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The impact of economic and regulatory factors on the relative profitability of fishing boats

A case study of the seaweed harvesting fleet of Northwest Brittany (France)[1]

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Abstract

This paper adresses the question of the relative importance of economic and regulatory (administrative) factors on the profitability of various components of a fishing fleet. The argument is that, while the official purpose of most regulatory measures is resource conservation, these measures may significantly influence the relative levels of incomes generated by various components of the fleet operating the fishery. When the management of the fishery is mainly under the control of fishermen themselves, this illustrates how the endogenous generation of rules by groups of users may affect both economic efficiency and equity.

The paper is based on a case study concerning a small-scale inshore fishing fleet of the Northwest part of Brittany (France). This fleet was investigated by a field survey, providing two main types of results : effort, output, cost and income data which are used in simulations concerning the impact of various factors on the profitability of boats operating the fishery, and data concerning the opinion of fishermen about the management system of the fishery.

According to the results of simulations, two regulations, concerning the cost of access to resources and the control of fishing effort, play a significant role in the difference of profitability observed between smaller and larger boats. At a time when the renewal of a large part of the fleet is at stake, this might influence durably the dynamics of the fishery.

Keywords

Boat profitability, regulatory measures, seaweed harvesting fleet.

Introduction

The basic need for fisheries management is connected with stock conservation problems. However, regulations that are adopted for this purpose frequently have a distributional impact among fishermen (Guyader and Thébaud, 1999), which raises equity issues and is a frequent source of fisheries conflicts (Charles, 1992). In these conflicts, public concern for resource and ecosystem conservation tends to be intermingled with distributional considerations. For instance, debates concerning the need to limit or ban the use of some gears, though apparently focused on the « biological » impact of these gears, are often rooted in the vested interests of various interacting fleets. In such cases, the lack of clear and commonly accepted definition of individual use rights frequently leads to non-efficient solutions, since no Coasian-type bargaining process may take place (Boncoeur, Fifas and Le Gallic, 2000).

[1] This paper was presented at the XIVth Annual Conference of the EAFE, Faro, 25-27 March 2002. A revised version was published in the journal *Aquatic Living Resources* (Alban et al., 2004).

Another consequence of the connexion between distributional and conservation impacts of regulations is the difficulty to assess the respective roles played by « economic » and « regulatory » factors in the relative profitability of various boats operating a fishery : part of the observed differences may be due to an artefact, such as the (possibly unintended) result of some regulation. This may significantly influence the dynamics of the fishery, as the most profitable boats usually tend to get over the least profitable ones and exclude them from the fishery. The risk is then to create some kind of circularity in the process of managing the fishery, adopting measures intended to promote « more efficiency » in the fishery, while

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The first part of the paper briefly describes the fishery, its dynamics and the main results of the survey concerning the profitability of various components of the fleet. The second part displays two simulations concerning the impact of regulatory measures on the relative profitability of boats. In the third part of the paper, the opinions of fishermen concerning the management system of the fishery are presented. The possible consequences of the regulatory measures on the dynamics of the fleet are discussed in the conclusion.

1. The fishery

The Northwest coast of Brittany concentrates the bulk of the French seaweed harvesting industry (Arzel, 1998). The main commercial species, *Laminaria digitata*, is harvested by a specialised fleet (58 boats in 2000). The harvest is bought by two factories located near the main landing areas, and transformed into alginates which are used as components of a wide range of industrial products. The fleet is small-scale : each boat belongs to its skipper and all of them are between 7.50 and 13.20 metres long. Contrasting with this structure of the primary sector, the processing sector is controlled by two multinational firms, the output of which is sold on the world market of alginates - which results in a hard price constraint for local producers[2] (Kervarec et al., 1999) -.

The harvesting of seaweeds by boats is considered by French law as a fishing activity[3]. The management system of the fishery relies on a set of rules adopted by the « seaweed commission » of the regional committee of fisheries (a professional organisation), and validated by government authorities[4]. Fishermen form the majority of this commission, where the processing sector is also represented[5]. Since 1985, the fishery has been managed on the basis of a limited entry license system[6], with regulations concerning fishing power (boat length should not exceed 12 m., except for boats

[2] Some 80% of the local output of alginates is exported.
[3] *Décret n°90-719 du 9 août 1990.*
[4] *Préfet de région*.
[5] The legal framework for this management system is provided by a 1991 law concerning the organisation of marine fisheries (*Loi du 2 mai 1991 relative à l'organisation interprofessionnelle des pêches*). Prior to this law, the fishery was managed by a committee where both the fishing industry and the transformation industry were represented (Arzel, 1997).
[6] According to French law, licenses are non transferable. Their cost is symbolic (under 100 euros a year). In 2000, the constraint was not binding, as 65 licenses were available but only 59 fishermen got a license (among whom 58 actually participated in the fishery).

which were in the fishery prior to the regulation) and fishing effort (limitation of the fishing time). Some additional regulations concern the areas open to harvesting and the maximum quantities landed per boat in the first weeks of each harvesting season, which usually extends from May to October. In 1987, the number of landings was limited to one per day.

Boats are usually operated by only one person (sometimes two). The gear, called *scoubidou*, is a hook which is fastened to a hydraulically driven mechanical arm. In 2000, the average age of the fleet was 19 years, with 22% of the boats over 25 years, and only 10% under 10 years old (fig.1). Most of the boats forming the present fleet were built during two periods : the 1972-1980 period (44% of the fleet in 2000), and the 1985-1982 period (40% of the fleet in 2000). The older boats are usually between 8 and 9 metres long, while more recent boats tend to be larger, with a length frequently between 11 and 12 metres.

Due to the seasonal character of the activity, fishermen have recourse to additional sources of income. At the end of the seaweed harvesting season, some of them engage their boat in other fishing activities, mainly shellfish dredging in the bay of Brest (47% of the fleet in 2000 - see fig.2 -). This activity has plaid an increasing role as a source of income for seaweed-harvesters in the 90', a trend which is partly due to the increase in landings induced by the restocking program concerning scallops (*Pecten maximus*) of the bay of Brest (Boncoeur and Guyader, 1995).

The present state of the fleet is the result of the evolution of the industry since the introduction of the mechanical harvesting technique in 1971. During the first years following this introduction, the number of boats using the new technique increased rapidly, from 21 in 1972 to 68 in 1980. By this year, the traditional non-mechanised fleet had almost disappeared (Arzel, 1987), and the increase in the mechanised fleet became slower. A maximum of 74 boats was reached in 1990. The number of boats fell by more than 20% during the 90', but a good part of this evolution was balanced by the increase in the average boat HP and carrying capacity (fig.3). This is due to an important change in the structure of the fleet : boats with a carrying capacity under 10 tons, which formed the majority of the fleet during the 70', had almost disappeared 20 years later. On the other side, the number of boats with a carrying capacity over 20 tons grew from zero to 17 during the same period.

Annual landings increased from some 30000 tons in 1980 up to a maximum of 65000 tons in 1986 (fig.5). After this date, landings fluctuated around 60000 tons during ten years[7]. At the end of the 90', landings fell below 50000 tons, and their quality deteriorated, with an increasing proportion of stones and parasitic seaweeds (*Saccorhyza polyschides*). The cause in the recent decline of global landings is not yet clear. The hypothesis which is presently favoured by biologists is a combination of overexploitation and climate change (Anon., 2001).

Average landings per boat, which were multiplied by 4 between 1972 and 1986, have fluctuated since this date between 800 and 1000 tons a year, the decrease in the number of boats after 1991 balancing more or less the decrease in total landings. This apparent stability conceals a decreasing trend in CPUEs since the mid-80', as the average capacity of boats increased significantly during the same period. The decrease in local landings is by no mean balanced by a rise in their price, which is constrained by the situation on the world market of alginates[8].

The processing sector complements its local inputs by imported dried seaweeds. However, a major concern is to keep local landings at a level high enough to justify the maintenance of the two factories in the area. Two causes of concern are at work : the aging of boats and men, and the deteriorating condition of the resource.

[7] The year 1993 was exceptional, due to special conditions on the world market of alginates.
[8] The price of landings (expressed in constant francs) has been fairly stable since 1994.

Table 1. Main features of the management system of the fishery (*L. digitata*)

Harvesting power	Harvesting time	Harvesting areas	Landings
Limited entry license system (65 licenses in 2000)	Limits of the harvesting season (in 2000 : 9 May to 13 October)	Rotation system at the beginning of each season*	maximum 1 landing per day
Maximum boat length : 12 m. (except for anteriority)	Harvesting days and hours : from monday to friday, between sunsrise and sunset		Weekly quotas per boat** at the beginning of each season*

* 5 first weeks. ** in 2001, daily quotas per crew member. Source : Regional Fisheries Committee of Brittany.

Figure 1

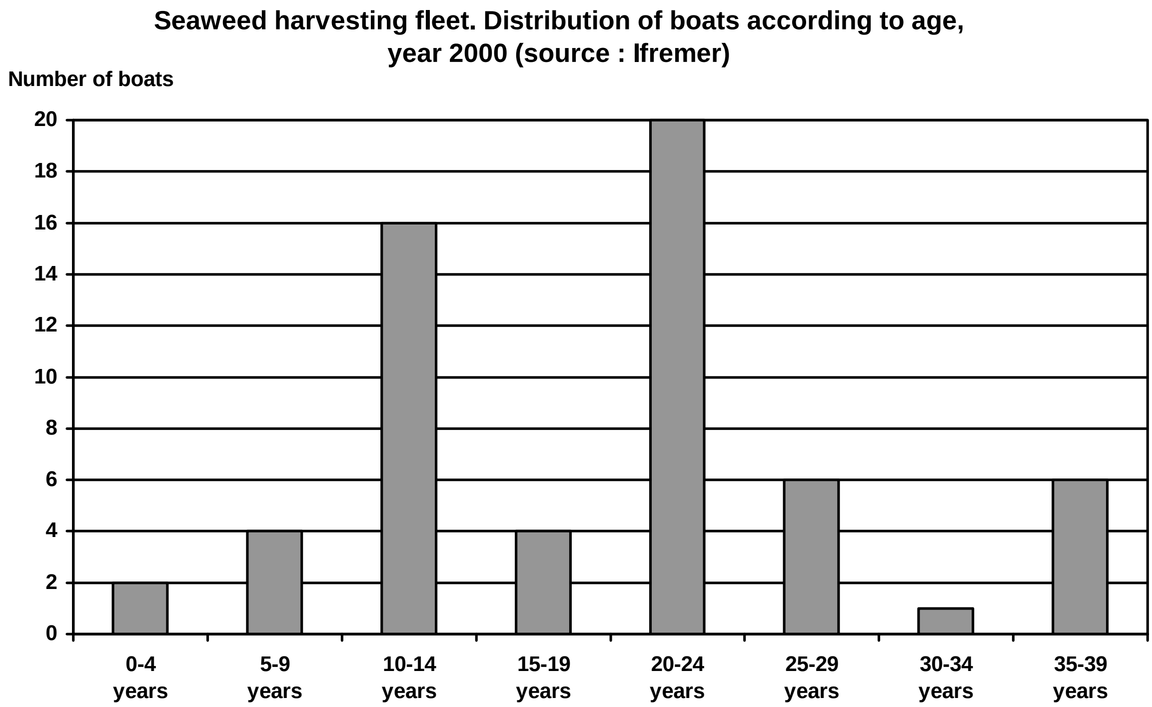


Figure 2

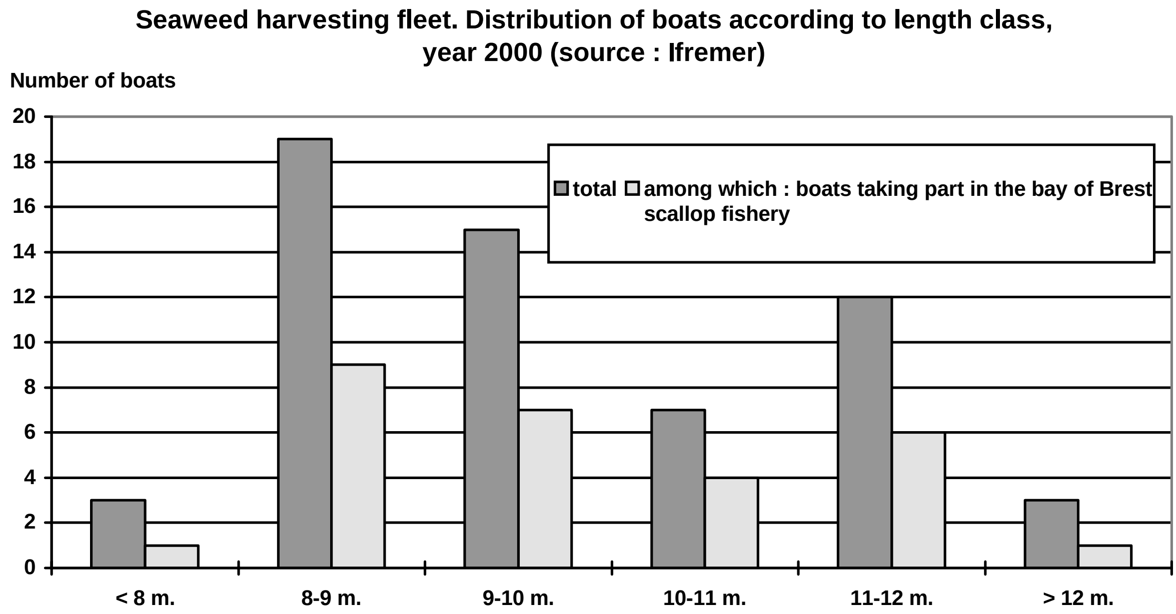


Figure 3

Seaweed (mechanised) harvesting fleet, 1972-2000
Numbero of boats, cumulated HP and carrying capacity
Indexes, base 100 in 1972 (source : Ifremer)

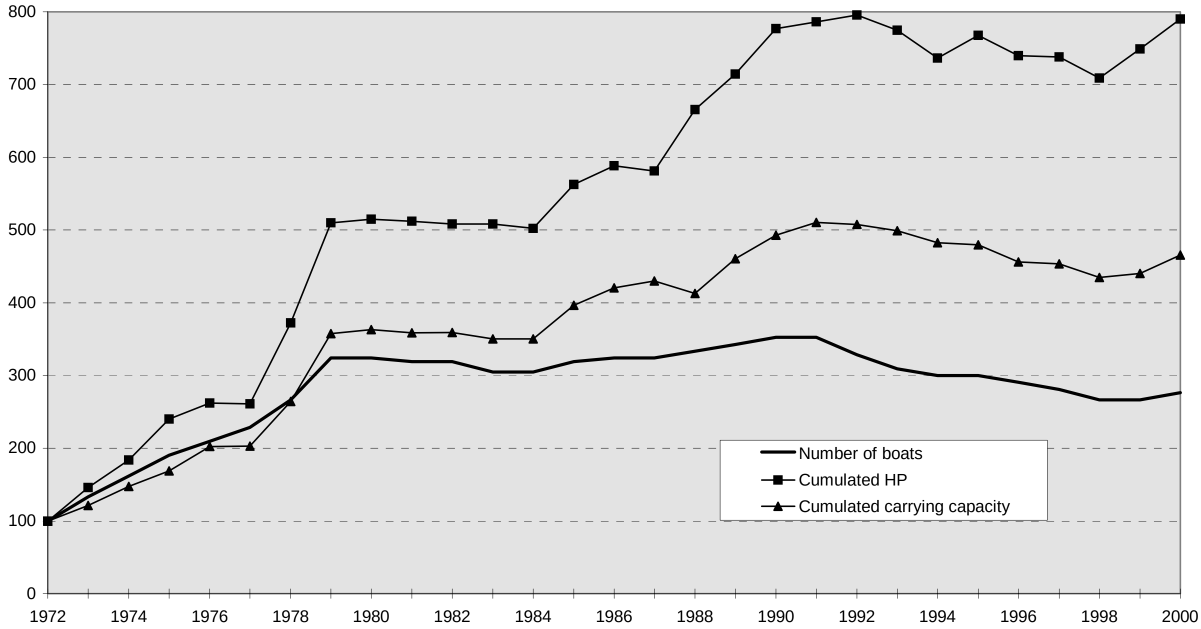


Figure 4

Distribution of seaweed harvesting boats according to individual carrying capacity, 1975-1995
(from Arzel, 1998)

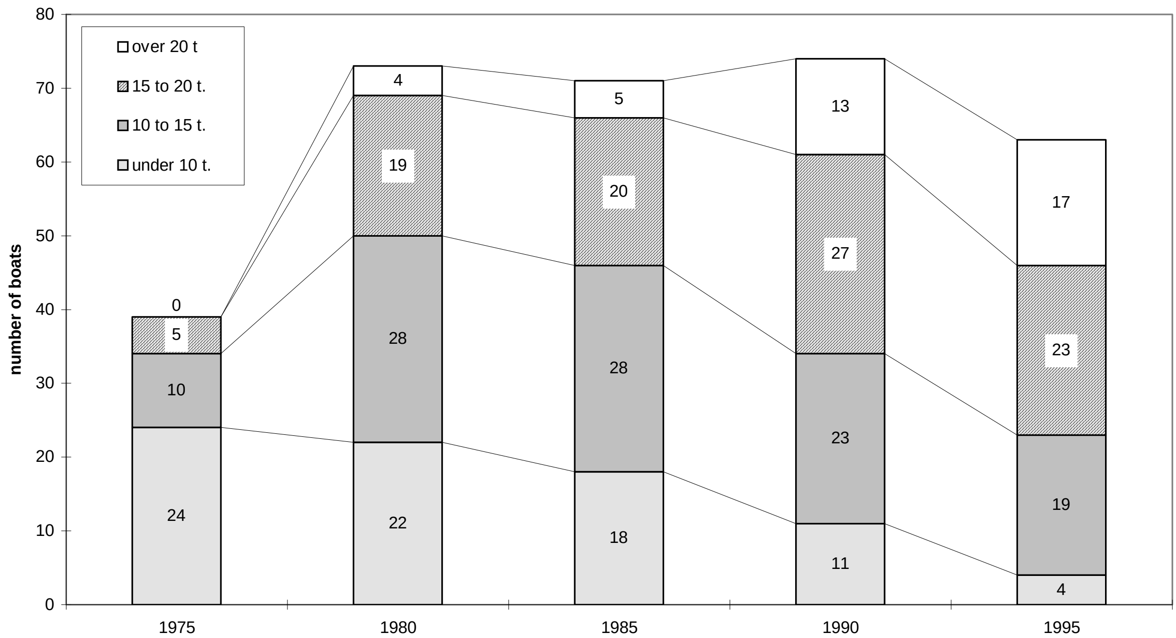
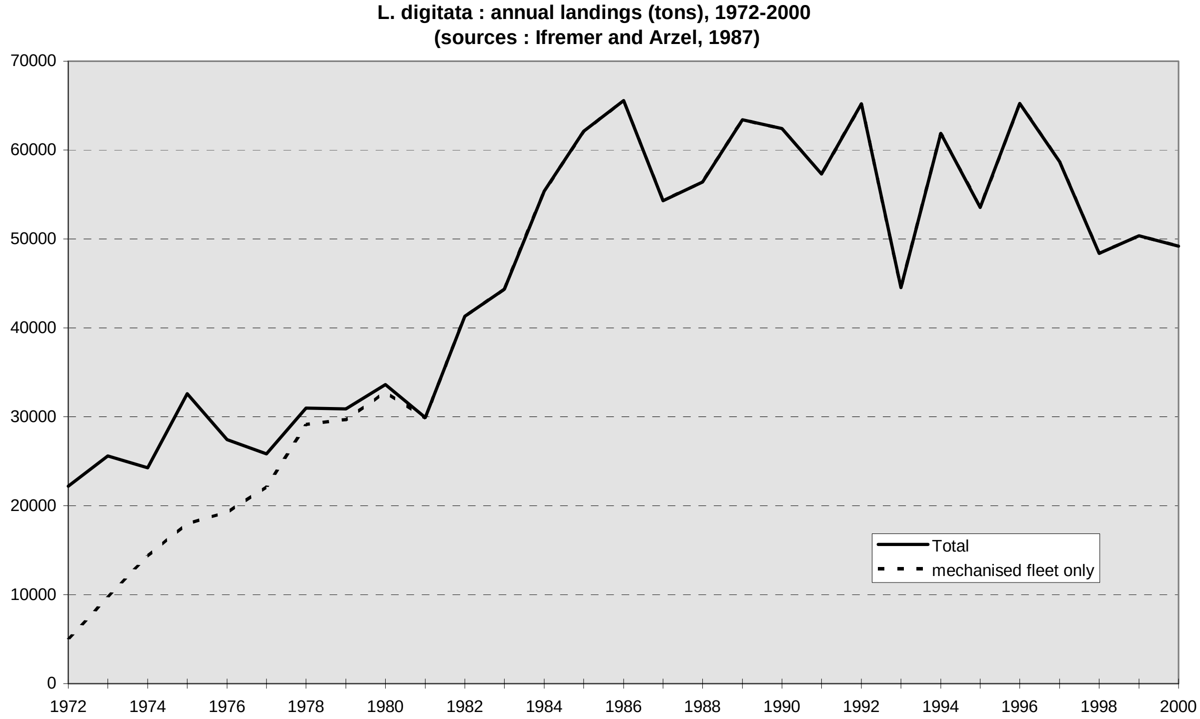


Figure 5


L. digitata : annual landings (tons), 1972-2000
(sources : Ifremer and Arzel, 1987)
70000
60000
50000
40000
30000
20000
10000
0
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
Total
mechanised fleet only

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