

# Against the Wind: The Difficult Task of a Fisheries Researcher in the Early 20<sup>th</sup> Century

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## ABSTRACT:

In his seminal paper, Gordon (1954) argued that, in a situation of open access and competition, the market would not lead to the most efficient solution in resource use. Almost four decades earlier, in 1911, a Danish economist, Jens Warming, put this issue and made a very similar analysis for the fisheries sector. This research makes a reflection on the proposed explanation for the common property problem and asks what went wrong and why the important achievements of Warming had not the justified academic applause and practical impact.

Keywords: Jens Warming, Common Property, Fisheries, Regulation.

## 1. Introduction

The origins of modern Fisheries Socio-Economic can be traced back in the 50s with the papers of Gordon (1954), Scott (1955) and Schaefer (1957). In his seminal paper “The Economic Theory of a Common Property Resource: The Fishery”, Gordon argued that, in a situation of open access and competition, the market would not lead to the most efficient solution in resource use. The common property nature of fish resources implied that, in an unregulated fishery, the result would be the expansion of the industry to a point of economic, even biological, overfishing. So, there is nothing like an “invisible hand” and it is the common property nature of the resources and the presence of externalities in the process of capture that are in the root causes of the mismanagement of the resources and the so-called “Tragedy of the Commons”.

In fact, there is another, more antique, article that put the problem and suggested this approach to its understanding. In a simple paper, in 1911, a Danish economist, Jens Warming, put this issue and made a very similar analysis for the fisheries sector.

The purpose of this research is to make a reflection on that paper and highlight the proposed explanation for the common property problem. The paper studies the legacy of this interesting fisheries researcher and ask what went wrong and why did this important achievements of research had not the justified academic applause and practical impact.

## 2. “On rents of fishing grounds”

### 2.1. Open access and commons tragedies

Forty three years before the publication of Gordon’s seminal paper, Warming made an important investigation about the problems of open access in the allocation of a common-property resource and presented his results in a short article “Om Grundrente af Fiskegrunde” (“On Land-rent of Fishing Grounds”) published in the *Journal of the Danish Economic Association*. After this article, of 1911, he made several references of his results in two unpublished books: a textbook from 1921 and another 1926 manuscript. This last manuscript, which was intended for an international

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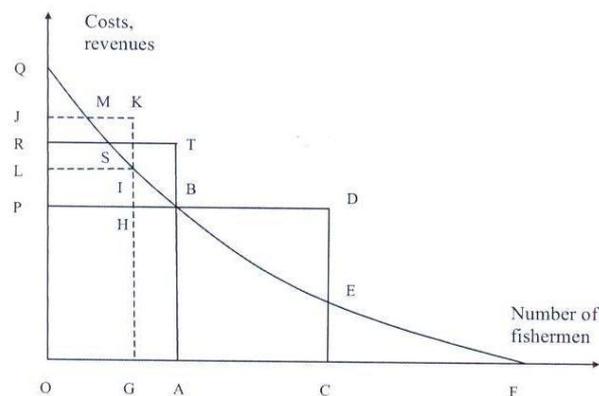
audience, includes an English new version of his 1911 model and became the main ingredient of a second article on fisheries, in 1931.

In the paper, Warming compared the rent available from fishing grounds and land. Land is, in the most part, in private hands and land rents are a privilege of private landowners, whereas fishing grounds are not privately owned but are considered common property. However, the differences do not change the basic economics of both forms of management. Warming stated that the common property nature of open access to fishing grounds without charges tends to decrease the rent and he proposed to alleviate this through transferable fishing licences.

The core idea of the paper reflected the Marginal revolution. In a competitive economy, a worker earns a wage equal to the value of his marginal product. But, according to Warming, there were examples in the economy where this did not hold. One of these exceptions was the case of the fisheries where the problems occurred due to a "lack in the organization of society".

These exceptions did not question the theory of marginal productivity as a general fundament but, some of them, had practical relevance. Warming explained that, under open access, the potential rent in a fishery is dissipated. As no one has property rights over the resource and there is no possibility of exclusion, the permanent introduction of a newcomer in the fishery must not cess until the difference between revenues and costs are zero, that is, until all the rents are dissipated. Biological regulation, as closed seasons or mesh size specification, can prevent the biological overexploitation of resources but not the economic over-exploitation. He also pointed out that a tax, equal to the difference between average and marginal revenue, at the optimal level, would lead to an optimal fishery. This idea is also very interesting, clearly reminding the proposals of pigouvian taxes to internalise the external effects. Note that was only in the subsequent decade of the 20s, that those ideas were divulgated by Pigou.

In his 1911 article, Warming did not elaborate much regarding the practical implications of his proposals but 20 years later he published another article ("*The Danish Right to Eel Weir*", 1931) going into new details and presenting a graphical presentation to explain his findings.



**Figure 1** The correct number of fishermen (OA) with a single owner of the rights to a fishing ground, compared to the number (OC) with no owner at all (full freedom)

The returns from fisheries are shown in the vertical axis, whereas in the horizontal axis we have the fishing effort measured by the number of fishermen. The

curve QF shows the diminishing returns as the fishing effort increases. The line PD represents the marginal cost. In this context, total benefits are maximized when the number of fishermen is OA, and the total income of fishermen is the area OABP.

Warming compares fishing with farming and states that the number of workers hired by a profit maximizing farmer will be such that the last worker hired produces as much as he receives in wages.

The total income from fishing is, in fact, OABQ. So, the value PBQ is the sea rent for access to the resource on the fishing grounds. If no one collects this sea rent and fishing is free, the average income of OA fishermen will be higher than AB and, as this rent is divided among fishermen, their mean income rests AT, that is, the median height of OABQ, so the value RSQ is equal to the value STB.

High average profit draws more people into fishing. Equilibrium is achieved where fishing effort is OC and total income is equal to the total cost of fishing, PBQ=BED. The additional fishermen produce only ACEB and could produce more in some other pursuit. They only receive the required ordinary income by having PBQ added to their production. The sea rent is wasted in the sense that it subsidizes the income of extra fishermen whose production does not correspond to their wages.

Finally, he maintains that in order to prevent that the number of fishermen goes up to OA, fees should be collected for the licences. A private owner would collect such fees and the fee ought to be BT, to result in the optimal number of people in the fishing activity. This would provide PBTR in the form of fees, received by the "land" owner or by the Government.

In this 1931 paper, Warming introduces some additional features: A right for the coastal owner to charge a fee for the fishing right in the areas near the coast, as it was proposed, implied a regulating effect that, according to the author, corresponded to the property right of land. The right of the owner to regulate the entry prevented the excess of fishing effort and maximized the rent guaranteeing the optimal number of fishers.

Warming also stated that free access could lead even to a negative marginal product implying the utilization of immature stocks. So, even in times of high unemployment (and that was the case in the 30s) it was better to keep away from fishing the superfluous fishers.

## 2.2. The Danish Fisheries Case and the Support for Regulation

We must note that this last article was a response to a specific situation of Danish fisheries. In fact, at the time, Danish fishers demanded that the "Right to Eel Weir" should be abolished. This right to eel weir was an exception from the freedom of access that was the general rule in Danish fisheries. According to the Danish Fisheries Act (from the end of the XIXth century) no one could be excluded "from a properly visited and marked fishing ground". But there was an exception: traditional Danish Law granted shorefront owners the right to set eel traps in the sea adjacent to their land property and property owners were entitled to charge fishers for permission to set traps in some of this specified offshore areas.

In one of their annual Assemblies, the Danish Fishing Association proposed to abolish private eels trapping rights with unanimity. Warming article was a protest against this change in *governance*. Warming opposed the introduction of free access to replace rental fishing in the limited area. He argued that this would lead to the total dissipation of rent. He was in favor of maintaining the existing system. His argument

was that it produced the optimal regulation result. Instead of abolishing this system, he also proposed to introduce a similar system in all Sea governance.

The debate faded away, in 1931, leaving the law unchanged. But, in 1955, when the debate was revived, the economic arguments of Warming remained ignored and the Danish parliament abolished the "Right to Eel Weir" (Gislason 1995) and the private shorefront owners were compensated for this loss of privilege.

Another important confrontation point in this debate: we must also note that his clear opposition to maintain extra-workers in fishery, appealing to the economic efficiency in the sector, could not be well accepted at the time. In the last quarter of 1930, the Great Depression was at his maximum level in Denmark (Eggert 2010). Still Warming argued strongly against using employment in fisheries as an alternative in recession days, because extra fishers would impose an extra-external cost to the other fishermen, dissipating the potential rent. And added another problem: because of the typical inertia in this sector, where socio-professional mobility is difficult, after entering, the superfluous fishers would not move, fast enough, for more productive sectors, when the recession went over.

### 3. An Investigation on the Causes of Academic and Political Failure

Why did these important achievements had not the justified academic applause and practical impact? What went wrong? How can we explain that the paper of Gordon (1954) is always presented as a classical one (one of the seminal articles in the area of socio-economic studies in natural resources and the environment) and the study of Warming (1911) remains a "perfect unknown", having, at the best, a minimum footnote in some academic texts<sup>2</sup>. This is the investigation that we proceed and that seems to be a good example of how the sociological conditions of Science development affects the conceptualisation, the methodological framework and the results of a specific scientific domain.

#### 3.1. The Man and his Circumstances

Jens Warming (1873–1939) belonged to the intellectual elite of Denmark. His father, Eugenius Warming, was a recognized professor of Botany in the University of Copenhagen. Jens was graduated in Law, in 1897, in the University of Copenhagen and went to the USA where he worked as a teacher. After his return to Denmark, he made a special master degree in Economics, usually given to lawyers who wanted to pursue a career in the administration. In fact, Warming went on pursuing a remarkable career in the Danish Central Department of Statistics.

He also went on being a part-time professor of Economics and Descriptive Statistics in the Danish Agricultural University and in the University of Copenhagen. But he was not a "genuine economist" (Topp 2008). This lack of formal graduation in Economics gave him some problems. He was frequently criticized for insufficient knowledge of Economic Theory and when he finally got a permanent tenure in the University was in Statistics, never getting the desired chair of Economics. Even his mentor, H. Westergaard, leader professor in Economics in the University of Copenhagen, seemed not to understand the relevance of his work. Jens Warming tried to get the tenure in Econom-

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<sup>2</sup> Of course there has been a "force task" to put in evidence his work, in several studies. Most of them are in the bibliography. And this paper (as other written by the author) has the purpose to overpass this unfair situation.

ics for two times but, in the first, it was L. Birch (another later well known Danish economist) to be chosen and, in the second time, it was his previous student, Axel Nielsen, who got the professorship in Economics.

Of course, some personal animosity played an important role. But it was his proactive attitude towards government regulation and intervention at the microeconomic level (that was not in accordance with the mainstream view of the 20s that the deregulation was required) that gave him some bitter objections in the academic playground.

His fundamental work rested in the Descriptive Statistics. In 1929, Warming published a textbook on Danish statistics, with an applied economic perspective, that was to be used extensively by Danish students in Economics, for more than a decade. Teaching Economic Theory was not, naturally, his task, but in his Statistics textbooks he went on partly disregarding that, making several critiques on mainstream economics and including his theoretical contributions, as it is the case of fisheries. He also tried, from 1921, to write a textbook in Economics but it was never published because of the dispute between a professor of Statistics and the professor of Economics in the Copenhagen University.

After the flaw of getting the desired tenure in Denmark he went on trying to get applause externally. In 1926, he submitted an essay to an international competition on the Theory of Wages. He did not win the competition but he had an “honorable mention” and the recognition from foreign colleagues that made him to pursue his efforts in the economic area, finally publishing a paper in the *Economic Journal*. After all, his ability in recognizing and applying the conceptualization of marginal revolution was evident and his developments in the area of wages and rents rested upon the most recent developments in Economics. The paper he published in the *Economic Journal*, made an interesting presentation of the multiplier (Topp 1981). He also made important seminal references about the problem of identification in econometric analysis.

To be noticed: Besides his knowledge about the economic science, his work has only a few references. Wicksell and Marshall are the most cited, but also Fisher and Germanic authors. This parsimony use of bibliographical references is also very far from what is the academic “political correct” attitude.

Of course, the fact that his article on fisheries was published in a Danish journal, in the original language of the author, was a significant factor for its weak disclosure. Only in the 80s, an English translation of the seminal article of 1911, by an important fisheries economist, P. Andersen, and a study from Hannesson and Anderson on the contribution of Warming, gave the relevance that his legacy deserved. In the 50s, during a round table, promoted by FAO, to discuss the advances in Fisheries Economics, one of Warming’s former Icelandic students, O. Bjornsson, called the attention to the work of Warming and made an English presentation of his model. It was only in 2010 that the *Journal History of Political Economy* published an English version of his article from 1931, translated by H. Eggert.

Note that the personal animosity and suspicion in the academic circuit that was referred made difficult his task. Also, some singular idiosyncratic aspects, as the one cited of not including extensive bibliographical references, were not in conformity with the usual policy in academic context.

### 3.2. “To be or not to be”, in Accordance with the Mainstream?

Second, we must note that his findings and recommendations were not in line with the mainstream: Not in accordance with the “sign of the times” and not in line with the usual methodological, theoretical and practical development of fisheries sciences. By one side, a lot of his results were, indeed, interesting in practical terms for fisheries regulation. But, by the other, they derived from an economic analysis. In the early 20<sup>th</sup> century, when they were proposed, that economic perspective had no impact on the decision-makers of fisheries management. In fact, only in the 60s and 70s the Economics of Fisheries went on being really considered. Until the Second World War the management of fisheries were only administrative and the focus (and the decisions) came exclusively from Biology.

Even for economists it seems that his results were always in the opposite side of the mainstream. He proposed a regulation approach where economists and the fishers associations proposed more liberalisation. He proposed the creation or, at least, maintaining the existing property rights, when everyone defended the free access. The basic lines of his thought were that a free market economy did not automatically lead to optimality and that government regulations were needed. The suspicion on the “Invisible Hand” would be a recurrence in his work. When all the economic environment of the 20s battled in the sense of deregulation, the proposals of Warming of state regulation and control seemed to be misadjusted.

At the same time, he was against the use of fisheries as a sector to absorb the unemployment resulting from Depression. That is, his defence of economic efficiency and sustainability of the sector put him in the unpleasant role. Even in a situation where the usual defenders of free market proposed a governmental oriented policy, his answer was in the opposite side. It seems that he was always on the “wild side of the street”.

From another point of view, highlighting the specific conditions of Science development, we must note that the results of his investigation are, in fact, very close with those of Gordon and Scott (in the 50s) that made the birth of modern Fisheries Socio-Economics. But, as Topp (2008) pointed out, even if the theoretical fundamentals and arguments are the same, the papers are very different with respect to scope and composition and perhaps that explains the different forms they were seen and used by the academic community. The Gordon article was directly focused on Fisheries Economics and resulted from a program of investigation that, at the time, tented to apply the economic theory to fisheries contemporary programs. This article was published in a highly considered journal (*The Journal of Political Economy*) and in a special period, when there was a group of researchers very interested in the results of public regulation in this area. By the contrary, Warming findings reflected his study about the flaw of competitive market but did not deal with contemporary and international debate on regulation.

### 3.3. Biologists, economists and other social scientists

Another interesting issue relates with the links with marine biologists and policy makers. First, it should be stressed that his research contains important elements of fisheries management that had no explicit reference in Gordon’s article. Perhaps for economists this debate did not seem very important at the time, but that would have been important for biologists and executives. For example, his discussion about the concept of MSY (Maximum Sustainable Yield) and the impossibility of getting the most

efficient result with only the usual command and control conservation measures, should have taken some kind of impact in the (biologist-commanded) traditional fisheries management.

Along the period of his research developments, the current situation in the sector of fisheries went on some important changes. By the end of the 19<sup>th</sup> century, the idea of inexhaustible fisheries was slowly being discussed. The leading fisheries biologist T. Huxley and other important biologists began to worry about the decline of fish stocks in the Baltic Sea and in the North Atlantic. This laid to the formation of the ICES (International Council for the Exploration of the Sea) in 1902. With headquarters precisely in Copenhagen, ICES pretended to be a forum of multidisciplinary discussion on practical fisheries problems.

It was also in this context, that Petersen, an important researcher in Marine themes, published a paper on the North Pacific fur seals. In the sequence, one of the first cooperation treaties in the area of fisheries conservation was introduced.

But the focus was still on Biology. As we said, only in the 50s, the modern Socio-Economics of Fisheries – with the research of Gordon (1954) and Scott (1955), and the modern Fisheries Biology – with the studies of Schaefer (1957) and Beverton and Holt (1957), evolved. Jens Warming tried to communicate with Marine biologists and to present his vision about the relevance of Economics in the treatment of the problem. He sent his papers to important researchers in this area (Kyle, Petersen and Hjort are most cited in Warming's notebook), even for the Danish prime minister (former fisheries minister) but with few results.

This last reference put also in evidence his work near politicians and other social scientists. In fact, as we said, his participation in the political discussion, at several levels, was significant. His approach to the Danish Fisheries Association and to other important decision-makers (in the Government and in the Fisheries-Labour Organizations) was noticed. His social commitment was clear. Sadly, the results were not the expected. His intervention at the practical level had not visible effects; at the theoretical level his work was only distinctive. The focus on Biology still maintain for decades. The multidisciplinary approach proposed by the ICES was delayed. Even in the new millennium the participation of economists and other social scientists (sociologists, political scientists, anthropologists, etc.) is still limited.

#### 4. Final remark

Warming's convictions and recommendations have, in the present, a real relevance. His preoccupation with superfluous workers in fisheries is now the subject of an important discussion on the Common Fisheries Policy (CFP) reform. The CFP points to the necessity of making the balance between the social stability in the coastal areas, mostly dependent on fishing, and the objective of getting sustainable fisheries, implicating a reduction in the fishing effort to put it in line with the necessary renewal of the stocks. But these are contradictory objectives. To solve this equation is, perhaps, the major difficulty in the process of 2013 reform. Now, with the economic crisis and the high levels of unemployment in the European economy, it seems more difficult to ask for a reduction of capacity.

Also, some problems, like "quota hopping", bring the idea that a system of quotas and TACs are not enough to get sustainable fisheries. That is, the command and control instruments, that made the core of the conservation and management regime of the CFP, can have results in terms of biological over-exploitation but, as Warming defended, cannot solve the economic problem. This problem rests, basically, in its com-

mon property nature. The solution of the externalities implies a socio-economic analysis and the introduction of Rights Based Management methods. They are also in discussion in the CFP reform.

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