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Regulating access to marine fisheries in the coastal zone: key issues

Introductory paper of the workshop on: "Regulating access to marine fisheries : perspectives for the coastal zone", "AMURE" research group, Plouzané, France, 20-21 January 2006.

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Abstract :

The main causes of excess harvesting in fisheries are economic and institutional. The first and most important of these causes is the natural tendency for excess capacity to develop in the competitive harvesting of a common pool resource, which increases with the value and rareness of the resource. The renewable nature of fish resources, by making this a dynamic problem, increases its complexity. Fisheries management relies on two complementary sets of regulations, differing from each other in purpose. These two purposes are *i*) the conservation of the productivity of fish stocks, and *ii*) the regulation of access to the desired extraction possibilities. While the former are indispensable, their effectiveness remains limited due to the fact that they do not tackle the economic and institutional roots of the problem of excess harvesting. Although this is not always explicit, there is a growing recognition that conservation measures must be complemented by regulations of individual access to fisheries and fish resources. The aim of this article is to recall the key lines of analysis which have emerged to explain the need for, and possible approaches to the management of marine fisheries, with specific attention to applications in the coastal zone. Based on recent data, the importance of the stakes associated to the implementation of regulatory tools allowing a sustainable development of coastal fisheries is underlined.

Résumé :

Les causes principales de la surexploitation des pêcheries sont économiques et institutionnelles. La première de ces causes est la tendance naturelle à la surcapacité que suscite l'exploitation concurrentielle d'une ressource commune, et qui se renforce avec la valeur et la rareté de la ressource. Le caractère renouvelable des ressources halieutiques, en introduisant une dimension dynamique au problème, le rend plus complexe. Les mesures collectives d'encadrement des pêcheries visant à éviter la surexploitation peuvent être classées en deux grands ensembles : (i) les mesures de conservation de la productivité naturelle des ressources ; et (ii) les mesures de régulation de l'accès aux possibilités d'exploitation souhaitées. Si les premières sont indispensables, leur efficacité reste limitée par le fait qu'elles ne traitent pas l'origine économique du problème. Même si le diagnostic n'est pas toujours porté clairement, on voit s'imposer l'idée que les mesures de conservation doivent être complétées par des dispositifs de régulation de l'accès individuel aux pêcheries et aux ressources qu'elles exploitent. Le but de cet article est de rappeler les grands traits d'une analyse qui permet d'expliquer la nécessité d'un encadrement des pêcheries, et les approches possibles pour cet encadrement, en s'intéressant plus particulièrement à l'application de cette analyse dans la bande côtière. A l'appui d'éléments empiriques récents, on souligne l'importance des enjeux associés à la mise en place de mécanismes de régulation permettant d'assurer le développement durable des pêches dans cette zone.

Introduction

There is by now a well established literature on the fundamental determinants of excess capacity and over-fishing in marine fisheries worldwide. In this literature, commercial fishing is considered as an economic activity pursued by private operators (individuals or firms) with the aim of generating profit, in the competitive environment of market economies. The activity is peculiar in that its development depends on the exploitation of a natural resource which is both common pool, and renewable. This entails specific difficulties, which lead to a need for the collective regulation of fishing. Fisheries management is the term generally used in this literature to describe such collective regulation, usually by public Administrations, but also and to a growing extent, at least partly by non-governmental organizations.

The aim of this article is to recall the key lines of analysis which have emerged from this area of research to explain the need for, and possible approaches to the management of marine fisheries, with specific attention to applications in the coastal zone. The article is structured as follows. The first section recalls the standard economic diagnosis of the causes of economic, social and ecological problems associated with the development of open access fisheries. Following from this diagnosis, a typology of fisheries management measures is presented in the second section, and some of the major difficulties involved in the application of the different categories of measures are recalled. Section three illustrates this typology, by applying it to the French context, with special emphasis on the regulation of fisheries in the coastal zone of the region of Brittany. The last section stresses the importance and specificities of fisheries management in the coastal zone, at both the European and French levels.

The fundamental determinants of fisheries mis-harvesting

Accounts of the economic, social and ecological difficulties encountered in fisheries world-wide abound[1]. Their fundamental determinants have been established for at least fifty years, in the fisheries economics literature[2][3][4] as well as in the wider ranging "tragedy of the commons" literature[5][6].

The analysis derives from the observation, first, that marine fish are common pool resources. Contrarily to other natural resources (e.g. land in agriculture), fish in the sea cannot easily be allocated *a priori* to individual owners: in the absence of specifically designed access rules, they can in principle be harvested by anyone wishing to do so. As soon as caught, however, marine fish become the private property of the operators who have realized the catch.

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[1] For a recent review and prospective analysis of the future of marine fisheries, see Garcia S. and Grainger J.R. (2005). 'Gloom and doom? The future of marine capture fisheries'. Phil. Trans. R. Soc. B. 360, 21-46.

[2] Gordon, H.S. (1954). 'The economic theory of a common property resource : the fishery'. Journal of political economy 124-142.

[3] Scott, A. (1955). 'The fishery : the objectives of sole ownership'. Journal of political economy 63 :116-124

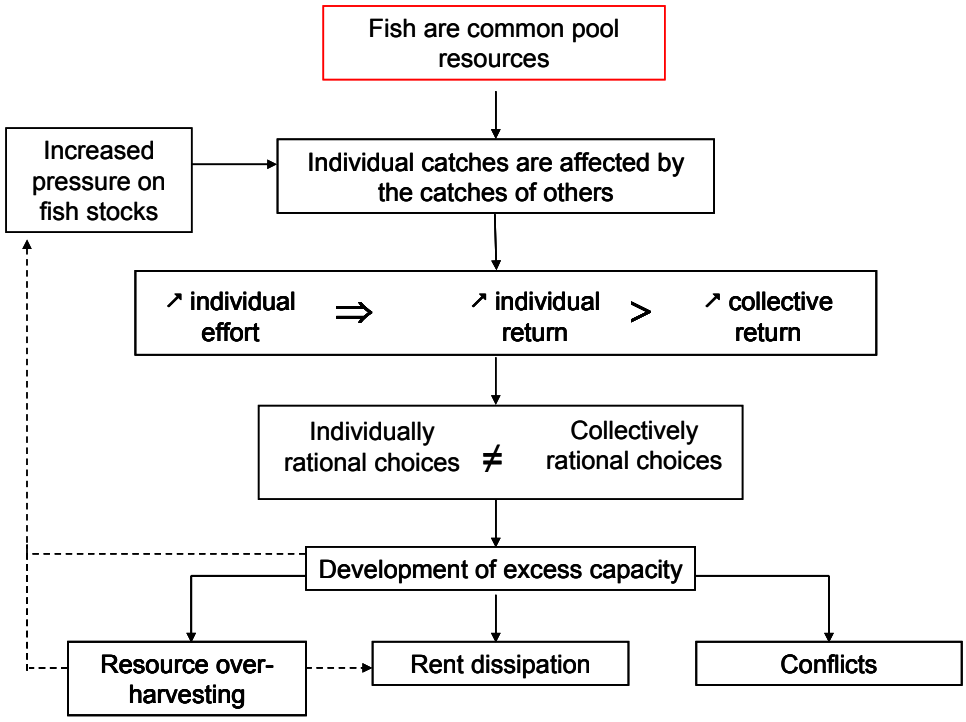
[4] Crutchfield, J.A., Zellner, A. (1962). 'Economic aspects of the Pacific halibut fishery'. Fishery industrial research 1 (1) : 1-162.

[5] Hardin, G. (1968). 'The tragedy of the commons'. Science 162 : 1243-1248.

[6] Ostrom, E. (1990). 'Governing the Commons; the evolution of institutions for collective action'. Cambridge University Press, USA : 280p.

The consequences of this specific status of fish stocks are depicted in figure 1 below. In any fishery, the potential catches of an individual operator will depend not only on his own fishing effort, but also on the fishing effort of all the other operators prosecuting the fishery: an increase in the catches of a given operator will be at least partly balanced by a decrease in the catches of other operators. Hence, there exists an interaction between the individual decisions to harvest: in a competitive environment with open access to the fishery (i.e. where the cost of this interaction can be ignored by individual firms seeking to maximize their profits), the marginal individual return derived by an operator from an increase in his fishing effort will lead to a less than equivalent increase in the marginal return observed at the collective level of the fishery. This interaction - or crossed externality in the economic terminology - leads to a divergence between individually rational choices and the choices that would appear preferable at the collective level: in particular, there will be a tendency for operators to invest in fishing capacity in excess of what would in principle be required to achieve a given level of production. This tendency will be stronger as the competition for access to the resource is strong, which will occur where the potential gains from harvesting are high and the stock of freely available resources is low.

Figure 1 – The fundamental drivers of mis-harvesting in open-access fisheries



The interaction between individual harvesting decisions exists, even without taking into account the second important characteristic of fish resources, namely their capacity to grow and to renew themselves. This second important characteristic increases the complexity of the problems encountered in open-access, competitive fisheries: indeed, harvesting by an individual operator in a given period will have consequences on his and other operators' potential harvests in the future, via an impact on the growth and reproductive capacities of the fish stock. With the development of fishing capacity, and the associated increase in fishing pressure, this impact may be strong,

leading to a reduction of the fish stock and to a modification of its demographic structure, which themselves lead to an increase in intensity of the interactions between operators' harvesting decisions. The dynamic nature of the problem posed by open access fisheries can thus lead to an aggravation of the difficulties due to the common pool status of marine fish stocks.

In fisheries where the above processes take place, the classic economic, social and ecological symptoms of fisheries mis-harvesting will be observed:

- Rent dissipation: where excess fishing capacity develops, there will be more human and capital resources devoted to fish harvesting than would be necessary, e.g. if the fishery was managed by a single owner. The implication is that, except in the specific case where the opportunity costs of production factors engaged in fishing is zero, potential wealth will be dissipated in the economy.
- Conflicts: in contexts where ownership over fish resources can only be achieved by being the first to catch the fish, leading to situations of excess capacity, competition will entail tensions, which will translate into conflicts of various kinds, and to social unrest.
- Resource over-harvesting: with growing fishing capacity, pressure on the growth and reproduction possibilities of fish stocks will increase, leading to reductions in the available biomass below levels ensuring sustainable production possibilities at the desired scale, and to modifications in the demographic structure of fish stocks. This can entail a reduction in the level of biological production achieved by these stocks, in some cases to the extent where their resistance and resilience to ecological and environmental pressures is significantly reduced. In extreme cases, this may lead to stock collapses, and more or less reversible shifts in the structure of fish communities, with consequences in terms of the extractive potential of commercial fish stocks.

A typology of fisheries management tools

The difficulties encountered in fisheries, due to the common pool and renewable status of marine fish stocks, entail a need for the collective regulation of fish harvesting. Based on the preceding analysis of the causes of fisheries mis-harvesting, a typology of fisheries management tools can be proposed, taking into account the main purpose of these tools. As illustrated in figure 2 below, two broad categories of fisheries management measures can be distinguished in practice: technical measures, and access regulation measures[7].

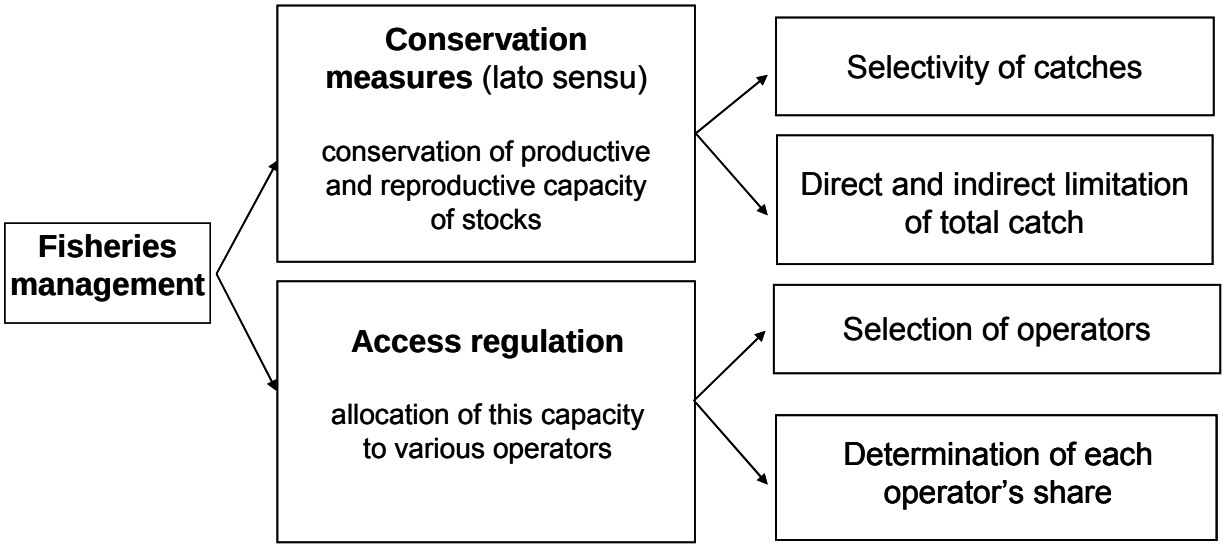
The purpose of technical measures is to preserve the capacity of fish stocks to grow and to renew themselves. In the fisheries biology terminology, this involves controlling both production per recruit, and the relation between spawning stock biomass and average long period recruitment. Measures aim at selecting the individuals which can be extracted from a given fish population, so as to favor growth and reproduction possibilities. This includes norms concerning gear selectivity (e.g. mesh size), minimum landing sizes, and fishing operations (fishing time and area closures). It also includes measures aimed at directly or indirectly limiting the impacts of fishing on total

[7] This typology was initially proposed by Troadec J.P., Boncoeur J. (2003). 'La regulation de l'accès'. In Laubier L. (animateur), Exploitation et surexploitation des resources marines vivantes. Académie des Sciences, Rapport sur la Science et la Technologie (17), Paris.

stock biomass, in order to preserve a stock's potential to renew itself. The most common regulations under this category are the setting of total allowed catches (TAC) and/or effort limitations in terms of the size (e.g. number of vessels, total engine power, etc) and activity (e.g. yearly, weekly or daily fishing time) of fishing fleets. Conservation measures, as defined here[8], have been widely adopted internationally, under many different forms in practice.

Although much less systematically developed, a second and complementary set of measures aims at explicitly resolving the problems related to the common pool nature of marine fish stocks. Once limitations on the acceptable level of harvesting are in place via technical measures, the aim of access regulation is to set up mechanisms which limit the negative aspects of competitive harvesting, by allocating each operator's share of the production possibilities *a priori*. This involves, first, identifying the operators who can participate in the fishery for a given fish stock or set of fish stocks; and second, defining each operator's share of the authorized fishing possibilities.

Figure 2 - The two complementary dimensions of fisheries management



Recent analysis of the status of fisheries and of the successes and failures of their management worldwide[9] shows that, while technical measures are necessary for stock preservation, they fail to resolve the difficulties encountered in fisheries development, since they do not address the fundamental causes of these difficulties. Indeed, in fisheries regulated by technical measures only, the stringency and effectiveness of stock conservation efforts may in practice be significantly

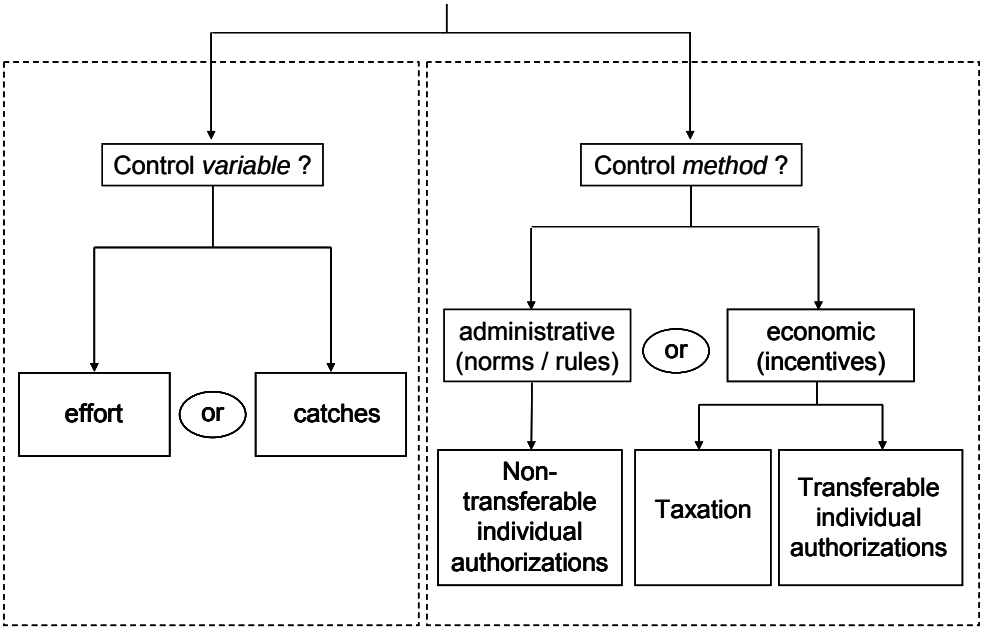
[8] Only selectivity measures are called « technical » in the usual fisheries management terminology. However, as TACs or fishing time limitations do not deal with the question of resource allocation between fishers, we consider these regulations as « technical measures ».

[9] Garcia and Grainger (2005), op. cit.; Hilborn R., Branch T.A., Ernst B., Magnusson A., Minte-Vera, C.V., Scheuerell M.D., Valero J.L. (2003) 'State of the world's fisheries'. Annu. Rev. Environ. Resour. 28:15.1–15.

affected by the development of excess capacity. This is because, with the economic and social difficulties that result from this development, there is increased pressure for allowing excessive levels of harvest, and/or for operating at levels beyond regulatory limits. Observation of these difficulties in practice across the world is progressively leading to the adoption of access regulation systems, in complement to the existing technical regulations of fisheries.

The following figure presents a schematic description of the means by which these systems can be developed. The two key choices involved in practical approaches to the regulation of access to fisheries relate to the control variable, and to the control method adopted.

Figure 3 - Approaches to the regulation of access to fisheries resources



Choice of the control variable

Choosing the variable on the basis of which access to marine fisheries is regulated is complicated by the nature of marine fish resources. Contrasting with the situation that prevails in farming or forestry, fish resources usually have a “fugitive” character, i.e. are mobile and difficult to quantify. As a result, in most cases, access rights cannot be defined directly in terms of stocks. In the case of sedentary species such as shellfish or seaweeds, controlling individual access to the resource may be based on territorial use rights. In other, more frequent situations, control of individual access relies on either inputs - control of the characteristics and/or activity of individual fishing vessels, or output - control of the catches of individual operators. The use of

the word “licences” is frequently limited to the case of input-based controls of individual access; while output-based controls are usually termed individual quotas[10].

Choice of the control method

Control methods are usually classified as belonging either to the category of “administrative” methods, or to the category of “economic” methods[11].

Administrative methods, which for long have been used to protect the productive and reproductive capacity of fish stocks, have often been extended to the regulation of individual access to the resource. They can be implemented by public Administrations, but also by non-governmental organizations, particularly commercial fishing organizations. In this case, rights of access to fisheries are managed by norms and rules established by the organization; they are thus not privately transferable between operators. In practice, administrative methods usually consist in implementing limited entry non-transferable licenses. These licenses are generally accompanied by limitations concerning individual fishing power and/or fishing-time, or sometimes individual catches. In this last case, individual catch quotas may be the same for all licensed boats, or may be based on individual boat capacity, historical catch records, or a combination of these criteria.

Economic methods aim at using incentives to lead private operators to adjust their fishing activity and their catches to desired targets, by fixing a price for the externalities generated by their fishing activity. In principle, two mechanisms can be used to do so: taxation and the implementation of individual transferable access rights.

Taxation methods, frequently used in the field of environmental management, are based on the theory of social cost[12]. According to this theory, taxing an activity that generates a negative externality will lead the producer of this externality to incorporate in his own economic calculation the cost it induces for other economic agents (provided the level of the tax is related to this cost); the expected result is a decrease in the level of the negative externality, either because the activity is itself reduced, or because the production method is changed (by a shift to “cleaner” techniques for instance). In the fishing industry, taxation increases the unit real cost of fishing effort, which is expected to prompt fishers to decrease their effort. If the tax rate is fixed at the appropriate level, fishing effort may be reduced to the point where its social marginal product becomes equal to its unit real cost (exclusive of tax), i.e. where the fish rent (net income

[10] See e.g. Copes P. (1997) – ‘Alternatives in fisheries management’. Proceedings of the IXth Annual Conference of the European Association of Fisheries Economists, UBO-CEDEM / ENSAR, Quimper, France : 10-35.

[11] This distinction may apply to both sets of fisheries management tools presented in the previous section. In the field of technical measures, economic methods can be implemented, e.g. via taxation of poorly selective gears, subsidising of highly selective gears, eco-labelling, or allocation of individual transferable rights to disturb marines habitats. To date (?), however, a vast majority of the technical measures adopted in fisheries are based on administrative management methods, and the debate concerning the use of administrative v. economic methods is mainly focused on the question of access regulation.

[12] Pigou, A.C. (1920). ‘Economics of Welfare’. McMillan, London.

generated by fishing) is maximum. However, taxation is seldom used as a management tool in fisheries, in particular for social acceptability and technical feasibility reasons[13].

Implementation of individual transferable access rights has been more frequently used[14]. This involves issuing a limited number of individual (input or output based) fishing authorizations, and allowing their transferability via private transactions between operators, at prices fixed according to market supply and demand. This possibility conveys an explicit monetary value (an explicit price) to fishing authorizations, which thus become assets in the account books of the fishing firms. Rights-based methods in fisheries management belong to the same family of management tools as pollution permits in environmental management. Their doctrinal background may be found in Coase's critical analysis of the pigovian theory of social cost, which stresses the fact that externalities are merely a consequence of loosely defined use rights concerning production factors[15]. At a microeconomic level, transferability enables each firm to adjust its level of activity according to its own interests: a firm may increase or diminish its share in the total rights of access to a given fishery by buying or selling fishing rights. As in the case of taxations, the opportunity cost of fishing rights leads their owners to take resource scarcity into account in their fishing behaviour: a fishing firm will normally develop its fishing effort (and buy the corresponding volume of fishing rights) up to the point where the social marginal cost of fishing effort is equal to its real cost (exclusive of the opportunity cost of rights).

Possible difficulties associated to the different approaches

In practice, access regulation measures usually rest on a combination of different approaches, rather than on a single measure, each approach having its own advantages and difficulties. The table below summarizes some of the major difficulties encountered with each of the two possible sets of control variables.

Table 1 – Practical difficulties encountered in controlling effort and catches[16]

Difficulties in controlling fishing effort	Difficulties in controlling fish catches
➢ Identification of the "appropriate" parameter(s), given the multidimensional character of fishing effort, and the high input substitution possibilities	➢ Monitoring of catches and landings, and enforcement of catch limitations
➢ Need to adjust to the permanent evolution of parameters of fishing effort, due to changes in production strategies and to technical progress	➢ Possible increase in discards in fisheries with high degrees of joint production (of size classes within a species, or of species)

[13] In fact, in many countries, fishing effort is subsidised, which means a negative taxation, thus favouring an increase rather than a decrease in fishing effort and catches (OECD, 1997).

[14] Shotton R. (ed.) (2000). 'Use of Property Rights in Fisheries Management'. FAO Fisheries Technical Paper 404/1, Rome.

[15] Coase, R. (1960). 'The Problem of the Social Cost'. The Journal of Law and Economics, 3 : 1-44.

[16] Based on Boncoeur J., O. Guyader and O. Thébaud (2006). 'A typology of fisheries management tools'. AMURE Publications, Working Papers Series n°D-16-2006, Brest.

Controlling access to a fishery based on effort begs the question of an operational definition of fishing effort. Because this is a multidimensional concept, and because of the usually high substitution possibilities between the different inputs and input combinations defining fishing effort, the answer to this question will always be case specific, and may in practice be difficult to find. Even if found, there is a need to constantly adjust to changes in the characteristics of effort, due to changes in the production strategies of operators and to technical progress. On the other hand, controlling access via catches and landings poses the question of the capacity for a regulatory system to monitor these catches and landings, and enforce catch limitations where this monitoring is incomplete.

The table below summarizes some of the major difficulties encountered with each of the two possible sets of control methods. One of the main problems faced by regulatory systems based on administrative approaches is the identification of adequate selection criteria on the basis of which to exclude operators from a given fishery. Another key problem is adapting the regulations applying to individual operators at a fine level, in order to adjust to differences and to short-term changes in the circumstances of each operator. In systems where access rights exist but are granted on an administrative basis, there is often a tendency for *de facto* transferability of these rights to emerge, pushed by operators seeking increased flexibility in the face of changing ecological and economic conditions. Where such informal markets develop, all the difficulties encountered in systems explicitly based on economic approaches to access regulation can in principle occur. The risk that these markets will operate in an inefficient manner may though be higher, due to lack of transparency of the transactions.

Table 2 - Practical difficulties associated with administrative and economic methods of access regulation[17]

Difficulties associated with administrative methods	Difficulties associated with economic methods
➢ Identification of adequate selection criteria on the basis of which to exclude operators from a given fishery	➢ High sensitivity of the initial allocation issue in systems based on transferable access rights
➢ Limited capacity of fine scale adjustments of fishing authorizations to differences and changes in the circumstances of individual operators	➢ Difficulties where markets for fishing rights do not operate efficiently (in particular due to distortions in prices)
➢ Development of *de facto* transferability of fishing rights	➢ Negative social consequences (employment, concentration of fishing rights)

In regulatory systems based on economic approaches, the initial set up of access regulations is particularly sensitive, as it directly affects the distribution of wealth generated from marine fish stocks. With a tax, the ultimate beneficiary of the resource rent is not identified a priori; however, setting up a tax on resource extraction will imply that existing operators who used to freely access a fishery will be required to pay to keep the privilege of doing so: a change of a politically

[17] Based on Boncoeur J., O. Guyader and O. Thébaud (2006). 'A typology of fisheries management tools'. AMURE Publications, Working Papers Series n°D-16-2006, Brest.

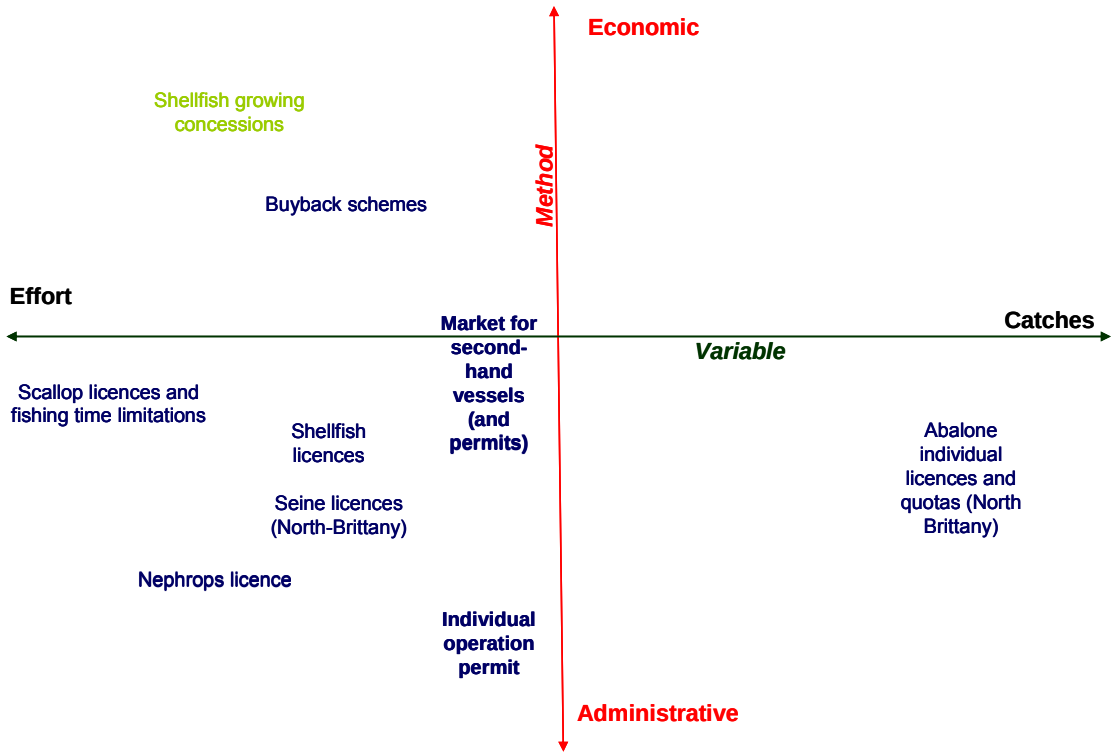
sensitive nature, which is probably one of the main reasons for the limited recourse to this approach in practice. In systems based on transferable fishing rights, fish rent is incorporated in the price of rights. This makes the conditions of first allocation of fishing rights critical as regards wealth distribution in a fishery. In practice, where transferable fishing rights have been established, the initial allocations have usually been granted for free on the basis of past involvement in the fishery, the so-called "grandfathering" approach. Beyong this initial allocation problem, market-based approaches face the difficulties related to the functioning of any market, particularly those related to the existence of price distortions of various origins. They also face strong criticisms related to their social impacts, in terms of employment and concentration of the fishing industry.

A diversity of approaches in practice

With growing pressure from fishing on marine ecosystems, there is an increasing recognition of the need to regulate access to fisheries worldwide[18]. Looking at practical situations shows that in addition to combining different approaches in given fisheries, there is usually a diversity of approaches within the same countries, or regions within a country, depending on the fishery considered. It is however possible to assess the dominant forms of access regulations in place from the perspective of our general typology. The figure below proposes an illustration of such assessment, based on the case of Brittany (France): it presents the status of a selection of the most significant access regulation schemes currently applied to the coastal zone, be they defined at the regional (light blue), or national (dark blue) level. An example from outside the capture fisheries sector is also presented, given its specific interest for a discussion of access regulation to marine fisheries in the French context. The x-axis in this figure represents the choices made as regards the main control variables on which access regulation is based; the y-axis represents choices made in terms of the main control method.

[18] See e.g. FAO (2002). 'Report and documentation of the international worshop on factors of unstainability and overexploitation in fisheries'. FAO Fisheries Report R672, Rome.

Figure 4 - Diversity of practical situations: some examples of access regulation to fisheries and aquaculture in Brittany (France)



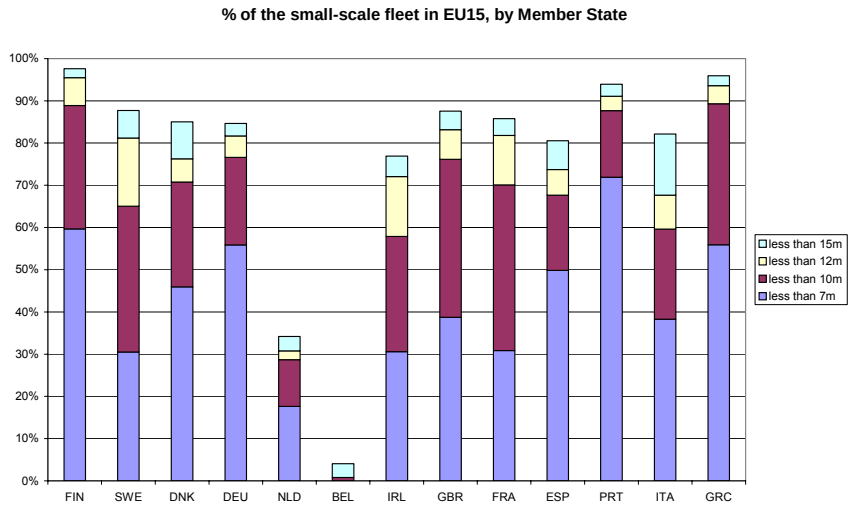
On the basis of these cases, it is apparent that access regulation to fisheries in Brittany is mostly based on administrative approaches to the control of fishing effort. A limited number of examples show that other options however do exist: three are based on effort and on economic approaches, one explicit (buyback schemes), and the two others implicit (market for second-hand vessels; market for shellfish concessions)[19]; one (individual quotas in the abalone fishery) is based on administered individual catch limitations (as well as on a licence system).

Regulating access to fisheries in the coastal zone

Coastal fisheries represent a significant proportion of the overall fishing industry in many regions of the world. For example in the European Union, a recent review of the EU 15 fleet statistics for year 2005 showed that the fleets of vessels of under 15 meters in length, which are more strongly dependent on near-shore areas for their activity, represent 87% of the total fleet in vessel numbers; in some countries, they account for an even higher proportion of the national fleets (see figure below).

[19] For more details on the operation of the two latter schemes in the context of Brittany, see the papers by Guyader et al. and Mongruel et al.; this issue.

Figure 5 – Structure of the EU 15 national fishing fleets, by Member State[20]

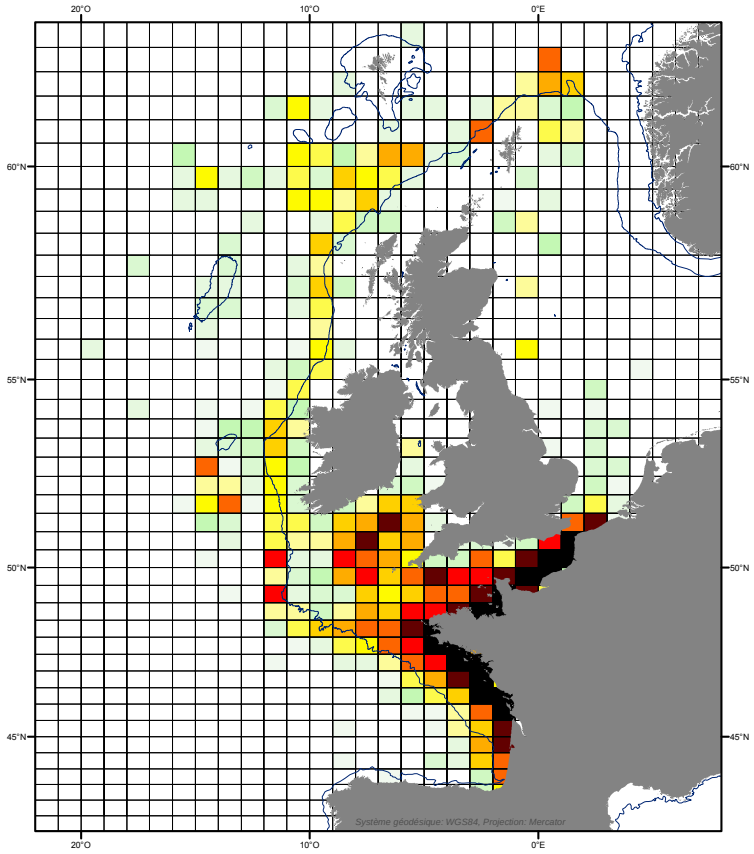


If coastal vessels are characterized as those vessels spending more than 75% of their total fishing time inside the coastal zone (defined in this case as the 12 nautical miles limit), statistics available for French fisheries in year 2003 show that the coastal fleet represented 72% of the total French fleet operating in the Atlantic in numbers of vessels, while the fleet "straddling" the offshore limit of the coastal zone represented 16% of the total fleet[21]. In terms of employment, these two fleets represented respectively 46% and 38% of total full-time-equivalent employment aboard fishing vessels operating in the region. The figure below, reproduced from the same study, illustrates the geographical distribution of gross return generated by the French Atlantic fishing fleet. It clearly shows the strong contribution of landings from the coastal zone to the total gross value of landings achieved by this fleet, both for coastal vessels and for vessels spending part of their time in the coastal zone.

[20] Berthou P., F. Daurès, S. Demanesche (2005). 'Some initial comments about Small-Scale Fisheries in Europe'. Paper presented at the European Workshop on Small-Scale Fisheries, Kavala, September 12-16th. 2005 (unpublished).

[21] Leblond E., F. Daurès, P. Berthou, S. Bermell, C. Merrien, S. Demaneche (2006). Synthèse des flottilles de pêche 2003. Ifremer, Plouzané (http://www.ifremer.fr/drvrhbr/action_recherche/synthese-pecheries/synthese-flottilles-peche-2003/index.htm)

Figure 6 – French Atlantic Fishing Fleet: Cumulated annual gross value of landings per statistical rectangle[22]



*Source : DPMA-BCS; Ifremer estimate

While the analytical framework described in the previous sections applies generally, there may be specific questions to address when considering the management of fisheries in the coastal zone. In what follows, we propose a list of questions which may warrant specific attention, when considering the regulation of access to coastal fisheries. These relate to the institutional context, the biological characteristics of fish stocks, the characteristics of the fishing fleets, and the nature of interactions between users which need to be considered.

Institutional context

At least in some parts of the world, there may be a certain degree of autonomy for coastal authorities, for the regulation of access to fish resources in areas close to shore. This has typically been the case at a fairly large scales with the creation of exclusive economic zones under the Law of the Sea. There may also be possibilities for national, regional or local authorities to dispose of at least some control over access rules in areas even closer to shore. In Europe, for example, national authorities have a degree of autonomy for the management of fishing activities within

[22] Berthou P., F. Daurès, S. Demanesche (2005). 'Some initial comments about Small-Scale Fisheries in Europe'. Paper presented at the European Workshop on Small-Scale Fisheries, Kavala, September 12-16th. 2005 (unpublished).

the 12 nautical miles limit of the Atlantic waters, as long as the management measures adopted are coherent with the E.U.-wide policy framework. One would expect that this autonomy for regulating access can entail specific developments in coastal areas.

Fish resources

A number of species can be considered as fully coastal species, being distributed entirely within the near-shore area. This, associated with the possibility to regulate at the same scale, would appear favourable for the development of access regulations. On the other hand, a number of species including some with high commercial value "straddle" or "migrate" across the offshore boundary of the coastal zone. In these cases, decisions taken in the coastal zone will have to take into account the decisions taken concerning offshore harvesting, leading to potentially greater difficulties in the design and implementation of access regulations. In some cases, the species caught mainly offshore will strongly depend on the coastal zone for part of their life cycle, leading to situations akin to those encountered in sequential fisheries. In those cases, decisions taken in the coastal zone will have potentially strong consequences for the wider fisheries system.

Fishing activities

As for fish stocks, fishing fleets depend to a varying degree on the coastal zone for their activity. Fleets of smaller scale vessels are active entirely within the coastal zone, often with a certain degree of polyvalence in terms of gear (and multiple gears used) and target species. This entails a strong potential for multiple and complex interactions between operators, and between fisheries. Landings of these small scale fleets are often less well known than for the larger-vessel fleets, being more diffuse, both geographically and in terms of markets. Other fishing fleets, composed of larger vessels, also "straddle" the coastal limit, spending part of their fishing time offshore; indeed, some fleets operate only for very limited periods of time in the coastal area, but given their fishing power, their activity can have significant interactions with coastal fleets.

Interactions

Interactions related to the harvesting of fish resources in the coastal zone are of different categories. First, coastal fishermen themselves interact, following the classic framework described above, but with a potentially larger degree of complexity due to the polyvalence of coastal fleets. This complexity is increased by the existence of interactions with offshore fishermen due either to the fact that their activities target the same, "straddling" or "migratory" stocks, or to the presence of offshore fleets in the coastal zone. Second, coastal fleets of commercial fishing vessels interact with recreational users of the same fish resources, all the more since in most cases, recreational fishing takes place near-shore. Third, commercial fishing in the coastal zone also interacts with the other uses of this zone, which may become competitors for space, or which may cause ecological changes detrimental to fishing (land or marine-based pollution, habitat degradation, …). Finally, given the high biodiversity of coastal marine areas, coastal fisheries may interact more strongly than elsewhere with the conservation objectives of projects designed to protect the marine ecosystem, including from fishing.

All these interactions relate to technical (negative) externalities within the coastal fisheries sector, between this sector and the offshore fisheries sector, and between this sector and the other uses of the marine ecosystem. In the context of the coastal zone, there may also be positive interactions, relating to the contribution of fisheries to the attractiveness of coastal areas for other users, in particular for tourists. Interactions between the fisheries and other sectors of the coastal economy

may also exist due to the existence of part-time employment of the same people in at least two sectors.

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