The conclusions of the studies permitted the establishment of new regulations based on a limitation of the stocks.

Once state aid was introduced into the system, it prompted a redefinition of the rules and balance of power. More specifically, it modified the method of setting production levels. The role of the oyster farmers was reduced and more attention was paid to biological factors, particularly the feeding capacity of the basin. The oyster farmers, of course, resented this loss of autonomy due to the imposition of a limitation on their use of natural resources.

The different oyster-farm categories

The second approach, used to study the effects of newly imposed regulations, began by focussing on the Cancale oyster farmers. Not all the oyster farmers share the same opinion of ecosystem management. The attitude of Cancale oyster farmers ranges from scepticism to outright hostility towards the biologists' conclusions. In some other basins, the oyster farmers appear more willing to cooperate.

To explain the differentiation of individual attitudes in Cancale towards the establishment of political management, large-scale surveys were conducted. In fact, two surveys were used to study the opinion of the professionals about political management and IFREMER theories :

- a 1987 statistical survey of the oyster farmers in North Brittany establishing a typology of the categories of oyster farms by focussing on the criteria of differentiation between enterprises ;
- a series of 1988-89 direct interviews with the oyster farmers investigating their attitudes towards the political management system.

The interviews were conducted with a representative group of one third of the farmers who had been surveyed in 1987. This sample size is necessary to overcome the induced limits of an average questionnaire concerning the opinion, attitude, or representation of a subject.

As a result of the 1987 statistical survey, three categories of exploitation can be defined :

- Small production units which produce from 5 to 30 tons of oysters annually with a farming area not exceeding 150 ares (1 are = 100 m²). These farmers can either breed only and sell their product to bigger farmers, or own a shipping licence and

sell directly to consumers. In the latter case, shipments are limited in size by the production of the oyster farm itself. In 1987, 31,1 % of the owners of an oyster claim in Cancale Bay belonged to this category.

- Modern farmers who produce from 50 to 200 tons annually with an area between 200 and 700 ares. Most of these farmers have a direct sale relationship with the consumer market. The most successful may buy from breeders to fill out a large shipment. The term « modern » in the name given to this class indicates that these farmers possess the most mechanized equipment. This allows them to maintain a reasonable profit margin by reducing their labour costs to deal with other production costs which have been rising since the late '60s. Automation is also the most effective means to expand an enterprise within the family unit. In 1987, this class comprised 29 % of the owners of Cancale Bay oyster claims.
- Large productions units which produce more than 200 tons a year on claims often larger than 1 000 ares and in some cases as large as 4 000 ares. In this class, each situation is different and the population is not large enough to permit a proper statistical analysis. However, in the cases studied, at least half of the production is bought from others breeders. In Cancale, only one of the oyster farmers belongs to this class. For this reason, other large oyster farmers in North Brittany were interviewed.

The remaining 39,2 % represents the oyster farmers who did not exploit their oyster claim in 1987. They own extremely small surfaces of 5 to 50 ares. Since the great epidemic mentioned above, that resulted in the death of the *O. edulis*, these oyster claims have been abandoned and are therefore not included in the survey. By now, many of these owners have sold their claims.

	Small Production Units	Modern Farmers	Large Production Units
Surface (ares)	150	200 to 700	more than 700
Production (tons)	$5 < X < 30$	$50 < X < 200$	more than 200
Operation type	breeders and larger wholesalers/breeders	primarily : wholesalers/breeders	wholesalers
Proportion	31,1 %	29 %	

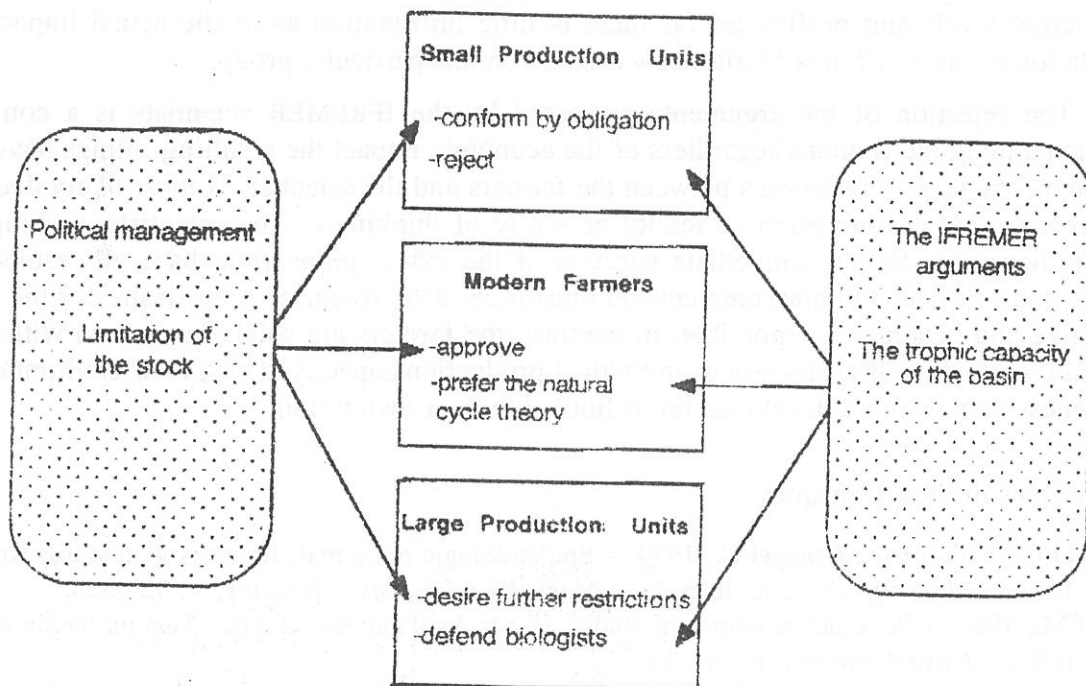
Table 1 - Typology of the oyster farmers in Cancale Bay.
- *Typologie des ostréiculteurs dans la baie de Cancale.*

The second part of the study correlates the attitudes of the farmers towards the political management system and the IFREMER biologists to the categories defined above. The results are summarized in the following figure. It was found that on larger, more productive farms, people answering the survey tended to agree with the regulations suggested by the IFREMER biologists. However, only one large production unit in category 3, out of the thirty surveyed, fully supported the arguments presented by the IFREMER concerning limitations of the oyster population.

General attitudes of the oyster farmers towards political management and the theory of limited trophic capacities

Among the thirteen modern oyster farmers interviewed, eleven tend to approve these population restrictions, not because of the importance of trophic capacities, as argued by the biologists, but because they think the regulations reduce competition between the oyster farmers by diminishing overall production. For nine of them, the growth rate of the oysters is seen purely as a result of the natural cycle, where one good year can be followed by a bad one, i.e the number of oysters they place on their claims is thought to be of little consequence. Thus, the natural cycle becomes the causal factor in the variation of the growth rate of the shellfish. The remaining two oyster farmers cannot explain this variation.

The sixteen directors of the small production units reject the theories developed by the IFREMER biologists ; however, most of them have no alternative ideas to explain the oyster growth variations. Those who do have explanations tend to favour the theory of the natural cycle. The small production oyster farmers conform to the new rules only because they are obliged to do so by the administration of the « Affaires Maritimes ».



Clearly, the attitudes expressed by the oyster farmers are linked to the relative size of their breeding surfaces. The establishment of political management for the coastal ecosystems has also resulted in a economic modification of the oyster market. Originally, breeding was regulated by the volume of stock demanded. By limiting stocks according to the surface area of the claim, the government has redefined the operation of the market. One of the weaknesses soon evident is that the surfaces of present claims cannot be expanded if the limitations do not provide enough profit to allow investment. At Cancale, only two categories of farmers are able to adjust their oyster claim areas under the new regulations. Both these groups, the modernist farmers and the director of the large unit, defend the limitations. The

smaller enterprises, however, are faced with numerous problems, because they have to own at least one and a half hectares to operate legally, but the limitations on stocks per hectare mean that a larger claim is now necessary to produce the same amount of oysters, and therefore revenue, as before. Many of these smaller oyster farmers cannot obtain the financing necessary to extend their claim to a profitable size, owing to their already weakened positions.

Conclusion

The two-part analysis presented above allows us to observe the consequences of France's attempt at managing its oyster industry. For the professional oyster farmers this intervention has resulted in a modification of the method of regulation and thus a loss of their supervisory role in the system of production management. As shown by the Cancale survey, the new system has proved to be advantageous for those farmers with the capacity to enlarge their holdings. For these cultivators, acceptance of the new limitations is based on economic rather than biological benefits. Small farmers without the resources to expand their surface area are faced with either closure, redevelopment, or a significant reduction of their production levels and profits. So far there is little information as to the actual impact the legislation of the « Affaires Maritimes » has had on this particular group.

The rejection of the arguments presented by the IFREMER scientists is a common reaction among the farmers, regardless of the economic impact the resulting rulings have had on them. The lack of consensus between the farmers and the scientists is most likely due to a difference in their conception of reality or « way of thinking ». The scientists, seeking the factors necessary for the immediate survival of the oyster population, base all results and suggestions on concrete measurements and historical data, owing to their desire for the most objective and general view possible. In contrast, the farmers are solely concerned with their own survival which is a function of individual production capacity. Thus, their environmental awareness may be more developed but is limited to their own terrain.

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Dynamique économique et sociale en milieu ostréicole

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Mots-clefs : ostréiculture, structure sociale, évolution, économie, Marennes-Oléron, France.

Key words : oyster-farming, social structure, development, economy, Marennes-Oléron, France.

Résumé

L'évolution de la structure sociale de la communauté ostréicole dans le bassin de Marennes-Oléron est la conséquence directe de bouleversements écologiques. Il y eut trois phases de transformation liées aux trois espèces d'huîtres ayant séjourné dans ce bassin (*Ostrea edulis*, *Crassostrea angulata*, *Crassostrea gigas*) :

- Avec l'introduction de la *Crassostrea angulata*, à la fin du XIX^e siècle, alors que l'*Ostrea edulis* est toujours exploitée dans ce bassin avec elle, on voit émerger une nouvelle communauté ostréicole composée d'hommes d'origine agricole.

- Avec la disparition de l'*Ostrea edulis* dans ce secteur (1920), les entreprises d'affinage de la plate adoptent la *Crassostrea angulata*, et transforment la structure sociale interne de leur cabane en favorisant l'installation d'une partie de leur personnel. C'est une forme de répartition des risques.

- Après la disparition de la *Crassostrea angulata*, en 1972, et avec l'introduction de la *Crassostrea gigas*, un certain nombre d'éleveurs tentent de se dégager de la dépendance économique à l'égard de l'expéditeur, en s'inscrivant eux aussi comme expéditeurs.

Social and economic dynamics in an oyster-farming community

Abstract

Transformations in the social structure of the oyster-farming community of the Marennes-Oléron Basin have all been a direct consequence of ecological modifications. The changes which have occurred in three successive periods were each related to one of the three species of oysters bred there (*Ostrea edulis*, *Crassostrea angulata*, *Crassostrea gigas*).

- With the introduction at the end of 19th century of *Crassostrea angulata*, added to *Ostrea edulis* already present, a new oyster-farming community arose, consisting of people who had formerly farmed the land.

- When *Ostrea edulis* disappeared from this sector in 1920, the oyster-farmers concentrated on *Crassostrea angulata*. By grouping together and encouraging some of their employees to set up on their own in partnership, risks were shared and a new social structure emerged.

- After the disappearance of *Crassostrea angulata* and the introduction of *Crassostrea gigas* in 1972, the oyster-farmers decided to become completely independent. Circumventing the professional dispatchers, they took charge of dispatching themselves.

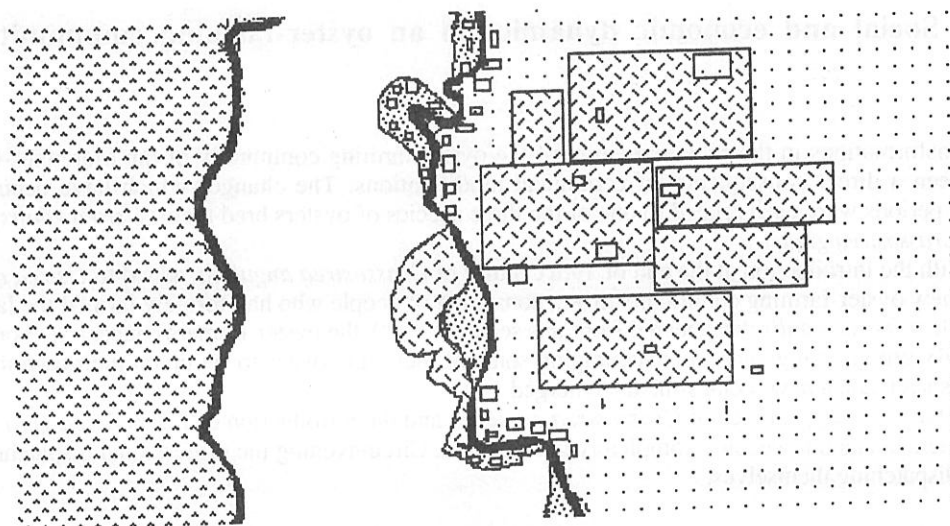
Introduction

Notre réflexion portera ici sur l'évolution, en un peu plus d'un siècle, de la structure socio-économique d'une micro-société qui cultive les huîtres : les ostréiculteurs du bassin de Marennes-Oléron.

Dans ce bassin, situé en Charente-Maritime, au nord du bassin aquitain (Fig.1), la culture de l'huître se pratique en deux lieux : l'estran et le marais. L'estran appartient au domaine public maritime. Une partie est concédée aux exploitations conchyliques, parmi lesquelles les exploitations ostréicoles sont les plus nombreuses. Le marais, endigué ou de sartières, situé à cheval sur le domaine public et le domaine privé, s'interpose entre la mer et les plaines agricoles (Fig.2). A chacun de ces lieux correspond une activité spécifique : le captage et l'élevage sur



Fig. 1 - Situation du bassin de Marennes-Oléron.
- The Marennes-Oléron location.









-  sea
-  private property
-  wetland
-  terre plein
-  limits between the Public Seaside Property and the private property
-  huts

Fig. 2 - Domaine public et domaine privé sur le littoral.
- Public maritime property and private property.

l'estran et l'affinage dans le marais. Marennes-Oléron étant la seule région française d'affinage, ce lieu a pour les professionnels charentais une très forte charge symbolique.

L'établissement, la "cabane", troisième espace d'activité ostréicole, est le lieu des travaux terrestres (préparation des collecteurs, "détroquage", tri, etc., et expédition).

Les trois temps de l'ostréiculture charentaise : la plate, la portugaise, la japonaise.

Trois dates-clefs sont à retenir pour le bassin de Marennes-Oléron : - 1875 : introduction de la portugaise; - 1920 : disparition totale de la plate; - 1971 et 1972 : disparition de la portugaise et introduction de la japonaise.

Nous avons pu observer que l'évolution de la structure sociale de la communauté ostréicole de Marennes-Oléron est la conséquence directe de bouleversements écologiques : développement d'espèces nouvelles, disparition des espèces existantes par destruction des gisements et épizooties. En effet, chacune des phases de transformation socio-économique majeure est liée à l'une des trois espèces exploitées dans le bassin : *Ostrea edulis* (la plate), *Crassostrea angulata* (la portugaise), *Crassostrea gigas* (la japonaise).

La plate, désignée dans cette région sous le nom commercial de "la Marennes", était l'huître indigène des côtes françaises. Intensément dragués ou pêchés à pied, les importants gisements, situés entre l'île d'Oléron et le continent, commencèrent à s'affaiblir dès 1855, et disparurent totalement des côtes saintongeaises vers 1880-1882. Les huîtres récoltées sur gisement ne suffisant plus à l'approvisionnement du bassin, les Charentais furent donc contraints, dès le milieu du XIX^e siècle, de se fournir auprès d'autres bassins producteurs - Arcachon, Bretagne -, tout d'abord pour pallier la diminution de production, puis remplacer le produit disparu.

L'exploitation huîtrière à l'époque de la plate se déroulait pour l'essentiel dans le marais et à l'établissement (la cabane) et se réduisait à deux activités : l'affinage et l'expédition. Cette activité huîtrière était pratiquée exclusivement par quelques grandes cabanes. Les propriétaires, détenteurs de grandes surfaces de marais sur domaine privé, employaient à l'année une main d'œuvre féminine et masculine très importante (100 à 150 personnes).

Alors que la plate est encore dans le bassin, la portugaise y fait son apparition dans les années 1875. Cet événement, lié à l'importation d'huîtres du Tage par des exploitants du bassin d'Arcachon, fait suite à l'implantation fortuite de l'huître portugaise dans l'embouchure de la Gironde, puis à sa prolifération sur les côtes saintongeaises jusqu'en Vendée. Tout d'abord rejetée par les affineurs d'huîtres plates, l'huître portugaise fut accueillie comme une manne par une multitude d'individus, pauvres sinon même misérables : journaliers, paysans, marins, qui, vivant à proximité du littoral, étaient bien souvent déjà des pêcheurs à pied occasionnels (des "galopes-chenaux" selon l'expression locale). Cette foule, bigarrée et hétérogène, que l'on désignait alors sous le terme de pêcheurs, qu'ils fussent marins ou terriens, fut à l'origine de nouveaux groupes professionnels ostréicoles, distincts des exploitants de plates. Suivant leur résidence géographique dans le bassin, ces galopes-chenaux devinrent capteurs ou éleveurs. Ils s'emparaient de l'emplacement qui leur convenait et le délimitaient à l'aide de balises. Ce n'est bien souvent qu'après cette appropriation clandestine (illicite) que ces pêcheurs régularisaient leur situation et, pour ne pas payer de redevance, se faisaient enregistrer auprès de l'administration des Affaires maritimes comme "inscrits maritimes". Apparaissent à ce moment là les premiers livres de comptes - prémices de l'entreprise -, et sont mis en place des réseaux

d'échange originaux, inédits, établis en fonction des spécificités d'exploitation des différents secteurs de production du bassin. Avec la portugaise, l'activité ostréicole se déroula alors presque exclusivement sur l'estran. Ainsi, ces hommes, le plus souvent d'origine agricole, se transformèrent en hommes de la mer en se tournant vers cette nouvelle production maritime.

Deux groupes, distincts tant sur le plan historique, technique, social qu'économique, deux produits, deux espaces de production particuliers, ainsi que des réseaux d'échanges différents, exogènes pour la plate qui vient de Bretagne ou d'Arcachon, endogènes pour la creuse puisque les échanges de portugaises se limitent au bassin, tel est le paysage professionnel de l'ostréiculture charentaise avant 1920.

L'éradication définitive de la plate dans le bassin (1920) entraîna en effet un profond bouleversement des modes de production et des structures socio-économiques de cet univers professionnel. Nombre d'établissements d'affinage et d'expédition de plates périclitèrent et disparurent pour n'avoir pas su s'adapter aux nouvelles conditions techniques et économiques imposées par le développement de la portugaise. En revanche, quelques-uns de ces établissements se préoccupèrent de maintenir la pérennité de leur exploitation. Il leur fut nécessaire de réviser leur stratégie de développement, d'une part en affinant en claires, puis en commercialisant les huîtres portugaises; d'autre part, en renonçant à l'emploi d'une partie de leur personnel; enfin, en "déléguant" l'activité d'élevage pour se consacrer presque exclusivement à l'expédition.

Cette évolution entraîna la modification des rapports sociaux internes à la cabane, ce qui transforma du même coup l'ensemble des rapports sociaux au sein de la communauté ostréicole charentaise. C'est ainsi que ces entreprises favorisèrent l'installation de leurs ouvriers comme éleveurs indépendants. Pour cela, les patrons prêtaient à leur personnel parcs, matériels et embarcations, afin qu'à leurs moments libres ils "fassent leurs propres huîtres". La totalité de cette production ouvrière était ensuite achetée par l'expéditeur. Avec l'aide matérielle que leur accordait le patron et grâce aux bénéfices des ressources supplémentaires, ces hommes de cabane se détachèrent du prolétariat ostréicole et créèrent leur propre cabane d'élevage. Cette aide matérielle, accordée encore aujourd'hui aux ouvriers par leur patron, est devenue coutumière. Toutefois, les conditions économiques et surtout territoriales se sont profondément modifiées depuis plus d'un demi-siècle. L'accès au domaine public maritime est maintenant exclusivement réservé aux personnes reconnues par l'Administration maritime comme détentrices du statut de professionnel. En outre, comme la population ostréicole s'est accrue, les surfaces exploitables sont, de fait, proportionnellement plus rares, et leur prix demeure inaccessible à la grande majorité des ouvriers.

La seconde phase du processus d'indépendance de l'ouvrier passait par l'édification d'une cabane. L'accession à la propriété privée était hors de question pour cette population peu argentée. C'est pourquoi la majorité des cabanes d'élevage furent bâties sur le "terre-plein". Cette zone côtière, la plus haute du domaine public maritime, est enclavée entre la mer et la terre. Nombre d'ouvriers accédèrent ainsi à "la propriété" grâce au faible coût des concessions du domaine public maritime, et devinrent autonomes.

Cette indépendance était toutefois assujettie à une double contrainte à l'égard de l'expéditeur. La première était d'ordre spatial. L'accès aux cabanes était conditionné par le droit de passage sur le terrain privé bordant le terre-plein. Dans de nombreux cas, comme pour La G., secteur d'une des communes du bassin, le propriétaire du terrain privé n'était autre que l'expéditeur. Les ouvriers, devenus éleveurs indépendants, étaient donc maintenus par des contraintes territoriales sous la dépendance économique de leur ancien patron. La seconde

contrainte était d'ordre économique. Les éleveurs, quoique libres de vendre leur production à l'expéditeur de leur choix, travaillaient en fait presque exclusivement avec celui qui avait été leur ancien patron. En outre, dès lors que l'éleveur vendait sa production à un expéditeur, il était - et il l'est encore - redevable en contre-échange de son temps. Ainsi, pour les fêtes, il devait, avec sa femme, "donner la main", c'est-à-dire aider à la pêche des huîtres en claires ou à l'emballage. Mais la plus grande contrainte économique tenait - tient encore puisque cette situation existe toujours - au fait que le règlement de la vente des huîtres d'élevage par l'expéditeur était systématiquement différé. L'éleveur devait patienter quatre à six mois, parfois plus, pour que déjà en aval les grossistes et les détaillants se soient eux-mêmes acquittés de leurs dettes envers les expéditeurs. En outre, l'éleveur touchant la globalité de ses revenus annuels une fois par an, la gestion en était délicate. Pour pallier ces difficultés, expéditeurs ou courtiers pouvaient faire une avance sur recette. Cette situation économique, liée en grande partie aux contraintes financières imposées par le marché extérieur, montre combien l'éleveur est dépendant de l'expéditeur.

Au regard de ce qui vient d'être rapporté, on observe que, pour ne pas se trouver confrontées à une crise similaire à celle qu'elles avaient connue avec la plate, la stratégie des entreprises d'expédition, à l'époque de la portugaise, fut de répartir les risques à la production par l'émiettement de la structure interne de la cabane et l'installation de leurs ouvriers comme éleveurs, tout en gardant le contrôle de la production en les maintenant sous leur tutelle. Ces rapports, en apparence fondés sur une relation d'indépendance, tenaient en fait à une forme assez paternaliste qui inféodait davantage, puisque les éleveurs continuaient à vendre presque exclusivement leur production à leur ancien patron. Toutefois les éleveurs adhéraient(-ent) aussi à ce système. Il leur assurait en contrepartie une sécurité économique. La vente des huîtres leur était quasiment assurée même si le prix n'était pas garanti. Les réseaux d'échange étaient stables. Établis sur ce principe éleveurs-anciens patrons, ils étaient fondés sur des relations affectives d'autant plus fortes qu'éleveurs et expéditeurs étaient souvent liés à divers degrés par des liens familiaux. En fait, l'expéditeur ne pouvait se défaire de l'éleveur, élément clef de la chaîne de production, qui dépendait économiquement de lui par des systèmes de prêts, d'avantages en nature, en matériel... Chacune des deux parties connaissait fort bien les modalités de cette relation.

Les modalités d'un nouvel équilibre : la japonaise.

On peut considérer que la structure sociale héritée de l'époque de la portugaise a subsisté jusque dans les années 1970. L'année 1967 voit déjà un affaiblissement du coquillage. En 1971, une épizootie détruisit définitivement les huîtres portugaises sur toute cette zone littorale. L'expérience d'implantation d'une nouvelle espèce, tentée quelques années (1966) avant cette catastrophe par les scientifiques de l'ISTPM, et vraisemblablement, quoique séparément, par des ostréiculteurs locaux, favorisa la réinsertion d'une autre huître creuse, *Crassostrea gigas*, la japonaise. Ainsi, en 1972, une cinquantaine d'huîtres mères furent introduites dans le bassin. L'expérience fut concluante et permit, dans les années qui suivirent, un essor sans précédent de la production.

Il ne fait aucun doute que, dès cette époque, s'amorça une nouvelle transformation de la société ostréicole. Les ostréiculteurs durent se réadapter et modifier leurs stratégies techniques, commerciales et sociales. Les modes traditionnels de production et d'échange furent bouleversés. Avec la portugaise, la division des tâches entre les groupes professionnels était très marquée, chaque exploitation étant spécialisée dans l'une des phases du processus de production. Avec la japonaise, on constate que les unités de production, du captage à

l'expédition, furent contraintes de diversifier leurs activités ostréicoles, sinon de les réaliser toutes. Cette contrainte à la diversification peut être illustrée par deux exemples.

Le premier concerne les capteurs. Dans la tourmente, ce groupe professionnel disparaît pour deux raisons. La première tient au fait que le cycle de production fut rompu pendant deux à trois années avec la mortalité des portugaises. Toutes les catégories professionnelles qui vivaient de l'huître subirent une situation similaire de pénurie. Avec l'arrivée des japonaises, éleveurs et expéditeurs furent contraints de capter eux-mêmes leur naissain pour tenter de reconstituer leur stock d'huîtres. L'abondance de naissain, les premières années, et la rapidité de croissance des coquillages fit que la demande auprès des capteurs diminua. La seconde raison tient à une évolution technique majeure : l'introduction du surélevé (Fig.3) et des poches dans le bassin. Avec les portugaises, les huîtres de captage étaient livrées "en paquet", puis semées directement sur des parcs à plat. Avec le surélevé, les huîtres sont "détriquées", puis mises en poche une à une. Face à une contrainte technique nouvelle pour eux - le détiquage -, et à la généralisation du captage, les capteurs se trouvèrent devant une double alternative : soit disparaître puisqu'ils n'avaient plus leur place dans la chaîne de production de l'huître japonaise, soit se reconvertir comme éleveurs. Ils optèrent pour la seconde solution et réalisèrent alors l'ensemble du cycle de production, du captage à l'huître marchande.

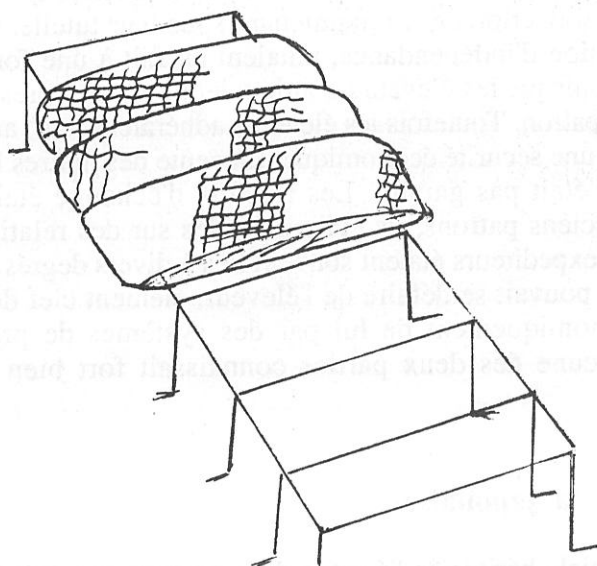


Fig. 3 - Disposition des huîtres "en surélevé".

- Raised oyster-beds; the oysters are placed in bags fixed to metal trestles.

Le second exemple devant illustrer les changements de stratégie de la communauté ostréicole charentaise a trait à l'évolution des relations expéditeurs/éleveurs. Dans les années 1970-1975, peu après la mortalité des portugaises, des entreprises d'expédition importantes vendent pour résister à la crise une partie de leur patrimoine privé, sans utilité strictement ostréicole, et investissent sur le domaine public maritime en "achetant" des concessions adaptées au surélevé, décidant de réaliser eux-mêmes l'ensemble du cycle de production. Le monde ostréicole change. Ainsi, si on reprend l'exemple du secteur de La G., le terrain privé appartenant à l'expéditeur est vendu. Les éleveurs, installés sur le terre-plein, deviennent propriétaires des parcelles attenantes à leur cabane et peuvent accéder librement à leur établissement par voie terrestre. Dans les cabanes d'expédition, la main d'œuvre est réduite (l'élevage en surélevé réclame moins de personnel que l'élevage à plat), et l'activité ostréicole est recentrée autour de la famille. Les relations expéditeur/éleveurs sont modifiées. L'expéditeur, en réalisant l'ensemble de la chaîne de production, tente d'augmenter les bénéfices à la production en réduisant les intermédiaires, et, dans le même temps, se défait en

partie de la relation d'échange qui le liait à l'éleveur. En fait, on observe qu'une partie des éleveurs, pour des raisons de proximité géographique ou de liens familiaux, continuent comme par le passé à vendre une part de leur production à leur ancien patron et à travailler pour lui au moment des fêtes. On retrouve ici la relation éleveur-expéditeur déjà rencontrée avec la portugaise.

L'exemple qui va suivre, établi à partir de l'analyse des conditions techniques de travail, illustre notre propos. On a en effet observé que l'emploi du laveur, habituel dans les établissements d'expédition, demeure rare dans ceux d'élevage où les huîtres sont encore brassées manuellement. Il existe une certaine résistance à l'acquisition de ce matériel qui tient moins, nous semble-t-il, à l'inadaptation du matériel ou au coût du laveur qui est très faible qu'à une attitude culturelle et commerciale. En effet, les huîtres d'élevage sont vendues au poids, en vrac, et livrées en mannes. Avant toute transaction, l'éleveur brasse les huîtres puis les trie sommairement. Le brassage reste délibérément très grossier, ce qui lui permet de "tricher" sur le poids réel contenu dans les mannes. Mais, à l'inverse, l'acheteur (expéditeur ou courtier) utilise cet élément pour argumenter en sa faveur lors des transactions d'achat. En réalité, acheteurs et vendeurs, tout en invoquant la malhonnêteté de l'autre, participent implicitement au même jeu commercial. Éleveurs et expéditeurs sont dans ce cas parfaitement interdépendants. Il existe donc une forme d'équilibre dans leur relation réciproque.

Une autre partie des éleveurs, en devenant indépendants, purent commercialiser leur production auprès de l'expéditeur de leur choix. Mais cette autonomie eut sa contrepartie : les éleveurs perdirent l'assurance de leur vente. L'indépendance de l'éleveur n'est en fait qu'apparente, l'expéditeur continuant de contrôler les moyens de production en détenant les moyens de commercialisation. C'est pourquoi, en raison d'une diminution de la demande en produits d'élevage, accompagnée d'une stagnation des prix à l'élevage, après quelques années de difficultés pour vendre correctement leurs huîtres, une partie de ces éleveurs "indépendants" disparurent : il y eut en quelque sorte élimination progressive des producteurs excédentaires.

Toutefois, une certaine résistance se fait jour depuis une dizaine d'années. Des éleveurs s'inscrivent au casier sanitaire comme "expéditeurs seconde catégorie" pour pouvoir écouler leur production en vente directe sur les marchés. Ils pensent ainsi accroître leurs bénéfices en éliminant les intermédiaires (expéditeurs, courtiers, grossistes) et, disposant déjà des moyens de production, échapper au contrôle de l'expéditeur en détenant aussi les moyens de commercialisation.

En fait, on constate, compte tenu de ce qui a été rapporté ici, que les choix des individus et des groupes sont libres, mais seulement à l'intérieur d'un cadre donné. Trois points sont à retenir :

- La marge de manœuvre de chacun des groupes professionnels est conditionnée par le comportement du produit : développement d'espèces nouvelles, disparition d'espèces existantes.

- La marge de manœuvre individuelle ou collective est aussi conditionnée par le contexte économique lié pour une part au comportement du produit -insuffisance ou excédent-, mais aussi aux conditions imposées par le marché global. Comme nous l'avons vu, l'indépendance de l'éleveur n'est en fait qu'apparente puisque l'expéditeur continue de contrôler les moyens de production en détenant les moyens de commercialisation. Mais si l'on pousse l'analyse plus loin en considérant la relation expéditeur/grossiste ou expéditeur/grandes surfaces, on observe que l'expéditeur lui-même n'échappe pas à un système de contrôle, même s'il est d'un autre type.

- L'introduction d'un nouveau produit, entraînant l'introduction d'une nouvelle technique, le surélevé, a des effets en cascade dans le processus de production. Les relations entre les groupes sont modifiées, les formes de contrôle évoluent. L'innovation technique n'a pas pour seul effet un accroissement de la production. Elle entraîne bien souvent des transformations de nature sociale. Il est possible d'étendre le propos en admettant que les résistances à l'innovation technique résultent souvent d'une évaluation plus ou moins objective, mais bien réelle, par les populations concernées, des conséquences qu'un éventuel changement technique pourrait entraîner.

L'objectif d'une telle étude est de repérer la marge de liberté d'action dont les individus ou les groupes disposent à l'intérieur du contexte dans lequel ils évoluent, et de chercher à comprendre le système productif dans ses relations à l'organisation sociale. Ainsi, lorsqu'on passe d'un type de société à un autre (de la plate à la japonaise), même lorsqu'en apparence le groupe social concerné reste le même - ici les ostréiculteurs du bassin de Marennes Oléron - les comportements individuels ou collectifs sont modifiés. Pour la compréhension des sociétés, il est donc essentiel de montrer que les relations établies au sein d'un groupe professionnel, tel que celui que nous avons étudié, vont au-delà des relations purement économiques, au-delà des simples faits bruts.

Glossaire :

Affinage : Opération ayant pour but d'améliorer la qualité, et éventuellement la couleur des huîtres sous l'effet de la *Navicula ostrearia*.

Affineur : Professionnel chargé de l'affinage des huîtres.

Cabane : Bâtiment de dimensions variables servant d'abri pour les travaux ostréicoles effectués à terre.

Captage : Première phase des activités ostréicoles qui consiste à recueillir les larves d'huîtres sur des supports artificiels.

Capteur : Professionnel chargé du captage des huîtres.

Détroquer (détroquage) : Séparer les huîtres de leur support, décoller les coquillages "en paquet", c'est à dire soudés les uns aux autres.

Élevage : Seconde phase des activités ostréicoles aboutissant à la production d'huîtres de taille marchande, mais non affinées.

Éleveur : Professionnel chargé de l'élevage des huîtres.

Estran : Portion du littoral entre les plus hautes et les plus basses mers.

Galope-chenaux : Personne sans emploi fixe vivant de la pêche à pied et autres menus travaux.

Inscrit maritime : Tout marin français se livrant professionnellement à la navigation, et inscrit comme tel sur les registres de l'administration des Affaires maritimes, est un inscrit maritime.

Marais : Espace géographique alimenté en eau de mer et en eau douce. Il est situé principalement sur le domaine privé et pour partie sur le domaine public maritime, et aménagé de bassins - les claires - servant à l'affinage des huîtres.

Poches : Poches en grillage plastique utilisées pour l'élevage en surélevé.

Surélevé : Se dit d'une technique d'élevage pour lequel on utilise des tables (métalliques ou en bois) pour isoler les huîtres du sol.

Terre-plein : Zone côtière, la plus haute du domaine public maritime, enclavée entre la mer et la terre. Cet espace fut, jusqu'en 1983, sous la tutelle des Ponts et Chaussées. Depuis cette date, à la suite de la mise en place d'un processus de décentralisation décidé par l'État, la gestion de cet espace est confiée aux différentes communes littorales sous l'égide de la région.

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Coastal land tenure and exploitation of marine resources in the South Pacific Islands

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Key words : South Pacific territories, tribal communities, coastal tenure, customary right.

Mots-clés : Territoires du Pacifique Sud, communautés tribales, occupation côtière, droit coutumier.

Abstract

In the South Pacific islands, land tenure has always been based on the customary rights of tribal communities. Even in countries which came under European rule, these rights continued to be respected, often in harmony with colonial legislation.

In recent years, several countries have acquired independence and everywhere attempts are being made to modernize methods of exploitation and management of resources, especially concerning coastal and marine fisheries.

This study examines the effects of these transformations on local customs of land tenure, new legislations and the fisheries economy, particularly in Fiji, New Caledonia and French Polynesia, as well as certain problems and conflicts which arise.

Occupation côtière et exploitation des ressources marines dans les îles du Pacifique Sud

Résumé

L'occupation du sol a toujours été, dans les communautés tribales des îles du Pacifique Sud, fondée sur le droit coutumier. Cette situation s'est maintenue même dans les îles passées sous contrôle européen et a été souvent intégrée à la législation coloniale.

Plusieurs territoires ont accédé ces dernières années à l'indépendance, et tentent actuellement de moderniser les méthodes d'exploitation et de gestion des ressources surtout en ce qui concerne les pêcheries côtières ou en haute mer.

Cette étude passe en revue les conséquences de ces transformations sur les coutumes locales d'occupation côtière, sur les nouvelles législations et l'économie des pêches, particulièrement dans les îles Fidji, en Nouvelle-Calédonie et en Polynésie française, et évoque enfin les divers problèmes et conflits qui se sont présentés.

Introduction

In South Pacific countries, customary ownership of land has now become an important political issue.

In Fiji attempts were made to codify 'Mataqali', the traditional clan ownership of land, but since then a conservative coup d'état has reinforced the power of the upper classes in the present social system. In Vanuatu, for many years under French-British joint administration, riots broke out when community land tenure was restricted to meet the need for modernization. In the Solomon Islands, a new system of land registration and inheritance set up by the government has caused immense confusion in a society where traditional ownership depended

on paternal or maternal hereditary rights. Throughout this region, traditional society is undergoing gradual but irrevocable changes.

The sea waters, especially in the lagoons behind the reef barriers, were originally part of the customary land holding and exploitation system. Though marine tenure was less restrictive than for land, this system did conciliate the exploitation of fish and other marine resources and the needs of the local populations. Nevertheless the recent introduction of new technology, the development of marine products, an urbanisation policy leading to the transfer of labour forces to the capital cities are all factors slowly but steadily changing the way of life of coastal communities in the Pacific.

Coastal land and sea water tenure in the South Pacific: harmony between customary rights and legislation

Fishing activities

Not only fishing itself but also fishery industries, are practised, like agriculture, on an extremely small scale in this area.

In terms of quantity, fish catches are very low and the number of fishermen and vessels engaged in the fishery industry as a whole is quite small. This does not mean though that fishery is insignificant in these islands. Indeed it plays an important role by supplying sufficient protein foods to satisfy domestic consumption. It is therefore essential to analyse the position of fisheries as an integral part of the social and economic structure.

It was not until the 1960's that some South Pacific islands gained independence. Under colonial rule, their economy was often based solely on agriculture, with plantations of coconuts, cocoa, sugar, cane, etc. The development of fisheries is recent. This explains the lack of infrastructures for fishery, particular fishing harbours, as well as the outdated fishing techniques employed.

The recent establishment of the 200-mile zone by many countries in the region and an increasing international interest in marine products (especially skipjack and tuna) have given rise to new systems of exploitation, such as joint ventures and the introduction of new regulations, for instance, an entrance fee to gain access to fishing grounds.

Nevertheless, fisheries in the region are still not sufficiently administered by the local authorities and are often deprived of industrial bases. Contracts signed with developed countries are not on an equal basis and the islands remain dependent on industrialized countries for processing and international sales. Thus it is important, in any regional plans for developing countries, to consider the problems and status of these small local coastal fisheries from a wider point of view, taking into account their role in the national economy and international trade.

Coastal fisheries in these islands are in many cases varied and abundant. Unfortunately this abundance is not sufficient to justify the creation of a real fisheries industry with the necessary technology and equipment to process and distribute this production. Even harvesting presents problems, for a complex series of different types of modern fishing gear are needed to cope with the variety of fish available, ranging from skipjack and tuna to pretty tropical reef fishes for aquariums.

The coral reef environment itself is very varied. In deep waters large-scale fishing gear is required, whereas along the lagoons small-scale industries could be set up to concentrate on processing representative species of edible tropical fish. Elsewhere, in the mangroves for example, simple fishing gear would enable housewives to catch bottom fishes, shells, seaweed, shrimps and crab to feed their families. Intensive methods could also be adopted by large communities using driving nets or small motor boats, whereas individual fishermen could be equipped with fishing nets and lines to ensure the local food supply. Finally, extensive laying gear would greatly increase open sea fishing.

The customary tenure of fishing grounds

In the South Pacific, each major coral outcrop on the barrier reef is given a particular name, in order to distinguish and establish ownership and jurisdiction inside the reef. This shows the extent to which the local communities still cling to a life style based on personal ownership.

In Fiji, a leading nation in the South Pacific, according to the Mataqali system, traditional ownership of land by ethnic communities, based on the grouping of families in clans, is recognized by law and the system is strictly respected. This system could easily be extended to coastal land ownership for the exploitation and management of marine resources and would in no way interfere with the modern system of granting licences to fish or to own a fishing vessel. Under the Mataqali system, contrary to land tenure where property rights are stipulated in written documents, the traditional rights to sea areas are established orally or are hereditary. The authorities in Fiji are at present charting detailed maps of fishing grounds and sea routes based on the Mataqali distribution of land in the reef area, in an attempt to establish legal control.

In Vanuatu the customary tenure of land is governed by the Nasara system whereby land is distributed into family plots. Customary rights extend as far as the reef and boundaries are marked by eye, choosing landmarks or physical particularities as limits. Outsiders are allowed to seek permission from traditional owners to fish there and when granted neither gifts nor fees are required. There are no rules concerning types of fishing gear or mesh size for gill nets and villagers do not observe any bans on the exploitation of turtle or turtle eggs.

In the 1950s, after World War II, Japan made great efforts to develop the skipjack fishery centred on the live bait fishing in the lagoons of Micronesia. Japanese enterprises often came into conflict however with the traditional communal owners of the bait grounds. In the Solomon Islands, an entrance-fee system has now been set up for access to live-bait grounds there.

It is hoped that a sound management of these fishing grounds will ensure, respecting the conservation of the ecological resources available. Training of professional fishermen must be developed and all concerned should be encouraged to take an interest in stockbreeding inside the lagoons and follow a resource management policy which uses rather than abuses the regional ecology.

Lagoon exploitation in various countries

In the villages of Maskelyne, on the island of Malekula, Vanuatu, the gathering and sale of trochus, mangrove oysters and crab, green-turban and sea cucumber occurs around the barrier reef and the lagoons.

A survey has been undertaken on the Nasara land tenure system and on the use of marine products. Exploitation and conservation of resources in the future have also been examined.

On Viti Levu Island, Fiji, owing to the satisfactory results obtained with the adoption of the Mataqali regulations as a codified customary law, the present system of control, operation and use of the lagoon area is being pursued. At Rakiraki, a village on this island, members of the Mataqali unit have started cultivating the seaweed *Eucheuma*, using modern aquaculture techniques. Here is further evidence of the changes under way in the traditional exploitation of the lagoon.

In Western Samoa, customary rights in the lagoon area are being superseded by a modern land tenure system.

The situation in the Solomon Islands reveals the existence of many different rights, notably in the north-western coastal area of Malaita and the Munda region in the New Georgia Islands (Western Province). Here fisheries have declined since the development of monetary economy and labour has been diverted to small-scale shipbuilding and tourist activities. Moreover, the Seventh Day Adventist Church has prohibited among its adepts the use of certain types of fishing gear and the consumption of marine products. Nevertheless, at the north end of Malaita Island, Mana'abu village has been reconstructed under the guidance of the new leader there.

Resource management jeopardized by illegal fishing operations in the French Territories of the South Pacific

New Caledonia

As in other Pacific islands, the indigenous Melanesians of New Caledonia consider that the reef and lagoon areas are an extension of the land of which they are customary owners by traditional right.

Since colonial times, two parallel systems have existed: the one implemented by the Melanesians is uncoded, whereas French legislation is considered official.

Property rights over crops, fishing and houses are protected by customary bans or taboos which originate from beliefs in ancestral spirits and their supernatural powers. In fact, fishing grounds are effectively "owned", just as territorial land is, by those endowed with the hereditary right to use them. Thus, land and water are not differentiated in terms of ownership, but form a whole.

Occasionally fishing is permitted by other neighbouring communities with whom tribal links exist, as long as no protected species are caught. These "protected species" are the subject of taboos, for they are believed to incarnate the ancestral spirits of the clan, so of course they can never be eaten or sold. In some parts of New Caledonia, this taboo is so strong that even the European settlers do not catch these species without special permission from the tribe leaders.

Other traditional management practices include the prohibition of poison unless permission is granted by the chief; women are only allowed to fish within the fringing reef areas

and must not use nets. The folklore of the Kanaks and many more of their traditional beliefs are concerned with the use and management of fisheries resources.

According to French legislation however, ownership of coastal or intertidal areas is vested in the state which can lease them to private individuals or enterprises. In most cases however, the Kanaks living near the coast have access to the use of intertidal areas and regard these as their customary fishing grounds, although this is not officially recognized as being legal by the government.

Owing to the parallel existence of two types of regulatory systems, conflicts and confusion often arise and it is difficult for an outsider to fish in waters dominated by the Kanak communities. However, since the commercialization of fisheries, Kanaks have entered the market economy, so that the exploitation of resources has increased, even where fishing grounds extend beyond their traditional zones. Cases have been known of disputes with Kanaks which should normally have been resolved by French jurisdiction rather than by their customary unwritten laws.

The enforcement of French laws to protect resource management, such as the prohibition of certain fishing methods (e.g. catching lobsters by using underwater lights or turtles during the closed season) has often been ineffective and there is evidence that these illegally caught products are on sale throughout the year.

French Polynesia

Coastal and lagoon waters in the archipelago of French Polynesia used to be under the control of the local chief (Ariki) who forbade access to members of certain communities or else limited exploitation. This is a fine example of how to conserve a particular area, but the reasons evoked were not always valid. Even now, people wishing to fish from the sea have to obtain permission from the local chief who owns the adjoining land and in return receives part of the catch. The chief also organizes collective fishing expeditions for celebrations or forbids fishing at certain times or of certain species to protect them or to build up reserves for a feast. Tuna fishing with live bait in the open sea is also organized by local chiefs.

Rural islands of the Territory, such as Tuamotu and the Marquesas Islands, have retained traditional coastal land and fishing ground tenure and fishing there is very active.

Contrary to the customary rights, the laws of the Territorial Assembly strive to regulate fisheries with a view to improving resource management, in particular regarding certain species of fish, crustaceans, shellfish, etc. in the coastal regions and the lagoons. There are strict limitations on the size of the animals, the open season and access to fishing grounds, as well as the types of fishing gear allowed. Legislation aims to guard against overfishing and to protect resources and stocks. Conflicts have often arisen though when local fishermen have considered that the government authorities have counterbalanced the customary order of the tribal system.

People often ask why the territorial government does not recognize traditional communal marine tenure as is the case in Fiji and other Pacific islands. Yet, without the support of a comprehensive global policy for regional development, the local fishing communities and individual fishermen are incapable of preventing the drain of resources and of meeting the increasing demand for marine products.

A review of the corresponding Japanese legislation

Apart from a few cases of free access, Japanese fisheries can only operate if they have been granted fishing rights or a fishing licence, in accordance with the regulations laid down by the Fisheries Law limiting and stipulating the different common fishery rights. The Japanese fisheries system and the management and use of coastal resources is ensured by the exercise of the common fishery right allotted to the local fishermen's cooperatives.

The Japanese Fisheries Law, often praised in Japan for being unique, is in fact an adaptation of the customary usage of fishing grounds practised since the feudal era in fishing communities and codified in accordance with the terms of the modern law. Consequently, it is important to know whether the common fishery right system under cooperative management is capable of playing an effective role in resource conservation and enhancement. Furthermore, it is interesting to compare the efficiency of sea-area fisheries under prefectural licencing with that of fisheries operating under the common or piscary right.

Conclusion

The regulation of coastal or lagoon waters in French Polynesia and New Caledonia appears to differ greatly from that in other South Pacific countries where the customary rule on sea tenure has proved reasonable and satisfactory. The present conditions of fishing under French control have caused confusion in the use of resources in rural communities and have also upset many sound traditional fishing practices.

The situation throughout this region will attract further Japanese research on fisheries and their impact on the socio-economic structures. Indeed the Japanese law regarding coastal fishing aims above all to maintain public order in coastal fishing communities.

Livres reçus

J.R. Durand, J. Lemoalle & J. Weber, éditeurs scientifiques. *La recherche face à la pêche artisanale*. Symposium international ORSTOM-IFREMER, Montpellier, juillet 1989. Éditions de ORSTOM, 72, route d'Aulnay, 93143 Bondy Cedex. 2 volumes, 513 et 557 pages, 390 F. ISBN : 2-7099-1054-3.

Le volume I comporte deux parties : - la recherche face à la pêche artisanale dans les différentes parties du monde; - recherche et structure des pêches artisanales. Le volume II s'articule en trois volets : - recherche et dynamique des pêches artisanales; - recherche et dispositifs d'intervention; - perspectives de la recherche sur les pêches artisanales. Les contributions émanent de nombreux spécialistes et sont rédigées en français ou en anglais.

Philippe Cury & Claude Roy, éditeurs scientifiques. *Pêcheries ouest-africaines : variabilité, instabilité et changements*. Paris, 1991, Éditions de l'ORSTOM. 525 pages, 250 F. ISBN : 2-7099-1040-3.

Cet ouvrage collectif, auquel ont participé des chercheurs de différents centres de recherche océanographique ouest-africains et européens, passe en revue tous les problèmes posés par l'évolution des pêcheries en Afrique occidentale. Il se divise en trois parties : - crises et ajustements : les difficultés d'exploiter une ressource instable; - fluctuations de l'environnement marin; - pêcheries pélagiques ouest-africaines. Les contributions sont rédigées en français ou en anglais, et les résumés sont bilingues.

F. Doumenge & A. Toulemont, éditeurs scientifiques. *Les anguilles : contribution à leur connaissance*. Monaco, 1992, numéro spécial du *Bulletin de l'Institut océanographique*. 147 pages, illustrations couleur. ISBN : 2-7260-0153X.

M. Fontaine y traite du rôle joué par l'Institut océanographique dans la connaissance de la biologie des anguilles. B. Gousset est l'auteur d'un exposé important : "Eel culture in Japan". G. Marquet étudie le recrutement et la physiologie des anguilles de Polynésie française : permettent-ils de cerner leur aire de ponte ?

L'INSTITUT OCÉANOGRAPHIQUE DE PARIS (Fondation Albert I^{er}, Prince de Monaco)

Le but fixé par les statuts de l'Institut océanographique est "l'étude et l'enseignement de la science océanographique", qu'il a pour mission de dispenser à son plus haut niveau, mais aussi de vulgariser : cours, séminaires, conférences, expositions, publications, documentation.

La recherche s'y effectue au sein de trois laboratoires (océanographie biologique, océanographie physique, physiologie des êtres marins), qui, en plus des thèmes qui leur sont propres, apportent une contribution à certains programmes nationaux et internationaux.

L'enseignement supérieur de l'océanographie est organisé sous forme de séminaires publics.

Depuis plus de 10 ans, le Centre de la Mer et des Eaux, installé dans les locaux de l'Institut océanographique, présente en permanence des expositions et des films sur les aspects les plus variés et les plus récents de l'océanographie.

L'Institut océanographique publie régulièrement les *Annales de l'Institut océanographique* et son supplément *Marine Microbial Food Webs* ainsi qu'*Océanis* (série de documents océanographiques).

La bibliothèque, ouverte au public, réunit plus de 5000 ouvrages spécialisés dans les sciences de la mer et quelque 1000 titres de revues, dont 450 sont reçues régulièrement. On y trouve également une importante collection de Rapports d'expédition, de cartes, d'atlas, de dictionnaires spécialisés.

Chaque année, des cours d'initiation à la recherche bibliographique sont dispensés aux étudiants en océanographie de l'Université Paris-VI.

Une grande place est accordée à la coopération inter-bibliothèques : participation au Catalogue collectif national des publications en série (CCN) et Catalogue collectif des ouvrages étrangers reçus en France (CCOE); de plus, des liens étroits sont maintenus avec les bibliothèques du Musée océanographique de Monaco, de l'IFREMER de Brest, et des principales stations marines françaises.

The aims of the Institut océanographique, clearly stated in the bylaws, are "the study and teaching of the science of oceanography". Its mission is not only to dispense this education at university level but also to cater for the general public, by organising seminars and courses or popular science lectures and exhibitions, and by publishing reviews and providing a documentation service.

Research is carried out in the three laboratories (specialising respectively in marine biology, physical oceanography and the physiology of marine organisms), which also participate in certain national and international scientific programmes.

Twelve years ago, the Centre de la Mer et des Eaux was inaugurated on the premises of the Institut océanographique, since when it has been giving regular exhibitions, permanent and temporary, and showing films on a large variety of the most recent aspects of oceanography.

The Institut océanographique publishes the *Annales de l'Institut océanographique* with its supplement entitled *Marine Microbial Food Webs*, as well as *Océanis* (série de documents océanographiques).

The library, open to the public, contains over 5000 monographs on marine sciences and some 1000 different periodicals, 450 of which are currently appearing. There are also large collections of expedition reports, maps, atlases and specialised dictionaries.

Each year, students in oceanography from the University of Paris-VI are given introductory lectures on the use of libraries, computerised data research and information retrieval.

Much importance is attached to interlibrary cooperation. The library participates in the National Union Serials Catalogue (Catalogue collectif national des publications en série - CCN) and the Union catalogue of books received from abroad in France (Catalogue collectif des ouvrages étrangers reçus en France - CCOE). Close links are maintained with the libraries at the Musée océanographique in Monaco, IFREMER in Brest and the principal marine laboratories throughout France.

