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SEAS AND OCEANS SET

Development of Marine Resources

Edited by

André Monaco and Patrick Prouzet

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coordinated by
André Mariotti and Jean-Charles Pomerol

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Foreword

We have been asked by ISTE to stimulate work in the area of the environment. Therefore, we are proud to present the “Seas and Oceans” set of books, edited by André Monaco and Patrick Prouzet.

Both the content and the organization of this collection have largely been inspired by the reflection, initiatives and prospective works of a wide variety of national, European and international organizations in the field of the environment.

The “oceanographic” community, in France and internationally – which is recognized for the academic quality of the work it produces, and is determined that its research should be founded on a solid effort in the area of training and knowledge dissemination – was quick to respond to our call, and now offers this set of books, compiled under the skilled supervision of the two editing authors.

Within this community, there is a consensus about the need to promote an interdisciplinary “science of systems” – specifically in reference to the Earth’s own “system” – in an all-encompassing approach, with the aim of providing answers about the planet’s state, the way it works and the threats it faces, before going on to construct scenarios and lay down the elementary foundations needed for long-term, sustainable environment management, and for societies to adapt as required. This approach facilitates the shift of attention from this fundamental science of systems (based on the analysis of the processes at play, and the way in which they interact at all levels and between all the constituent parts making up the global system) to a “public” type of science, which is finalizable and participative, open

to decision-makers, managers and all those who are interested in the future of our planet.

In this community, terms such as “vulnerability”, “adaptation” and “sustainability” are commonly employed. We speak of various concepts, approaches or technologies, such as the value of ecosystems, heritage, “green” technologies, “blue” chemistry and renewable energies. Another foray into the field of civilian science lies in the adaptation of research to scales which are compatible with the societal, economic and legal issues, from global to regional to local.

All these aspects contribute to an in-depth understanding of the concept of an ecosystemic approach, the aim of which is the sustainable usage of natural resources, without affecting the quality, the structure or the function of the ecosystems involved. This concept is akin to the “socio-ecosystem approach” as defined by the Millennium Assessment (http://millenniumassessment.org).

In this context, where the complexity of natural systems is compounded with the complexity of societies, it has been difficult (if only because of how specialized the experts are in fairly reduced fields) to take into account the whole of the terrestrial system. Hence, in this editorial domain, the works in the “Seas and Oceans” set are limited to fluid envelopes and their interfaces. In that context, “sea” must be understood in the generic sense, as a general definition of bodies of salt water, as an environment. This includes epicontinental seas, semi-enclosed seas, enclosed seas, or coastal lakes, all of which are home to significant biodiversity and are highly susceptible to environmental impacts. “Ocean”, on the other hand, denotes the environmental system, which has a crucial impact on the physical and biological operation of the terrestrial system – particularly in terms of climate regulation, but also in terms of the enormous reservoir of resources they constitute,

covering 71% of the planet's surface, with a volume of 1,370 million km^3 of water.

This set of books covers all of these areas, examined from various aspects by specialists in the field: biological, physical or chemical function, biodiversity, vulnerability to climatic impacts, various uses, etc. The systemic approach and the emphasis placed on the available resources will guide readers to aspects of value-creation, governance and public policy. The long-term observation techniques used, new techniques and modeling are also taken into account; they are indispensable tools for the understanding of the dynamics and the integral functioning of the systems.

Finally, treatises will be included which are devoted to methodological or technical aspects.

The project thus conceived has been well received by numerous scientists renowned for their expertise. They belong to a wide variety of French national and international organizations, focusing on the environment.

These experts deserve our heartfelt thanks for committing to this effort in terms of putting their knowledge across and making it accessible, thus providing current students with the fundaments of knowledge which will help open the door to the broad range of careers that the area of the environment holds. These books are also addressed to a wider audience, including local or national governors, players in the decision-making authorities, or indeed "ordinary" citizens looking to be informed by the most authoritative sources.

Our warmest thanks go to André Monaco and Patrick Prouzet for their devotion and perseverance in service of the success of this enterprise.

Finally, we must thank the CNRS and Ifremer for the interest they have shown in this collection and for their financial aid, and we are very grateful to the numerous universities and other organizations which, through their

researchers and engineers, have made the results of their reflections and activities available to this instructional corpus.

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1

Fishing in the Mediterranean, Past and Present: History and Technical Changes

The historical context of the maritime sector can present certain difficulties for historians and fishery specialists. Seas and oceans are mostly worlds without archives, often mistakenly thought of as immutable. Most often glossed over by biologists, more than ever does it seem necessary to ask questions about the past of the underwater world. It must today be at the heart of all reflections that condition the defining of policies for the management of fisheries. While the challenges faced by Mediterranean fishing, climate change, acidification and the need for a rigorous management of stock, are no different from those found in all seas of the world, they are all the more applicable in this closed basin and must engage the responsibilities of all the surrounding states in the 21st Century. Dedicated for millennia to fishing and the movement of men and goods, this “liquid continent with a solid border”, as it was called in the 1930s by the poet Gabriel Audisio and his friends from the *Cahiers du Sud*, has witnessed the rise of new uses in the last 50 years, which present important problems for fisheries. The rise of leisure fishing, harm to coastal fishing caused by the damaging of marine ecosystems and the need to provide for urban and tourist markets increasingly

demand of sea products today, influence the maintenance or the survival of professional fishing in all of the basin. However, the long history of Mediterranean fishing, far from unmoving, shows that the men and women who formed it over centuries were able to adapt their methods to the fluctuating conditions of access and exploitation of fishing resources. The future of fishing in the Mediterranean requires mastering the effects of industrialization and urbanization on ecosystems, also must take into account the cultural aspects, including traditional expertise, for a better management of this medium. Compiling a comprehensive history of fishing would appear unfeasible in the confines of this chapter. A choice has therefore been made first to present a reflection on historical methods of fishing. A table of traditional techniques, the organization of communities and their plurality is envisaged here (section 1.1). Second, the successive changes that have transformed this activity sector since the modern era are analyzed (sections 1.2 and 1.3). The third component of this approach proposes some reflection on the characteristic of Mediterranean fishing at the start of the 21st Century. This last part will be a description of the current flotillas in operation, while looking at the challenges faced by this sector of activity: environmental changes, changes in how people consume, the redefining of the fishing boss, between collective needs for the protection of the habitat and the need to fulfill the demands of the market (section 1.4).

1.1. Mediterranean fishing of the past (18th Century)

Structured by religious brotherhoods and communal efforts, fishing communities efficiently control the exploitation of the natural medium in the modern era. The large variety of

fishing techniques used, as well as the characteristics of an “Ancient Regime” style of consumption, marked by a chronic lack of protein, explains the extreme diversity of the products offered at the fishmonger’s stall.

1.1.1. *Brotherhoods and prud’homies: old forms of regulation of the fishing world*

Being present as early as the 15th Century on the north coast of the Mediterranean, the brotherhoods, Italian *confraternite*, Catalan *gremis* or the Spanish *cofradias*, appeared as the dominating form of organization in the fishing community. Placed under the protection of the Virgin Mary or a patron saint, Saint Peter, Saint Elme or Saint Roch, the brotherhoods were first of all religious structures that not only guaranteed their members’ collective solidarity in the case of an accident (loss of ships or fishing materials), but also looked after the souls of the dead through prayers and processions. They were also professional regulatory structures. Made up of all the fishing bosses, i.e. the boat owners, they enacted precise fishing regulations, most often passed on orally. The distribution of fishing zones (the Provençale “postes”), the mesh size of the nets, the size of the hooks, the quality of the baits and a strict calendar fixed by the community [FAG 11], thus precisely defined the modes of exploitation of a “fishing ground” [FER 01] whose spatial limits are strictly delimited. The names used by the fishing communities of the past clearly illustrate this distribution of the marine space, which was split into microterritories: for example the two seas of *Amoun* and *Avau*, which split the organization of fishing in Marseilles in the 17th Century [FAG 11]. Exceptionally, the organization of the community would depend on two structures: the

prud'hommes, a tribunal made up of representatives of the profession, are clearly distinguished from the brotherhood, which would in this case be reduced to a spiritual function and a function of assistance. The only jurisdiction in all of the ports of the Mediterranean, the corporation of *prud'hommes* of Marseilles would appear today as the most accomplished form of self-regulatory organism for fishing activities [BER 98]. It benefits from its age, since the municipal authorities allow the community as early as the 14th Century to choose its own *probi homines*, its wise men, to sort out any conflicts related to fishing. There are four of them, renewed each year and elected by a simple vote by show of hands. These Marseilles *prud'hommes* provide public justice, orally, freely and without the possibility of appeal. A tribunal of experts and recognized as such, the Marseilles *prud'hommes* thus avoid the suppression of corporations put in place by the revolutionary laws of the 2nd and 17th March [FAG 11]. A model of professional organization, as early as the last decade of the 18th Century, it became the dominating form of justice within the fishing communities of the French Mediterranean coast.

Figure 1.1. *Provençale fishing prud'hommes*
(source: Musée Ciotaden)

COMMENTS ON FIGURE 1.1.– As Mediterranean fishing boss communities, the *prud-hommes* appeared for the first time

in Marseilles in 1481, officially recognized by Louis XI's royal charter. Extended to all fishing communities after the French Revolution, the *prud'homme* form of organization found its definitive form in a decree from 1859. The function of the *prud'hommes* is to sort out conflicts between fishermen and regulate the access to fishing zones depending on their jurisdiction. Long neglected by the legal authorities, especially during attempts to develop industrial fishing, they have been, since 1994 by decree of the *Affaires Maritimes*, systematically consulted before any regulation is made in maritime affairs. As a decentralized power of management and authority, the *prud'hommes* constitute a model of management and governance of fisheries ensured by the polyvalence of the activities and making the fishers aware of their responsibility, which are the optimal conditions for the proper exploitation of the resources. "The five *prud'hommes* wore hose, a doublet and a black coat with a white band. On their heads they wore a hat with large edges. Their faces were tanned, and they represented the elite of the maritime population of the town and of the gulf" [SUE 45].

1.1.2. *Plural communities*

Present over the entire Mediterranean coast, traditional fishing communities offer much diversity. The differences first concern the forms of habitat and insertion in the coastal space. From the simple Languedoc or Moroccan rosewood hut [FER 01, PAY 07] to the specific urban quarter, the fisherman's habitat appears as the result of natural conditions (dirtiness of the coast), and also depends on historical processes that can reflect the age of a community (Saint-Jean quarter in Marseilles, Jonquières quarter in Martigues, etc.), or reflect political decisions, often made later (Barceloneta quarter in Barcelona, created from scratch in 1753, La Bordigue quarter in Sète, after the 17th

Century) [CAB 95]. On top of these differences in accommodation, a plurality of the activities that are not entirely dedicated to fishing can be added. Better than the classes system etablished by the French Royal administration, the study parish registers also frequently highlights the professional instability of the people of the sea, successively recorded professionally as “brassiers”[1] rather than fisher[2].

Like for the Atlantic coast, the presence of a cultivatable inland explains the coexistence in the Mediterranean, within fishing families, of time dedicated to the cultivation of wine grapes or wheat and periods dedicated to fishing. The availability of agricultural resources, which sometimes transforms income taken from the sea into significant revenue, explains the choice of one type of fishing over another by communities. In the Languedoc and Roussillon, the fisher-winemakers of Leucate, Banyuls or Collioure, masters of the *sardinal*[3] or of small fishing in lagoons, thus opposed the fishing owners of Gruissan or Sète in the 18th Century, who were converted to the *pêche au boeuf* [4] very early on (section 1.2) [LAR 97]. For the most part an opportunist, able to make the most of any positive variations offered by the resource, the traditional fisherman adapts his trade according to the season. He knows how to use the *boguière* or the *thonaire*[5] with the same dexterity as the *girelier*[6] or the *eissaugue*[7], due to ancestral knowledge passed down from father to son. The use of all types of traditional fishing, more than the limits of his expertise, only depends on the financial capabilities that condition the buying of certain materials, whose cost is often greater than the value of the vessel itself.

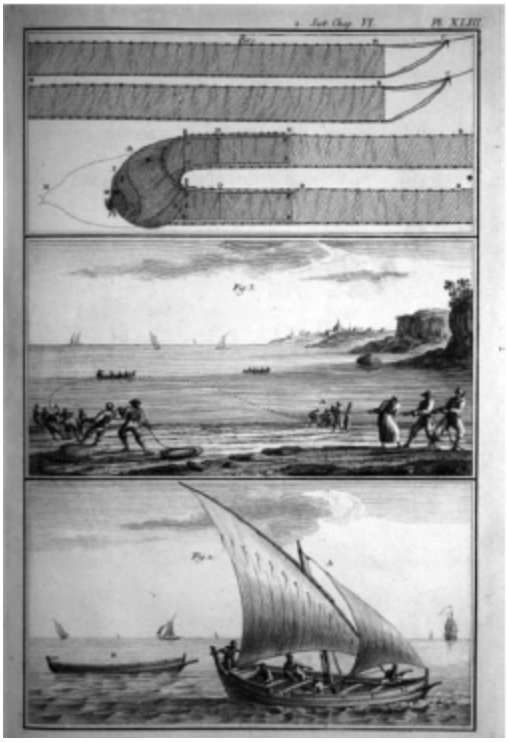
1.1.3. *Diversity of traditional techniques in the Mediterranean*

Under the watchful eye of brotherhoods or *prud'hommes*, Mediterranean fishermen use in the modern era techniques that were already known in Antiquity, and often represented in mosaics of the Greco-Roman civilization, an example being the one found in the Villa del Casale in Sicily, dating back to the 3rd Century AD. Passed on through the vernacular, the expertise attached to these techniques is rarely the object of treaties or professional manuals. They are part of an oral culture of apprenticeship, provided on a vessel, aimed at sailors. The materials used can be classified into two categories. The first category is that of static gear, traps, coastal fishing lines, longlines and nets – whose extreme variety reflects the species that are being caught. Among these, we can distinguish bottom gillnets with a single *aumée*[8], the trammel nets superimposing three *aumées* or net panels, aimed at catching benthic fish, gillnets floating on the surface, aimed at catching pelagic or semi-pelagic species (tuna, sardines, anchovies, etc.). This first group of static gears, opposed to all the mobile gear, is essentially composed of towed nets [MAR 05]. Whether manipulated from the coast by hand (Provençale *eissaugue* and Languedoc *boulier*), or from a vessel (*gangui*, Languedoc "*peche a vache*", Albufera or Valence *gànguil*)[9], these nets have the particularity of sweeping the posidonia prairies, the beds of silt or of coral sands, to find flat fish and elasmobranchii fish. Whether static or mobile, these different fishing gears are made up of fragile materials and are characterized by rapid wear. Their manufacture is supplied by a highly active artisan industry, mostly gone today, and their maintenance calls upon practices found on

most of the Mediterranean coast. Nets made of hemp, which retain humidity, are subject to alteration, the damage caused by which delays the process of dying. This is carried out with the help of the bark from the Alep pine tree (*Pinus halepensis*), from which a decoction is obtained by boiling it in the community cauldron. The fish traps and crab traps (*gireliers*, Provençale *emborniers* and Spanish *nansas*) are most often made from myrtle sticks *(Myrtus communis)*, their imputrescibility ensuring the longevity of the materials. If, for the most part, the manufacture of almadraba nets uses the same materials as those used in the elaboration of other fishing gear, the dimensions of these fixed fisheries and their maintenance costs are enough to put them in a class apart from that of small-scale artisanal fishing.

Figure 1.2. *Eissaugue*

(source: etching taken from Duhamel Du Monceau Henri Louis, Traité général des pêches, Guillaume de Bure, Paris, 1782)

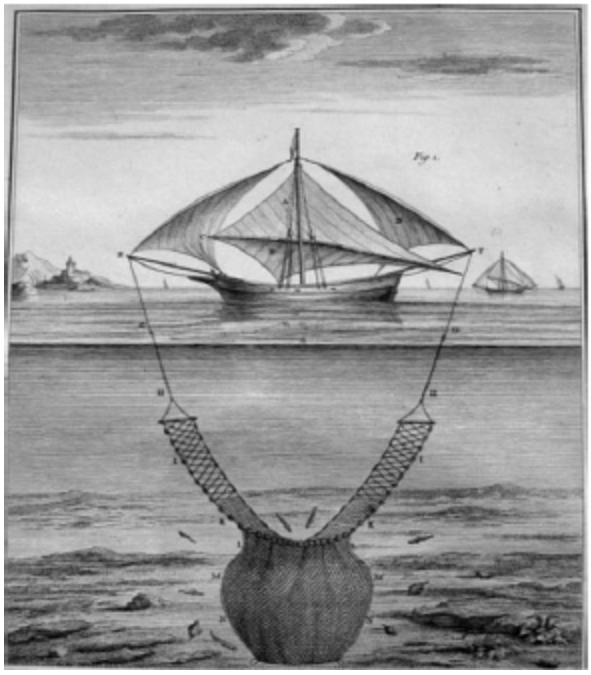


COMMENTS ON FIGURE 1.2.– A dragged net manipulated from land, the beach seine is a piece of fishing gear whose

history goes back to Antiquity. Called *eissaugue* in the French Provence, this net required a consistent coastal line, against a shallow infracoastal space free of rocks. This technique, maintained throughout the Middle Ages, preceded the growth from the 17th Century of open sea trawling. It was, however, still in use in the first half of the 20th Century.

Figure 1.3. *Tartane*

(source: etching taken from Duhamel Du Monceau Henri Louis, Traité général des pêches, Guillaume de Bure, Paris, 1782)

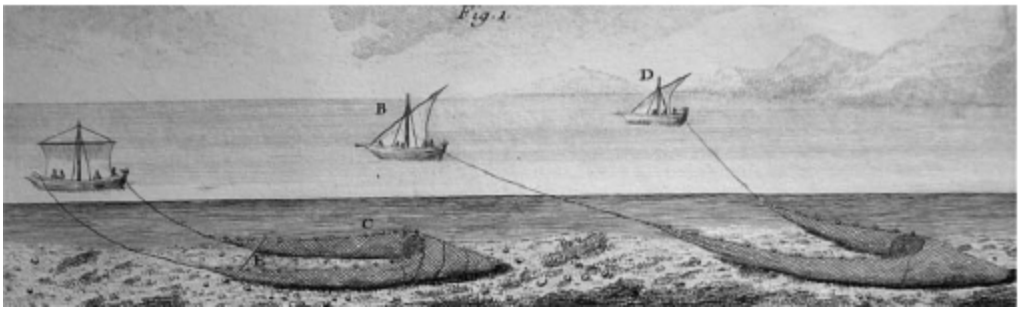


COMMENTS ON FIGURE 1.3.– At the end of the 17th Century, a new, powerful, polyvalent vessel appeared in the Mediterranean world. This new vessel was armed with a Latin sail. It was equipped with special nets with high sea fishing. With an important tonnage (between 30 and 50 tons, 1 ton = 2.83m^3), this vessel was first built in Martigues (called *tartana* or *martingana* in 17th Century Italy). Parallel to the distribution of the sardinal, the development of the vessel was at the origin of the

development of new activity, dragged fishing techniques at sea.

Figure 1.4. *Gangui "à la vache or plow" fishing*

(source: etching taken from Duhamel Du Monceau Henri Louis, Traité général des pêches, Guillaume de Bure, Paris, 1782)



COMMENTS ON FIGURE 1.4.– The dragging technique originating in the Spanish Levantine coast, the *pêche au boeuf* spread from the end of the 17th Century over all of the north-occidental coasts of the Mediterranean. Quickly accused of destroying resources, *pêche au boeuf was* a reply to the increasing demands of urban markets. As they only required modest boats powered by the wind, the practice *of pêche au boeuf* progressively imposed itself over *pêche à la vache* and "tartanon fishing" (on the left of the etching).

Figure 1.5. *Fixed artisanal Mediterranean fisheries: the Tunisian charfia*

(source: Daniel Faget)

COMMENTS ON FIGURE 1.5.– An ancient technique, *charfia* fishing relies on the use of traditional materials (palm trees and palm fiber fish traps) and the existence of strong community practices. The future of these artisanal fixed fisheries, which are nowadays threatened, illustrates the coexistence of traditional fishing and industrial fishing in the Mediterranean. The Tunisian *charfia* gives an example of sustainable fishing, with respect to the resource, orientated toward satisfying close alimentary markets.

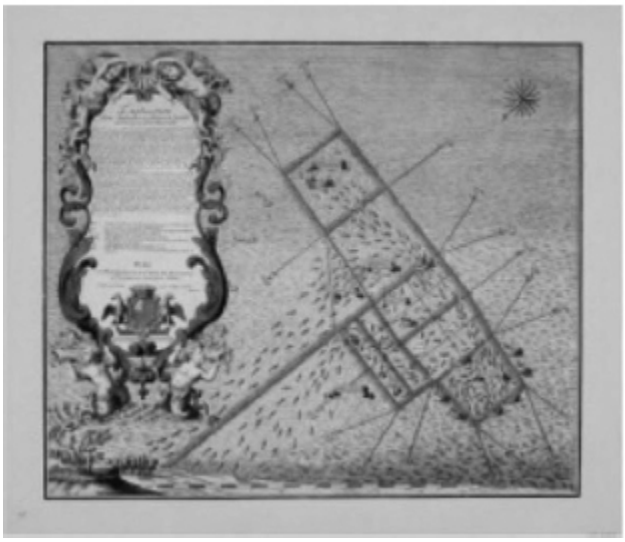
1.1.4. *Speculative fishing: the madrague*

In use since Antiquity, the *madrague* is an immersed fixed post used to catch tuna. The fishing gear is presented as a large net divided into a succession of chambers, called "*le corps de la madrague*". The walls of this device are kept afloat by pieces of cork, their lower extremities reaching the bottom due to weights made of large stones (the Provençale *baudes*). This underwater trap, sometimes set at a depth of 45 m, is linked to the coast by a net that acts as a barrage: "the tail of the *madrague*", which guides the fish toward the entrance of the successive chambers. Set out in the months of February or March, for a fishing season that goes on to the start of autumn, the *madrague* is directed by a *rais* or *ray*, which organizes its exploitation. Highly developed in the modern era, the *brassier* are present all along the coast from Sicily to Gibraltar and from the Gulf of Gabes to Tangier. The Provençale coasts had no fewer than 19 of these fixed fisheries on the eve of the French Revolution. The big investments necessary for their exploitation (sailor's wages, net mending, conditioning and sale of fish, transport and *esparto*)[10] meant that they mostly evaded the fishing communities. They were headed by powerful landowners, such as the lords of Bandol or the Prince of Rohan in

Provence [BUT 98] or the dukes of Medina Sidonia in Andalusia in the 18th Century [RAV 03]. These landowners, whose fishing rights came from royal privilege, did not look after their *madragues* themselves. They delegated their exploitation, by leases of three or six years, before a lawyer, to rich representatives of the world of negotiation and banking, who themselves worked for urban clients on behalf of their companies. In terms of price, the cost of a single *madrague* in the mid-18th Century was around 20,000 *livres-tournois*, which is the price of a 40-ton tartanon [BUT 00]. The management of these fisheries is, therefore, beyond the communities, who do not consider the world of *madrague* to be true fishing. Calling the *madrague* societies "companies" and "firms", the members of the brotherhoods were well aware of what differentiated the world of the boat from these speculative and precapitalist activities.

Figure 1.6. *Madrague etching*

(source: Archives départementales des Bouches-du-Rhône, 1Fi3398)



COMMENTS ON FIGURE 1.6.– Very common in the Mediterranean in the 18th Century, the *madrague* were fixed fisheries aimed at catching tuna. Due to the amount of investment required, they were most often beyond the control of fishing communities, whose members had to work

for them as employees. With high tonnages, they supplied a very prosperous activity of fish conditioning. Eight of these *madragues* are actually still in use in the Mediterranean.

1.1.5. *A highly varied consumption, reflective of relative shortages*

Coming from small-scale fishing, or from these large companies that are the fixed fisheries, the products offered at the fishmonger's stall in the modern era are extremely varied. Few species manage to evade capture according to the testimonies of naturalists of the 18th Century. While compiling his inventory of Marseilles fishmongers in 1768, the German philosopher Martine Brunnich referred to no fewer than nine species of shark and catshark, including porbeagle, despite its reputation at the time as a man-eater [FAG 11]. Duhamel du Monceau revealed that in Provence "highly rated sausages" are made with the flesh of bottlenose dolphin, i.e. a large dolphin (*Tursiops truncatus*). In this diverse palate, the south coast of the Mediterranean is no exception. As in Sardinia, the consumption of sea turtles seems to be the norm on the Tunisian coasts, and we can find on these coasts, as on the coasts of Provence or Cataluña, the use of sea anemones (*Actinia viridis*) in cooking. However, all the available products are not equal. Michel Darluc, author of *Natural History of Provence* (published in 1786) made the distinction within marine animals between those species aimed at the people and those targeted at wealthy amateurs. On the fishmonger's stalls, the sardine, the bogue and the goldline porgy thus join the category of lower foods with the likes of the octopus, cuttlefish and squids, mollusks reduced by the author to the hardly appetizing rank of "cartilages", while

more sophisticated buyers can share the more delectable sea dates and marinated tuna, with a special place for the whiting, king of the tables of Provence in the modern era. Behind this apparent health of the fish market in the 18th Century, there is the reality of relative shortages. The necessity of a certain level of protein in diets governs all here. Coastal populations also make the most of coastal fishing to complete their daily rations, by gathering limpets, periwinkle and green crabs – easy prey for the amateur fisherman. While most of the products of the sea used for food seem to be identical over the entire Mediterranean, detailed analysis shows that there are certain cultural differences in the art of using fish, mollusks and shells. Grilling is the most prevalent in the east of the Mediterranean, while boiling seems to be the rule in the septentrional coasts of the occidental basin.

1.2. Evolving practices (18–19th Centuries)

The complex world of Mediterranean fishing was not an unmoving universe over the centuries that preceded the birth of mechanized vessels. The product of migrations and an ever-increasing demand from the markets, the techniques spread over the entire basin, changing the faces and practices of fishing communities. While some of the techniques date back to the Middle Ages, their progressive use from the first decades of the 18th Century allowed a more intensive exploitation of the environment. Combined with an increase of marine pollution made worse by the first by-products of the industrial revolution, the acceleration of the exploitation of the resources was felt very early on. The fear of a depopulation of the seas and its corollary, the belief in a past golden age, appeared in intellectual writings

from the end of the “Age of Enlightenment”. These two themes became certainties in the 19th Century, when public powers and populations saw a confirmation in the rise of the price of fish and a rapid impoverishment of coastal marine fauna. The search for alternative solutions is explained by this context of worry. Mostly unnoticed by those involved in traditional fishing, aquaculture companies did flourish under the Second French Empire, but ended in failure, largely explained by the scientific limitations of those initiating it. As they multiplied at the end of the 19th Century, the research carried out in marine biology centers did, however, afford a better understanding of the dynamics of species, while the world of Mediterranean fishing was being transformed by the applications of mechanical power.

1.2.1. *The evolving world of fishing: human migration and technical changes*

Even more porous than national boundaries (themselves established rather later), the maritime zones are areas of active movement of men and knowledge in the modern era. Certain fishing communities played an important role in these transfers in the 18th Century. Among these vectors of technical evolutions, the fishermen of Provence or Cataluña appear to have played an important role in this period. Following the rapid spread of the sardinal in the 16th Century, the massive increase in dragged nets appeared, on the coasts of the Levantine seas, as the great event of the end of the 17th Century. This technique was essentially practiced from the coast up to this era. In Provence, it was the process of eissaugue, and in Languedoc it was the process of the *boulier*. The use of dragging nets in the sea from a vessel was still unknown at this time, since a royal

decree from 1584 banned the use of the *dreige*[11] in the Atlantic. Regularly practiced in the 17th Century despite the ban, sea dragging was developed at the end of the century from Andalusia to the Adriatic, linked with the spread of the tartan, this new boat of roughly 50 tons, developed at the start of this century in the naval building yards of Martigues. This type of fishing, whose provisions were invaluable for the urban markets, was finally authorized under certain conditions by the decree on fishing of 1681. Its variants in Provence and Languedoc, *gangui, tartanon* or moulinet, presented a common aspect of being carried out by a single vessel, anchored (for the moulinet), drifting (for the gangue and tartanon). The spread of the *pêche au boeuf* (the Catalan *bou*), known from the Middle Ages in Valence, radically changed the characteristics of trawling. Now practiced by a couple of vessels, using the sail to tow a particularly large net, this technique considerably increased the efficiency of fishing. Only requiring small vessels, they democratized the access to the trawling art, freeing fishing owners from the obligation of possessing a costly tartan. It also allowed an extension of the fishing season; the *pêche au boeuf* was practiced with wind coming from the rear, as opposed to the *tartanon*, which placed the vessel across the wind.

As soon as it appeared in the Occidental ports of the Mediterranean, the *pêche au boeuf* was immediately adopted, resulting in a rapid expansion over less than 3 years from the north of the Valencian country to the Adriatic. Carried by Catalan or Provençale fishermen, then locally relayed in Italy by heads of the kingdom of Naples and Chiogga (Venice laguna), the diffusion of this technique illustrates the flexibility of Mediterranean fishing methods in the past. Present on the coasts of the Roussillon as soon as 1725, “pair trawling” reached the coasts of Languedoc in 1726. The following year it reached the Rhône, then

appeared in Gênes and Livourne, where it developed in the direction of the coasts of Latium and Campania under the impulse of the fishers of Gaète, despite a ban issued by all the states concerned.

The initial pole of the diffusion of the *pêche au boeuf*, the Catalan coast provided an example of fishing communities powerfully transformed by new economical and social conditions which were those of this part of the Iberian peninsula from the end of the 17th Century. While its population doubled between 1713 and 1787 [HUR 02], Cataluña experienced a form of preindustrialization that led to an increase in the demand of food. The diffusion of *pêche au boeuf* can, therefore, be considered to be an answer to the growing needs of new urban centers in animal-based protein [ALE 03].

1.2.2. *Between the thought of decline and fragility of the environment*

As early as the end of the 18th Century, the rise of towing gears deeply destabilized coastal communities. In its very region of origin, the affirmation of the *pêche au boeuf* caused the emigration of part of the fishermen using fixed material, such as the Catalan longliners, who at the same time left the ports of Selva or Maresm to cast their lines in the waters of the gulf of Marseilles. The use of the *pêche au boeuf*, progressively adapted by the most enterprising of fishing owners, contributed to the division of communities already affected by the arrival of foreign bosses in their waters. In Marseilles, the divorce seemed confirmed by the end of the French Revolution between those practicing polyvalent fixed fishing and the fishermen converted to the practice of the “great art”, who went as far as no longer