

# PUBLIC POLICY FOR THE FISHING INDUSTRY IN BRAZIL: SUSTAINABILITY THREATENED?

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## **ABSTRACT**

Fishing is one of the oldest economic activities in Brazil, but experienced a late development started only in the 1960s and made possible by effective public policies for the sector. These policies encouraged investment in capital and generated an increase in extraction capacity without regard to sustainability issues. After the peak of production in the 1980s, the country experienced a significant decrease of its production in the 1990s, mainly of their capture at sea, which culminated in a sector crisis. In the current scenario, Brazil is among the 20 countries with the highest participation in the production of fish in the world and the government's willingness to introduce policies to develop this industry is again on the agenda. The policies that nowadays guide the fishing industry will be exposed and classified and then be opposed to the results achieved by this research having as backdrop the discussions in the international literature on the relationship between subsidies and sustainable fisheries.

**KEYWORDS:** FISHERIES, SUSTAINABILITY, SUBSIDIES.

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## **INTRODUCTION**

This article discusses the relationship between public policy and sustainability of marine fishery activity in Brazil. The interest in addressing the sustainability of fishing activities in this sector is justified by the evidence of reduction of global fish stocks, which contrasts with forecasts of increased demand for food in the context of world human population growth.

Begun in the 1960s, the tax incentive and credit policies for fishing in Brazil were in search of development of the fishing activity. These policies encouraged investment in capital and generated an increase in extraction capacity without regard to sustainability issues.

In the early 1980s, besides the large amount of credit for the sector, import barriers were erected and the country has reached historic levels of production. In 1985 the country reached the peak of 756.000 tons caught in the ocean then a downward trend thereafter that lasted until the late 1990s.

The Brazilian government did not consider the potential negative effects of these subsidy policies on sustainability. In this context, this paper investigates the hypothesis that the problem of overfishing in the ocean waters in Brazil has as origin the use of policies

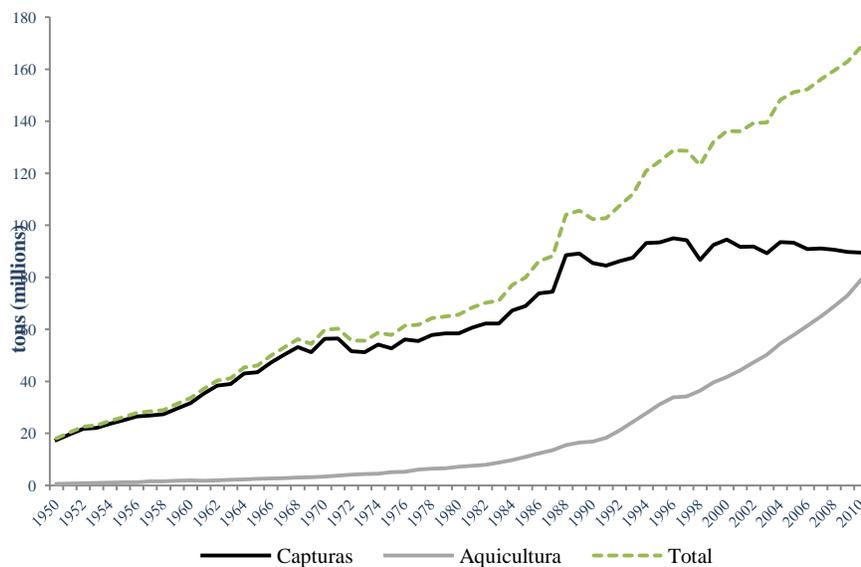
that literature recognizes as "bad subsidies" (definition below), direction that emerges in the context of current policies.

In recent years fish stocks have been the focus of attention of researchers around the world, worried about exploitation by fishing. Contrary to these concerns, the Brazilian government institutionalizes policies to encourage fishing activity which lead to investments in capital goods. Mapping these policies and their impacts on the marine environment is of paramount importance in the light of discussions on international and Brazilian literature on the relationship between subsidies and sustainable fisheries. Thus, it will be possible present the context of the sustainability of the fishing industry on marine environments, making the monitoring of the evolution of subsidies offered to the domestic production of fish from the 1960s.

The methodology used in this study constitutes a literature review and data collection, mainly of books and articles published in Brazil and abroad. Data collection has been carefully carried out through search banks of agencies and public entities. Nevertheless, some hypotheses and questions were tested in non-structured interviews with leaders of organizations of small-scale fishers, entrepreneurs and owners of fishing, which enabled a broad view of the realities that underlie the marine fisheries sector. This paper is divided into four sections: (1) World Fishing Extraction; (2) Classification of Fisheries Subsidies; (3) Marine captures in Brazil; and (4) Brazilian Public Policy for the Fishing Sector.

## 1. WORLD FISHING EXTRACTION

World production of fish from aquaculture and extractive activities showed strong growth from the year 1950, having grown up since then, continuously, over nine times by 2009. However, there was a significant loss of overall share of extractive fishing in the total yield in this period: in 1950 were extracted from marine and continental waters nearly 97 percent of total production, although this percentage did not exceed 55 percent in 2009 (Figure 1, FAO, 2012).



**Figure 1:** TOTAL GLOBAL PRODUCTION OF FISHING IN THE PERIOD 1950 TO 2009 (FAO, 2012)

Fishing is an important food source, contributing with 19 percent of the animal protein for human consumption (FAO, 2011). Considering the extractive fishing and aquaculture in 2009 were produced 162.82 million tons of fish. Only 10 countries

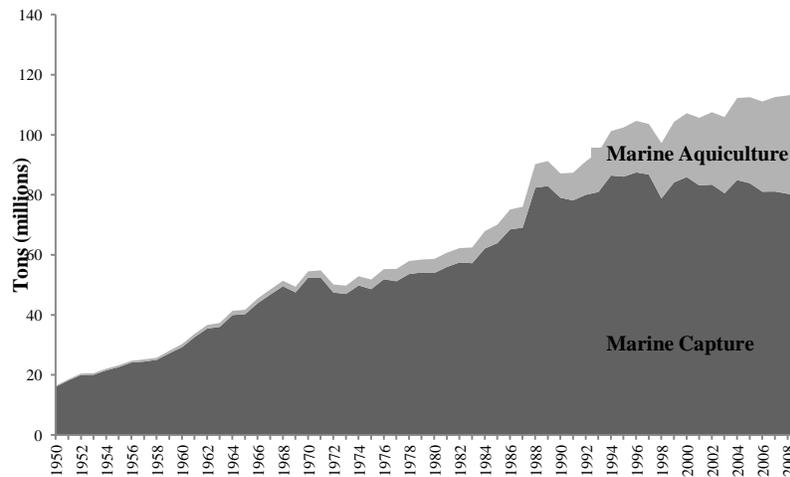
concentrate about 70 percent of total production (Table 1), and 60 percent of global production comes from developing countries (FAO, 2012).

	Country	Total Production (Aquaculture + Captures)	Total Captures	Marine Captures	Inland Waters Capture
A	China	37.16	16.94	16.40	21.16
2	Indonesian	6.03	5.69	6.04	3.00
3	India	4.82	4.52	3.95	8.87
4	Peru	4.28	7.72	8.66	0.44
5	Japan	3.19	4.40	4.93	0.39
6	Philippines	3.12	2.91	3.05	1.81
7	Viet Nam	2.97	2.50	2.64	1.40
8	USA	2.95	4.82	5.42	0.22
9	Chile	2.89	4.26	4.81	0.00
10	Russian	2.43	4.27	4.51	2.38
	Share in Global Production	69.84	58.03	60.41	39.67
18	Brazil	0.76	0.92	0.74	2.32

**TABLE 1: SHARE (IN PERCENTAGE) IN GLOBAL PRODUCTION OF TOP COUNTRIES PRODUCERS IN 2009 (FAO, 2012)**

Considering only the marine production (captures and aquaculture of fish, crustaceans, molluscs and other aquatic animals), total production increased 7 times after 1950 and reached 114.3 million tons in 2009. Excluding any type of aquaculture, ocean current captures are 10 percent smaller than the maximum production achieved in 1996 (FAO, 2012).

Notably, the increase in sea production due to the continued growth in the last two decades, ocean aquaculture species (Figure 2, FAO 2012). However, even with the increased supply of aquaculture across a number of oceanic species at risk of extinction whose main cause is overfishing.



**FIGURE 2:** CAPTURE AND AQUACULTURE IN MARINE WORLD IN THE PERIOD 1950 TO 2009 (FAO, 2012)

In fact, the number of threatened fish species grows every year. According to the Food and Agriculture Organization - FAO, a total of 900 species analyzed, between the years 2000 to 2006, the number of species in imminent danger of extinction increased from 144 to 238 and the number of species vulnerable to increased 452 to 682 during the same period (*cited in Khan et al., 2006*). Currently, 80 percent of fish stocks traded in the world are exhausted or have been fished beyond their capacity for biological reproduction (UNEP, 2011).

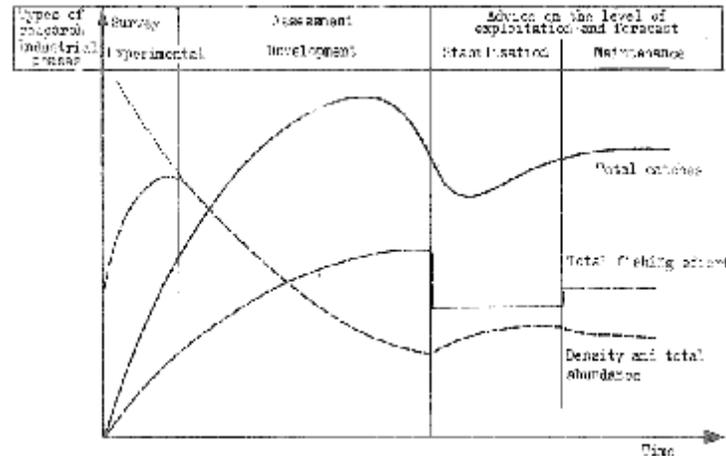
According to FAO (1988), the overfishing is constituted by factors exogenous to the marine environment is therefore expected that the abundance of the populations affected suffer a decrease, then stabilizing at a level below the equilibrium presented before the start the activity of fishing.

The measurement of overfishing is given by the fishing effort, that is, the amount of fishing that is exerted on a given resource per unit time. Number of vessels, gallons of fuel used, bidding and sieges, of hours of trawling, hooks, nets for fishing are the examples that quantify this effort. The income from fishing are measured by the equation:  $CPUE = C / EP$ , where the capture per unit effort  $CPUE$  is an indicator of abundance result of the relationship between capture  $C$  and fishing effort  $EP$  (FAO, 1988).

When fishing effort is kept within reasonable limits to the size of the population, it is beneficial to keep this population with a size consistent with its biological balance (FAO, 1988). On the other hand, the exaggerated increase in fishing effort can lead to overfishing because a high rate of exploitation increases the rate of fish mortality due to fishing activity, being higher than the intrinsic growth rate, override the conditions of sustainability.

Thus, overfishing, and environmental degradation, eventually cripple the fishing activity itself and understand why it is not a difficult task. When you start fishing on a virgin stock, it offers high yields due to high abundance. However, as the activity develops and fishing effort grows there is an increase in captures and in a sense, income, since the capacity of fishing improves. This situation attracts new fishers, further increases in fishing effort and hence reduces the abundance of fish stocks so that individual incomes progressively decrease. It is observed that the development stages of a fishery capture usually consists of four stages: (i) expansion, (ii) Exploration moderate, (iii) intensive exploration and (iv) Overfishing. The curves of total capture, fishing effort and total

abundance and density of the fish stock of Kesteven (*apud* Troadec, 1976), illustrate this condition (Figure 3, TROADEC, 1976).



**FIGURE 3: DEVELOPMENT OF A FISHERY (TROADEC, 1976)**

Similarly, according to Castro (2005), the fish stock behaves similarly to a finance application: the initial biomass (capital) in interest bearing form of reproduction, and at the same time it is taxed by natural mortality and fishing. To have a sustainable position requires a balance between these components. Thus, for the stock size is preserved, the capture, coupled with natural mortality should not exceed playback.

However, according to Mace (1997), in the world between 1970 and 1992 the number of vessels with deck (which allow a more effective packaging of fishery products and provide better conditions for the crew) went from 580,980 to 1,178,160, while the number of small boats increased from 1.5 million to 2.3 million. Currently, it is estimated that the power to capture the boats in the world is 250 percent higher than the possibility of sustainable supply (FAO, 1995). In addition to this quantitative growth of fishing effort,

technological advances also contributed to increase captures ocean. A study based on 1980 estimated coefficients of technological impacts of 0.54 for 1965, 1980 and to 1, 2 for 1995 (DIAS NETO, 2002). In practice, the development of technological tools and techniques of fishing, navigation equipment and satellite location of schools, in addition to other aid equipment to capture, almost quadrupled between 1965 and 1995, contributing to overfishing.

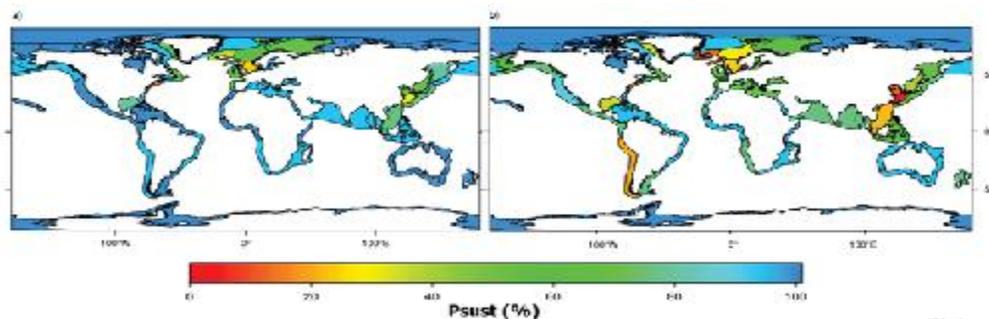
Overfishing in the oceans is also observed when the capture species encroaching on "lower" in the marine food chain such as sardines and anchovies (PAULY, *et al.* 1998). In this case, the overexploitation of these species can alter the structure of marine ecosystems because they grow smaller captures of fish stocks predators begin to collapse. These small fish are caught in enormous quantities by the fishing industry and accounted in 2000, 49 percent of the capture of fish in the world recorded in March ine (PAULY *et al.*, 1998).

An investigation of geographic expansion of global overfishing is presented by Coll *et. al.* (2008), and is one of several efforts to quantify the pressure exerted by fishing activities on marine ecosystems worldwide. The study evaluates the risk of overfishing on a global scale by quantifying the depletion of production from a global mapping of fisheries<sup>3</sup>, which also takes into account the loss caused by the extraction of secondary species to finally generate the probability of a given ecosystem to be extracted in a sustainable manner (PSUs).

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<sup>3</sup> Contained in: Watson R, Kitchingman A, Gelchu A, Pauly D (2004) Mapping global fisheries: sharpening our focus. *Fish 5*: 168-177

So, are considered safe levels of sustainability the May re than 75 percent. Figure 4 (a) represents these probabilities according to the captures in the 1950s, while Figure 4 (b) shows the results collected from 2000 to 2004. The result indicates that, from 1950 to 2004, several regions have experienced declines in their e indices of sustainability (Coll *et. Al.*, 2008).



**FIGURE 4:** HISTORICAL ECOSYSTEM ASSESSMENT FOR LARGE overfishing MARINE ECOSYSTEMS: Probability (%) of Being sustainably FISHED (Psust%) - (Coll et al. 2008)

Another factor that contributed to the intensification of fishing is the fact that, in most cases, fish and crustaceans are typically normal or superior goods, that is where demand grows in response to rising incomes. Now, taking into account that income *per capita* of the world population is growing, it appears that the demand for fish and shellfish following the same trend (RIMBEBOIM, 2010).

These factors are the result of excessive growth of fishing effort that mostly result from market failures where property rights are undefined and the conditions of entry are free. Public policies aimed at correcting these deficiencies, however, for the case of fishing,

many governments have poor controls of fishing activity and grant subsidies that aggravate the situation of natural resources (MUNRO AND SUMAILA, 2002).

It is estimated that economic losses due to overfishing are estimated at around U.S. \$ 50 billion per year (UNEP, 2011).

## **2. CLASSIFICATION OF FISHERIES SUBSIDIES**

Even with the drop in production of marine captures worldwide in recent decades, the expansion of fishing effort continues and intensifies fish trade in the footsteps of globalization (SUMAILA, 2002). However, the fishing industry employs about 200 million people worldwide and reaches to international trade, more than \$ 50 billion per year (VANNUCCINI, 2003).

The increasing demand for fish, ineffective monitoring and management of public access areas unregulated, technological innovation, economic and social pressures are growing fishing effort that aggravate the situation of overfishing of the oceans. And it is not rare presence of subsidies that act incisively further aggravating this context.

Fisheries subsidies are financial payments from governmental entities for development or maintenance of the fishing industry. There is no single criterion to classify fisheries subsidies, therefore categories depend on the nature and purpose of the subsidy and complexity, however, is because there is no agreement on how to measure the effects of a subsidy (KHAN *et al.* , 2006).

These contributions may be given for different reasons, depending on the objectives of government policy, including: a) support and develop the local fishing industry; b) To protect jobs and improve income distribution in fishing communities; c) To manage the marine environment (KHAN *et al.*, 2006).

Munro and Sumaila (2002) identify three categories of fisheries subsidies. The first consists of *Bad Subsidies* that include all investments in infrastructure from public sources that reduce costs or increase revenues. As an example we can mention the programs of construction and renovation of vessels, the renewal of fishing ports, support for *marketing*, processing and software infrastructure and storage, tax exemptions, rents boats, the price subsidy fuel, among others.

The second one, called *Good Subsidies* corresponds to programs that lead to investment in natural capital and goods are intended to enhance growth of fish stocks through conservation and monitoring of capture rates by control measures. This category comprises the fisheries management programs and services (monitoring, research and *habitat improvement programs*, creation of protected areas), research and development focused on improving fishing methods to keep their resources in a sustainable manner, which surveys can be on the boards of fisheries oceanographic studies, socioeconomic studies of fisheries planning and execution, information and creation of databases and statistical reports for fisheries management.

The third, called *Ugly Subsidies* can potentially lead to increase or decrease in fishery resources. The complexity of this category is such that some programs with the potential to be *Good Subsidies*, over time and depending on the variables that are submitted may become *Bad subsidies*, as in the case of providing assistance payments to fishermen for temporary suspension of fishing and provide income during closed seasons. It can be seen that this is a benefit that aims to decrease the pressure on fish stocks but can be socially harmful since the guaranteed income and other goodies would be attractive for low-skilled agents to venture in the fishery and would entail great pressure on local resources. Another example is the *Ugly Subsidies* buyback programs for vessels, reduce fishing capacity but can become a problem if conditions are not provided income to fishermen. In short, these subsidies have the potential to generate a kind of conflict between social and environmental issues.

It should be noted that in fishing income comes exclusively from the sale of fish caught, the costs, however, vary. According to Castro (2005), we can consider three categories of costs: fixed, variable and dependent on the value of fish. Fixed costs are generally those that are independent of the operation of the fleet, mainly linked to the payment of investment in boats and fishing equipment, depreciation, licensing fees and compensation of ground personnel. The variables include the costs of use depend on the intensity of the fleet fuel, lubricating oil, feed, and other maintenance. Costs depend on the value of fish are represented by the payments as a percentage of the value of fish, especially the crew, auctioneer or in the form of taxes imposed on the movement and marketing of fish.

When analyzing the behavior of costs with respect to fishing effort, Castro (2005) concludes that, although no increase in fishing effort, the fixed remain constant until this increase involves the acquisition of more vessels. The variable costs always grow with increased effort fishing while the costs depending on the value of the capture independent of increased effort. Worth remembering that, with an exaggerated increase in fishing effort, capture not only loses its value by reducing their commentary, but also the largest capture of lower commercial value. The sum of these behaviors results in total costs increased as income grows, from a certain point, decrease with the increase of the increase of fishing effort, when it may become negative.

At this juncture, the subsidies offered to the fishing sector assume an extremely important role in socioeconomic issues, but can hide a threatening effect to environmental sustainability. Both subsidies that reduce the cost of operations as those that increase company revenues make fishing more profitable activity than it should be (Khan *et al.*, 2006). This over-capitalization reduces the costs of the activity, manipulate market prices and yields an increase in demand that often the ecosystem can not behave.

Thus, certain subsidies directly or indirectly contribute to the accumulation of fishing effort that compromise the sustainability of fisheries resources and the lives that depend on it (Khan *et al.*, 2006).

According to FAO estimates (*cited by* ICTSD, 2008), the world's fishing fleet costs annually about \$ 50 billion in subsidies to their countries. Of these, most are intended to cover economic losses due to dispersal of fish stocks. In fact, over-fishing near the coast

becomes increasingly necessary distant expeditions that raise costs such as fuel consumption and, in many countries, this situation makes the fishery viable and subsidies appear to mitigate this problem. In short, much of the amount spent on subsidies is rated "bad subsidies".

Another study, this one from Khan *et al.* (2006), examined various types of subsidies and found that nearly 60 percent was provided by developed countries and 40 percent for other developing countries. Of these, 58 percent were allocated to programs of "*Bad Subsidies*"; 27 percent contributed to the so-called "*Good Subsidies*" and 15 percent financed the "*Ugly Subsidies*."

The notorious International Plan of Action for the Management of Fishing Capacity FAO (2003) (IPOA-Capacity) encourages States to achieve an efficient, fair and transparent fishing capacity to reduce and eventually eliminate all factors, including subsidies that contribute, directly or indirectly to the accumulation of fishing effort (FAO, 2003).

The international community recognizes that excessive fishing effort and investment in capital goods negatively affect the efforts of conservation and management of fisheries and threaten the long-term sustainability of fisheries.

### **3. MARINE FISHERIES EXTRACTION IN BRAZIL**

Dias Neto & Domelles (1996) showed that the national fishing is placed among the top four sources of supply of animal protein for human consumption. In 2009, Brazil produced 1.24 million tons of fish, creating an industry GDP of around U.S. \$ 5 billion which represents approximately 0.24 percent of GNP. (FAO, 2012, IBGE, 2012; MPA, 2012).

According to the Ministry of Fisheries and Aquaculture - MPA, in Brazil, the sector generates about 3.5 million direct and indirect jobs and occupies today 800,000 professionals between fishermen and fish farmers (MPA, 2012). Currently, about 60 percent (about 500 thousand tons / year) of the total extracted by fishing in Brazil comes from fishing (MPA, 2012). The national fleet is composed of approximately 25,000 boats, where only 2000 are considered industrial the remainder being composed of fleet craft al or small scale (DIAS NETO, 2002).

In Brazil, fish stocks are already guardianship of the State Constitution provides that the assets of the Union as the natural resources of the continental shelf and exclusive economic zone (EEZ).The role of the state covers the need for conservation of environmental resources and, therefore, must act as effective manager of such property in favor of social interests. It is evident also that Article 225 of the Federal Constitution provides:

*"Art 225. Title VIII, Chapter VI, Article 225, states: "All have the right to an ecologically balanced environment, which is an asset of common use and essential to a healthy quality of life, and both the Government and the community shall have the duty to defend and preserve it for present and future generations."*

However, free access or lack of entry restrictions enables the continued growth of fishing effort leading therefore to exhaustion of the appeal, characterizing the situation described by Hardin (1968) as "tragedy of the commons."

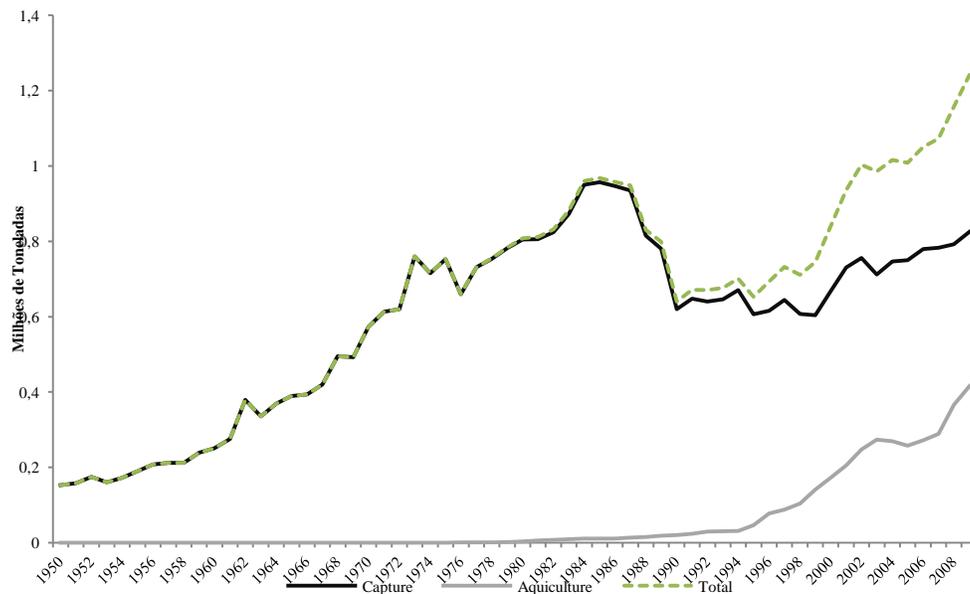
In this context, it is the Brazilian state to use its regulatory power over the use of fisheries resources of their property however, the fragility of control enabled, even with a system of licenses (Registrar General of Fishing - RGP), the use of fishing resources have been conducted in a manner similar to that described by Hardin. The immediate consequence, in the absence of effective measures for the development has been the decline in economic returns verified for important stocks along the Brazilian coast.

Other countries have largely promoted the regulated access by onerous subsidy of a finite number of fishing licenses for a number of fishermen or an enclosed area, while still others go through a process of capture certification (DIAS NETO, 2002). These numbers can be linked to other sets of rules, in whole, seek to ensure the sustainable use of fisheries resources.

In Brazil, are 8500 km of coastline of tropical and subtropical waters, with high temperature and salinity, but poor in nutrients and very productive (IBAMA, 2002). These characteristics contribute to determining the absence of thick stock, explaining the stress concentration on a few species fishing providing conditions in terms of concentration and potential activity to support a more profitable.

The first attempts to estimate the potential production of marine fish, along the Brazilian coast are of Hempel (1971), which showed a total of 1.725 million t / year (*apud* Paiva, 1997). Other estimates presented mented by Neiva and Moura (1977) and Neiva (1990) distinguished regions and environments, considering these to 200m depth and fish production showed a maximum sustainable marine resources in Brazil with a potential between 1400-1700 tons/year.

Since 1950, domestic production of fish increased by more than eight times, reaching a high of 1.241 million tons in 2009. Only between the periods 2003 to 2009, this production showed an increase of 25.2 percent, as Figure 5 (FAO, 2012).



**Figure 5:** Total Brazilian Production in the period 1950-2009 (FAO, 2012)

In contrast, marine captures reached Brazil in 2009, 599,000 tons, far from its historical peak of 755 000 tons in 1985. However, unlike the global marine capture, the

capture has increased in Brazil since 1999 when they were caught that year 418 000 tons (FAO, 2012).

In 2008, Brazilian exports reached 36,800 tons. Accumulated in 2009 exports declined to just over 30 000 tons (MPA, 2011). Proportionately decreased by 18 percent in quantity of the product. Imports showed an opposite behavior when, in 2008, the country imported nearly 209,000 tons the following year while imports rose to 230,000 tons, a growth rate of 10 percent (MPA, 2011). Because this set of results the Brazilian trade balance between 2008 and 2009 had its deficit increased by 16 percent in volume (MPA, 2011).

Currently, the Brazilian population is close to 191 million inhabitants (IBGE, 2012). Thus, added to the total production with imports and exports deducted in Brazil has a *per capita* consumption of fish from 7.5 kg/2009. In 1996, according Bombardelli *et. al.* (2005), this consumption was 3 kg per capita.

The example of what happens in the world, to analyze the industrial marine fisheries in Brazil, Paiva (1997), are common finds evidence of decline (overfishing), and even the collapse of fisheries exploitation, mainly arising from the uncontrolled increase in fishing effort to they face. This picture of overfishing can be considered as a major cause of the slump that the sector faced marine captures in the 1990s. This major commitment of resources may have been the result of inappropriate policies associated with the immediacy of a significant portion of the productive sector.

#### **4. BRAZILIAN PUBLIC POLICY FOR THE FISHING SECTOR**

Begun in the late 1960s, the attempt to modernize the fishing captures lasted until the 1980s and was linked to a model that concentrates capital exporter, technologically and ecologically intensive predator (DIAS NETO, 2002). The proposed model for the Brazilian fishing industry is classified as "productivism late", since the early 70s, the Club of Rome was already critical to this model (DIAS NETO, 2002). Subsidies such as tax incentives and credit, had a role in this process of enormous importance.

In fact, during the 70s and 80s, there was the heyday and decline of national fishing, an effect reproduced with the main instruments of management support, such as incentives or subsidies, research, statistics and even the legal aspects (DIAS NETO, 2002).

In the 1960s, the policy of tax incentives (Decree-Law 221/67) aimed to increased captures in Brazil and allowed companies to receive tax deductions for their investment in fishing activity. In this case, companies could deduct up to 25 percent of their taxable income as a benefit of their investments in projects to capture. Abdallah and Sumaila (2002) note that the tax incentive program for the sector was part of the Federal Government policy to develop regions or sectors of Brazil. According to Abdallah (1998), were allocated to the sector through tax incentives \$ 1.13 billion in the period 1967 to 1986. Of these, 78 percent were granted in the first stage of the program between 1967 to 1974 and the remaining 22 percent was raised by companies from 1975 to 1986.

Still, according to the author, the project implementation of tax incentives in 1967 occurred without proper planning. Lack of appropriate technology and public monitoring, shortage of skilled labor and diversion of resources to companies that were not approved projects have resulted in delays to the development of fisheries. Second report of the Superintendent of Fisheries Development (SUDEPE), the body responsible for the viability of projects,

*"Have not been complied with criteria for choosing the area for installation of new industries, leaving the analysis of projects restricted to being or not economically viable, discarding, especially factors related to fishing effort on a given stock of fish (SUDEPE 1985). "*

Thus, in the region of the State of Guanabara and Rio de Janeiro, where the fish stock was represented by the sardine (*Sardinops sagax*), about 35 projects were approved to operate a total of 600,000 tons annually, when the most optimistic calculations in evaluating 200 000 tons capture possibilities (SUDEPE, 1985). These factors, in combination with other international problems, the difficulties of marketing fish in foreign markets combined, even with the oil crisis, discouraged investments.

Another error, evidenced by Dias Neto (2002), was the unequal distribution between geographic areas and fisheries resources. Even with a policy aimed at the development of poor regions of northern Brazil fell to South Central 80 per cent of program resources, and of these, 80 percent for the shrimp. There was also a breakdown of fishing, over fishing industrial. On this, Diegues (1983) states that the industrial sector has benefited from the tax incentive policy, serving business groups unprepared and without experience in the industry concentrated in the richest regions of the country.

The policy of tax incentives for the fishing industry was closed in 1986, but 1981 to its closure, the maximum deduction was reduced to 12.5 percent.

On rural credit, Abdallah and Sumaila (2002) emphasize that this instrument of public policy has been very important for the promotion of agricultural development in Brazil. Initially implemented in 1965, the rural credit consists of loans provided by financial institutions to farmers and cooperatives in order to stimulate rural investment and support for marketing activities and maintenance. (ABDALLAH and SUMAILA, 2002).

With nominal interest rates lower than those on the market, the rural credit allowed for the purchase of fishing nets, food, ice, acquisition of boats, small repairs and facilitated improvements in network marketing the fish, always aiming to provide the fisherman conditions necessary to support the capture and to improve the quality of their products.

In the first half of the 1980s, large amounts of resources were invested in the fishery through rural credit. Only in 1983 were allocated to the sector about \$ 494.2 million<sup>4</sup> (ABDALLAH AND SUMAILA, 2002). However, the application of this type of credit for fishing activities showed a decreasing trend in the next two decades. Still, according to Abdallah and Sumaila (2002), the volume of lending to the maintenance gradually increased. In the 1980s, spending on maintenance accounted for 44 percent while

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<sup>4</sup> In 1994 dollars

investments had a stake of 45 percent. In the following decade, spending on maintenance has jumped to 70 percent of the total.

May remember that in the period between 1981 and 1986, trade barriers erected to prevent the importation of fish contributed significantly to the increased amount of fish caught. (ABDALLAH AND SUMAILA, 2002). In short, increased captures followed the incentives granted by the government in the 1960s, 1970s to mid 1980s. In the early 90s there was a significant reduction of benefits for fishing and there was also an apparent decrease of the total capture.

TABLE 1: LOBSTER FISHING UNDER THREAT

One of the most important captures for Brazil is the lobster (*panurilus argus*). According to UNEP (2011), only the lobster fishermen work 13 000, and it is estimated that another 150 million people depend directly or indirectly, from the crustacean fishing as a livelihood in northeastern Brazil. This region is one of the poorest in the country, offering few alternatives for employment for their workers (UNEP, 2011). In the first phase of development for fishing promoted by tax incentives, from 1166 to 1807 fishermen were funded for the Northeast Region and should be directed to capture fish, but started to act covertly in the lobster, aggravating the situation of the fishery (DIAS NETO, 2002). Today, the lobster has a tendency to decrease its population caused by excessive fishing effort by the Red List published by the International Union for Conservation of Nature - IUCN.

That's when the fishing is now managed by the Brazilian Institute of Environment and Renewable Natural Resources - IBAMA, under the Ministry of Environment - MMA. After more than two decades where absolutely nothing has been invested in research related to the fishing industry (good benefits), this change was a reflection of more general embodiment, the public sector, the protection of the environment that has become part of the agenda of all boosted by the ECO 92 countries, organized by the United Nations Conference on Environment and Development (DIAS NETO 2002; ABDALLAH AND SUMAILA, 2002).

Note Dias Neto (2002), which under the management of IBAMA was decided to implement plans and programs aimed at the recovery of fish stocks overfished or threatened, as well as the recovery gains economic activity triggered by unsustainable production in given regions and species of the previous decade. Thus, between the years 1991 to 1995, there was negotiation, definition and implementation of measures to recover these resources. Good results were derived from the measures. According to Paez (1993), only in the southeastern region of sardine fishing (fish most consumed by Brazilians) jumped from 38,000 tons in 1964 to 114,000 tons in 1969, reaching its peak in 1973 with 228,000 tons caught, and then , captures decreasing until 1990. Then there is an average production of 32,000 tons / year by 1996.

The impact caused by the end of the benefits to the fishery caused a lot of wear for the Brazilian government. After a period between 1989 and 1997, in which there was no official national policy on fisheries, the political discontent by different offices of the executive branch caught a dispute over the management of fishing resources. These wear strengthened coalitions dissatisfied that came to exert strong pressure on the rulers. In 1997, jurisdiction for the production and promotion of the activity was transferred to the Ministry of Agriculture and Livestock and the IBAMA fit the activities related to conservation policy.

Thus, 90 years come to an end with reversals of some indices observed until the middle of the decade (DIAS NETO, 2002). The production increases again driven by

aquaculture and marine captures. In the case of sardines, in 1997, 117,600 tons were captured, leading to a drastic reduction to an average of 17,000 tons / year for the next three years (ADEODATO, 2011).

In 2003 it launched the "Strategic Plan for Sustainable Development of Aquaculture and Fisheries" and goals aimed at social inclusion of fishers, improved captures and an increase in domestic consumption of fish. Born with it, the National Financing for Development and Modernization of National Fisheries - PROFROTA with the goal of building 500 new vessels of medium and large fishing capacity and incentives for the acquisition, construction and conversion of vessels (coastal fishing to deep sea fishing) and equipment for the capture.

The total resources for the program totaled \$ 682 million<sup>5</sup> and was an anti-cyclical policies made by the then Minister of Financial Planning, Budget and Management Guido Mantega (ABDALLAH and SUMAILA, 2002; MANTEGA, 2004). Significant increase, given a budget of \$ 4.7 million intended for the entire sector in 2002 (GREGOLIN, 2010). However, not achieved the goals set for the year 2006, they are: the increase in production for a total of 1.5 million tons, increasing *per capita* consumption of fish for the 12 kg recommended by the FAO and the tripling of trade surplus of fish.

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<sup>5</sup> In 2003 dollars

In 2009, fisheries management moves to the newly created Ministry of Fisheries and Aquaculture - MPA. Even with some areas of shared management with the Ministry of Environment, the intention with the creation of the MPA is to provide greater security for the market to the private sector can invest in this sector (GGREGOLIN, 2010). To achieve this goal, the strategies adopted by the MPA were to increase the volume of production in a sustainable manner; Increase the number and income of people involved in the production process, increase productivity and quality of fish; increase fish consumption in the domestic market; Increase the participation of fisheries and aquaculture products in the export tariff.

Currently, the Brazilian government, through the MPA, created the "More Fishing and Aquaculture Plan - Plan for Sustainable Development", with stipulation of goals for 2011. It is consolidated so that a government plan to provide the industry more than \$ 1.7 billion (or U.S. \$ 751 million <sup>1</sup>) for three years subsequent to 2009 (MPA, 2011).

Composed of guidelines that seek mainly the strengthening of the market structure and supply chain, the plan benefits the following actions (MPA, 2012):

*The National Program for Financing and Modernization of the National Fishing* (PROFROTA) aimed at financing for the acquisition, construction, conversion, modernization, adaptation of vessels to provide greater efficiency in the exploitation of the Exclusive Economic Zone (EEZ) and in international waters. Of the total for the plan, 15 percent will benefit the PROFROTA classification, which is associated with the practice of Bad Subsidies.

*The Technical Assistance and Incentive Extension Fisheries Associations and Cooperatives* consists in creating an integrated national network to promote technical assistance and extension aquaculture and fisheries aimed at the professional activity. Within this, a sub-program of Vocational Qualification and serve more than 150 000 fishermen. Thus, according to the expectations of the government, the jobs associated with the activity should reach 5 million by 2011 and, for this will be allocated 12 percent of the resources of the plan - this can be considered a Ugly Subsidy. This is because, excluding aquaculture, qualifying the manpower existing results, in many cases, improvements in the sustainable management techniques, however, the addition of new fishermen can increase fishing effort if they engage in fishing captures .

*The Subvention to the price of diesel oil* which is intended to equalize production costs so that the price of fuel is equivalent to international prices. This subsidy denounces, at best, that the fishery has serious structural problems that are reflected in their costs and, at worst, that coastal resources are already overexploited. Currently, he is granted in the form of tax incentives, with 25 per cent reduction in road tax for the purchase of diesel fuel. Clearly classified as a bad subsidy, that subsidy will cost the public treasury seven per cent of program resources "More Fishing and Aquaculture."

*The Incentive Program of Fish Consumption* aims at increasing the current 7.5 kg / inhabitant / year to 9 kg / capita consumption of fish by Brazilians through the actions of dissemination and marketing. Thus, maintaining the current national interests between aquaculture and marine captures of fish in total produced in the country, the consumption

of 9 kg / capita in 2011, would require 802,000 tons of fish caught at sea - more than the maximum number obtained 1985. This type of action is classified as a bad subsidy and demand a percent of total resources for the plan.

*The Program Planning, Monitoring and Control of Activity:* search the conservation of ecosystems through the implementation of the maintenance of evaluation, control and monitoring of commercial fishing and aquaculture. To do so, will be invested 6 percent of the initial amount of the Ministry of Fisheries' Plan More Fishing and Aquaculture. This is a good subsidy for creating tools aimed at protecting marine ecosystems as a rule establishing a minimum size for capturing different species pair. Within this program, is included the "Bag Fishing" with a 2011 budget of over U.S. \$ 695 million <sup>1</sup>. Paid by the Ministry of Labor is designed to benefit fishermen, ensuring a minimum wage so they can suspend their activities during periods of reproduction. Currently, benefits are paid 553,172 (5 times more than in 2003). This is a good benefit but in Brazil, the lack of enforcement has provided the benefit is paid indiscriminately to people who are not related activity (Duarte, 2011).

Finally, the *Program Strategic Information Management Aquaculture and Fisheries* receive 6 percent of resource and includes the preparation of fisheries and aquaculture statistics, boundaries and definitions of potential and vocation of different biomes, mining stocks and development of new technologies for protection of the environment. In this program are included the RGP - a register of fishermen and fishing companies - and Vessel Tracking Program Satellite of industrial vessels fishing in the EEZ.

In order to create a scientific apparatus for control of fishing and providing tools for protections that are built to ecosystems, is a good subsidy.

The remaining 53 percent of the resources of the "Plan More Fishing and Aquaculture" will go to infrastructure projects in aquaculture and fisheries capture.

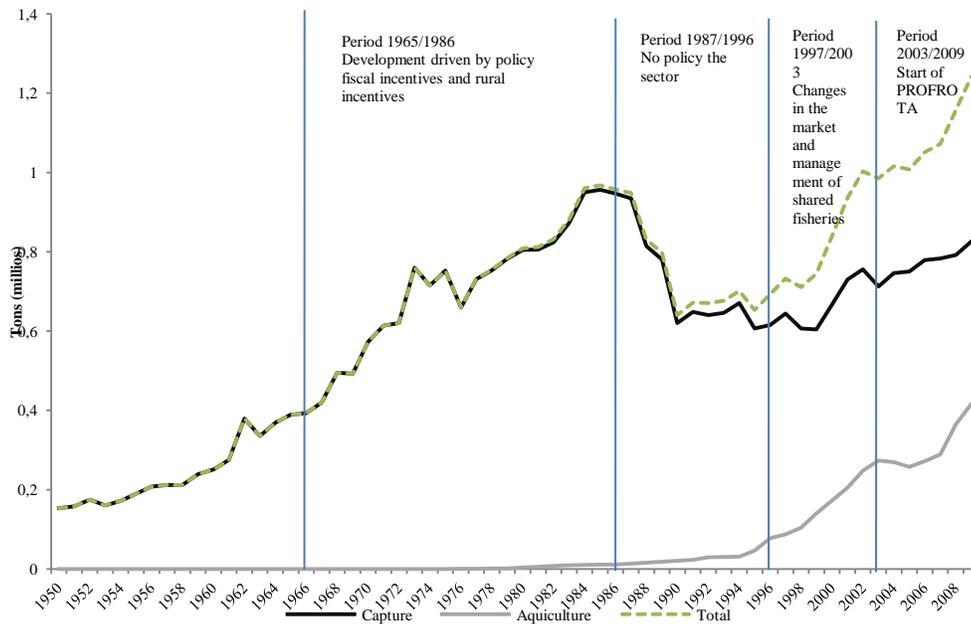
Meanwhile, Petrobras together with the Global Environment Fund will earmark \$ 110 million over the next five years, to advances in the creation and implementation of marine protected areas for recovery or increase in fish stocks (ADEODATO, 2011). Brazil has experienced success in this type of initiative which, in the Reserve in Abrolhos, researchers monitor a decade ago the benefits of conservation. The goal for the Ministry of Environment is to extend these protected areas to 6 percent by 2017 in the EEZ (ADEODATO, 2011). Brazil currently has 1.57 percent of the EEZ protected in conservation areas, although the Convention of the United Nations - UN Biological Diversity has established minimum target of 10 percent by 2020 for replacement of species (ADEODATO, 2011).

The Report of the Environment Programme of the United Nations shows the need of U.S. \$ 110 billion for the sustainability of fisheries, with the creation of marine reserves and reducing the fleet of boats (AADEODATO, 2011).The theme will be a highlight of the Rio +20, the UN conference that will point the direction towards a green economy.

In short, there was a significant increase in total marine capture in Brazil from the 1960s, caused by the increase in fishing effort. In that decade and the two consequent fiscal incentives and rural credit were created in a development context, regional and sectoral. Second report Abdallah and Sumaila (2002), there was sufficient concern with the environmental aspects and the rational exploitation. Moreover, the political ideal of the development model adopted difficult any rapprochement with the discussions of sustainable use of marine resources. As stated in relation to rural credit, much of its resources were intended only for maintenance of vessels.

Between 1988 and 1997, with the extinction of SUDEPE and the transfer of management of fisheries resources to IBAMA, body directly connected to the MMA, there was a trend of declining captures, the scrapping of the national fishing fleet and control over drive of the capture during the 1990s (ABDALLAH AND SUMAILA, 2002; DAIS NETO, 2002). From 1997 to 2009 the Brazilian market is marked by change. The sector is replaced by articulated public policies and environmental concerns arise a conducive environment where technical and scientific, environmental concerns of NGOs and the scientific community are taken into account.

A better view of the stages of Brazilian policy for the fisheries sector is highlighted in Figure 6.



**FIGURE 6: PRODUCTION OF FISH AND NATIONAL POLICIES FOR THE SECTOR.**

The creation of the MPA in 2009 consolidated the importance given by the government to the activity of fishing. Observed when the first sector development policies initiated in the 1960s, when nothing was invested in capital goods environment, refer to current political concern with the subject. However, despite the execution of subsidy programs rated as good, others clearly lead to increased fishing effort.

Currently, the difference between the supply of good and bad subsidies is still negative for the environment. This is because the current and main development plan of the Brazilian government for the sector meant 23 percent of its resources to programs and subsidies classified as bad, only 12 percent subsidies for so-called good. The remaining 65 percent, while benefiting sustainable practices (such as research and aquaculture) also increase the fishing effort (such as infrastructure investments capture).

Important projects, such as certification of origin of captures has little representation in the country and arrived only in 2010.

## **CONCLUSION**

The urgency emphasized by the World Trade Organization - WTO to be banned from government subsidies harmful fishing exposes the concern of various agencies to introduce new measures to ensure the future viability and sustainability of the oceans. Regarding Brazil is well known that public policies have generated periods of high productivity between the 1960s and 1980s. As is well known that the failure of such policies resulted in a profound national crisis in the fishing industry that lasted almost a decade. It is said that this crisis was caused by the indifference of the government to maintain their credit lines for fishing. However, after the peak of production in the mid-1980s, the national fishing did not, even today, such productivity. What is observed today is that, in order to sustain a growth of marine captures is an ongoing effort of the government to subsidize fisheries further offshore, and solid investments in the issue of aquaculture to meet the goals of production of the MPA. Also important to consider some opinion that socio-economic problems should be evaluated in the conduct and policies for fishing in order to it becomes increasingly evident that the economy can not grow forever and that the planet has its limits. In this context, it is essential that developing countries like Brazil seek, increasingly, measures to offset the use of "bad subsidies". The increase of marine reserves for breeding and to encourage the certification of origin are measures that deserve more attention from the Brazilian government.

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