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Pelagic longline fisheries in southeastern/south Brazil. Who cares about the law?

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ABSTRACT

The fishing industry has been facing problems related to catch yields, predatory competition and economic collapse. Management should be based on substantial scientific studies and the state's ability to implement these. In Brazil, the surface longline fishery has been in existence since the 1950s, and remains of great economic importance. This study analyzes 179 legal instruments (1934–2014), divided into restrictive, administrative and promotional, comparing with catches landed (1996–2011). The results show that there was a complete disrespect for the regulations, wherein fleets continued landing prohibited or size limited species, such as *Kajikia albida*, *Makaira nigricans*, *Alopias superciliosus*, *A. vulpinus*, *Carcharhinus longimanus*, *Galeorhinus galeus* and *Xiphias gladius*. Furthermore, divergent regulatory provisions have hindered understanding/implementation of regulations by all those involved. Being a country of continental proportions and with different longline fisheries along the coast, conducting scientific studies and the development of normative approaches becomes a huge challenge. In a dynamic activity such as fishing, the constant review of these regulations will allow fisheries management to become more accurate and in accordance with the aspirations of the different interests involved. Despite the surface longline fishery having operated for 60 years in Brazil, the existence of incongruous laws makes the management and control of this activity incompatible with the conservation of species. The lack of regulations governing this fishery creates a "gap", increasing the risk of extinction of species (target and bycatch) and the future collapse of this activity.

1. Introduction

Fisheries resource management can be defined as a set of formal or informal rules that are established and implemented by law or customs to ensure that access and use of fish stocks does not compromise the stocks, while generating jobs and income, and allowing cultural aspects and modes of life to be passed down from generation to generation [1].

After experiencing an accelerated global growth, strongly linked to the development from the early 1960s [2], industrial fishing has been facing problems related to decreasing production and income, disappearance of the most valued species, and intense competition between fishermen that resulted in some cases the economic collapse of the fishing industry [3]. The key factors that led to this reduction are exploitation policies of the exclusive economic zones - EEZ; grant programmes; inadequate management and planning; increased efficiency and catch capacity of the fleets; maintained profitability as a result of technological advancement and the variation of fish prices; adaptive capacity of the sector; and fragility of the institutional structures related to fisheries management, especially in relation to the operation of domestic and foreign vessels without the corresponding surveillance and monitoring [4].

Most countries do not meet international standards for the sustainable management of fishing activities, such as: (a) scientific studies for resource management recommendations; (b) transformation of these recommendations into public policies using the best available scientific data with the participation of different actors; and (c) capacity to implement regulatory actions [5]. In this context, the allocation of fishing concessions to foreign fleets can present a high risk

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of overexploitation due to the lack of definite catch limits, a distortion of declared catches, and the excess of bycatch [6,7].

The decline in catches and the ecological and socioeconomic consequences require greater responsibility from countries [8–13]. Two important indicators for management are: (a) the extent to which the results of scientific research are used for decision-making; and (b) whether these decisions are effectively carried out by the public authorities and the productive sector [14]. Furthermore, there is a consensus that the current management models do not contribute to sustainable fishing, essentially because they only consider the variables "fisherman - target-stock" and exclude the ecosystems that sustain this relationship [15]. The Food and Agriculture Organization - FAO, recommends an ecosystemic approach to fisheries that recognises an interdependence between human activities and ecosystems, as well as the need to maintain natural productivity for this and future generations with actions that target the conservation of critical environments, the reduction of pollution and degradation, the minimisation of waste production, and the protection of endangered species [16,17].

The numerous existing regulatory instruments for fisheries were motivated by real problems associated with environmental degradation and the depletion of living stocks, among other issues [18]. Regulatory instruments have required an ecosystem approach to fishing that encompasses social and financial issues [18–24]. Therefore, public fisheries management policies should not be based on models that ignore the complex effects of interactions among ecosystems, fishers and exploited species [25]. An example is the case of Eastern Atlantic and Mediterranean bluefin tuna stock, where scientific studies have pointed to the overexploitation. However, lobbies opposed to the use of robust scientific data have not allowed an improvement in species conservation status [26]. These authors have commented that in order to have a low risk of collapse, mid and long-term sustainable management and an increase in fishery yields, it is necessary to carry out more scientific studies and that these are used as recommendations for management.

The Brazilian fisheries management model is outdated and inadequate, and it is incapable of promoting sustainability in the use of the fish stocks in the country, which causes several problems for the sector, such as overexploitation of stocks and the absence of shared management [27–32].

Among the factors that may have contributed to the failure of Brazilian fisheries management is the significant institutional instability of the last 50 years, when several institutions have been given powers related to fisheries management [33,34] (Table 1).

The joint fisheries planning coordinated by the Ministry of Fisheries and Aquaculture - MPA was confusing and unstable, and led to several conflicts and obstacles in the management of fish stocks due to the differing interests of the ministries - the Ministry of Environment - MMA targeted stock conservation and the MPA sought to promote production and exports [20]. Currently, with the disappearance of the MPA, the management of fish stocks is going through a stage of transition and instability.

Finally, the Brazilian fisheries legislation appears quite complex in terms of scope and spatial standards, which often makes it difficult for users to understand it [47]. For the pelagic longline fleet, which in the southeastern/south - SE/S - targets the catching of the blue shark *Prionace glauca*; swordfish *Xiphias gladius;* albacores *Thunnus alalunga, T. obesus, T. albacares*; and dolphinfish *Coryphaena hippurus*[48], few specific regulations have been published in the last 50 years, and this activity is regulated primarily by general fishing legislation or legislation that focuses on some species [49].

Consequently, the aim of the present study is to assess the relationship between the restrictive laws associated to pelagic longline fishing in the SE/S of Brazil with the dynamics and strategies used by the national and foreign fleets regarding the species with regulatory instruments captured and landed in the port of Itajaí, state of Santa Catarina - SC - between 1996 and 2011.

Table 1
List of Brazilian institutions responsible for fisheries management in the past 50 years, their legal instrument, scope and/or mandates, and publication dates.

Legal instrument	Date	Institution	Scope and/or mandate	Reference
Decree-Law No. 23672	02/01/1934	Ministry of Agriculture	Creation of the first Fishing Code	[35]
Decree No. 50872	28/06/1961	President of the Republic	Establishment of the Council for the Development of Fishing (CODEPE)	[36]
Delegated Law No. 10	11/10/1962	Ministry of Agriculture	Creation of the Superintendence for the Development of Fishing (SUDEPE)	[37]
Decree-Law No. 221	28/02/1967	During the military dictatorship	Creation of the new Fisheries Code	[38]
Law No. 7735	22/02/1989	During the military dictatorship	Creation of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA)	[39]
Decree No. 1697	13/11/1995	Board of the Natural Resources Policy	Creation of the Executive Group of the Fishing Sector (GESPE)	[40]
Law No. 9649	27/05/1998	Ministry of Agriculture, Livestock and Food Supply (MAPA)	Creation of the Department of Fisheries and Aquaculture (DPA)	[41]
Law No. 10683	28/05/2003	Presidency of the Republic	Creation of the Special Secretariat of Aquaculture and Fisheries of the Presidency of the Republic (SEAP/PR)	[42]
Law No. 11516	28/08/2007	Ministry of Environment (MMA)	Creation of the Chico Mendes Institute for Biodiversity Conservation (ICMBio)	[43]
Provisional Measure No. 437	29/07/2008	Presidency of the Republic	Creation of the Ministry of Fisheries and Aquaculture (MPA)	[44]
Law No. 11958	26/06/2009	Presidency of the Republic	Shared fisheries management between MPA and MMA	[45]
Provisional Measure No. 696	02/10/2015	Presidency of the Republic	Extinction of the MPA and transfer of the competencies to the MAPA	[46]