

1.- EXECUTIVE SUMMARY

This is the analysis of the fishing activity considering the general description of the physical environment of the oceanographic and Current System of Humboldt off the coast of Chile. For these purposes is treated as geographical limit for the southern portion in the stream derived from the West, this branch moves seasonally year-on-year between the "Isla Grande de Chiloe" (41°29 'S) and the "Golfo de Penas" (47°S), proposed the latter latitude as an operating limit south of the area of this work, while northern limit has been established in the border with Equatorial Current, although the analysis in this study should be limited to geographic boundaries off the coast of Chile.

The coast of Chile has a linear development close to the 4,200 km, although in terms of an effective perimeter of coastline, including all the irregularities (i.e. bays, inlets, gulfs, inlets, etc.) and coastal islands, it reaches the 83,850 km, of which 95% applies only to the area of channels that goes from "Isla Grande de Chiloe" to Cape Horn. From a topographical point of view, within this maritime space, two major regions will be recognized, being the "Isla Grande de Chiloe" (41°29 'S) the geographical accident that marks the boundary between two regions.

In terms of submarine relief, this basin presents some mountain ranges or submarine ridges, intermediate depressions of these reliefs (funds or ocean abyssal plain), mass graves and on which there are excavations near the coast, the platform and the continental slope. Among the most notable features of Nazca would be Dorsal, which is interrupted before reaching the Peruvian coast. That is the northern of the two and this relates the Island Room and Gomez and the Dorsal West of Chile that unites Easter Island with Continental Chile to the latitude of "Puerto Montt" and the "Golfo de Penas". There are between the two dorsal transverse some reliefs linked to the underwater volcanic activity. One of these will raise the island of "Juan Fernandez" and another neighbor to the backend of Nazca, the islands of "San Felix" and St Ambrose.

Between the mountain ranges and the beads already described there are some underwater depressions or basin, also called abyssal plains. The two most significant basins are:

- 1) The Austral Basin or Baker or Billingshausen, between Antarctica and the Dorsal West of Chile.
- 2) Basin of Chile, between the Dorsal West of Chile and the backend of Nazca.

In addition to all this amalgam geomorphologies there is the submarine trenches that are accidents that prevent the secondary transverse alignments

and connects with the South American coast, because they are real trenches with depths greater than 6,000 m. The main are:

- 1) Fossa of Atacama located between Valparaiso and Antofagasta.
- 2) Chilena-Peruana Fossa located between Antofagasta and Callao (Peru).

In a more coastal form and immediately associated with the coast of Chile and in parallel to its coast, it presents the continental shelf, which has a variable width between 3 and 60 km, and average depths between 200 and 300 m. From Arica to Valparaiso which presents a width that varies between 2 and 5 nautical miles, with very rough bottoms and with few plains of sand. Valparaiso to the south is widening to achieve 40 nautical miles, approximately, in front of the Peninsula of Tumbes, in conception. It narrows between the Gulf of Arauco and compared to "Isla Grande de Chiloe" has an extension of 25 nautical miles. Toward the southern end is close and its surface becomes irregular. From an oceanographic point of view there are eight main currents that are recognized:

- The oceanic branch of the Humboldt Current (Superficial)
- The counter-current of the North (Partially subsurface)
- The coastal branch of the Humboldt Current (Subsurface in its northern part)
- Current Günther (Subsurface)
- The Chilean Current (Superficial)
- Southern Oscillation or "El Niño Current" (Aperiodic)
- The Chilean Coastal Current (Exclusive of the northern zone and superficial)
- The coastal upwelling (All around the coast, but associated with upwelling centers)

From a climatic point of view it is possible to identify various kinds of climate: desert in the north, polar in the south Atlantic and Mediterranean, steppe and tundra between both ends of the country. The main climatic variation is associated with latitude, although there are also significant variations with altitudinal gradients.

The average annual temperature fluctuates between 18 °C in the north and the 5 °C in the south, with variations which flank the 20 °C between day and night. Rainfall varies from a few millimeters in the north to more than 4,500 mm in the south of Chile, with averages close to 350 mm in the central area.

Although, considering the temperature, rainfall and prevailing winds, Brattström and Johansson (1983) recognized for the coast of Chile three areas: (i) "dry zone" from Arica to Coquimbo, (ii) "temperate" from Coquimbo to Isla Mocha

and (iii) "rainy zone and Patagonia" from Mocha Island to Cape Horn, Castilla et al. (1993), based on what was described by Viviani (1979), distinguishes four areas along the Chilean coast: 1) arid coast, 2) arid coast 3) central Coast: and 4) Costa of fjords.

The El Niño event, is the onset of abnormally warm waters that cause significant alterations in the system of Humboldt, which consists of the occasional warming, and a periodic irregularity of the waters of the sea, due to the advance of a mass of tropical waters, about 30m in thickness, which significantly raises the temperature on the average of them, causing significant environmental changes on the biomass and influencing the climatic characteristics of the riparian countries: Ecuador, Peru and Chile. In accordance with studies it has been concluded that there are no two identical phenomena of The "El Niño", however, is an event that has certain characteristics in common, such as:

- Positive anomalies of sea surface temperature and the air
- Negative anomalies of the pressure Surface atmospheric
- Strengthening of the S and SW winds in the North of Chile and central Chile
- Increase in precipitation in the latter region

Another event is observed in the region corresponds to the so-called "La Niña" characterized by positive anomalies of the atmospheric pressure and negative anomalies in the temperature of the sea and the air, the weakening of the SW winds in Arica (Region I) and the strengthening of the same in the center of the country, with a translation of anticyclones to areas located more to the S than usual and that causes dramatic droughts.

Finally, the upwelling correspond to the outcropping of subsurface waters, colder, that reach the surface, mainly as a consequence of the prevailing winds, accidents and other causes coastal oceanographic. The upwelling process allows you to concentrate and move nutrients which facilitate the flowering, development and abundance of the biomass.

From the point of view of the natural resources in the large yard contains a marine ecosystem of the flow of Humboldt, landings of fish reached the 2011 for the 4,435 million tons of which 3,428 million tons, corresponded to a catch of fish. In relation to the 2003 (4,527 million tons), there is a decrease of 2.03 %, particularly for the decline of the contribution of landings of fish, an 87% in 2003 to 77% in 2011. This fishing activity develops in more than 198 species of which 53% corresponds to fish. As the GDP contribution in the last decade varied 1.4 to 1.2% and it decreased from the year 2007. Other sources of important abiotic resources in these environments have been detected, such as the presence of

hydrocarbons, methane hydrates and development potential as the use of tidal energy, these being in an embryonic stage.

From the point of view of marine protected coastal areas in Chile there are 79 priority sites defined along the entire coast, of which 13% corresponds to sites exclusively marine and a 45% to coastal marine or coastal. Of these marine parks (particularly the Marine Park Motu Motiro Hiva) cover more than 99% of the surface intended for this type of measure that in a whole exceed the 15 million hectares. The areas destined for the AMERB's already allocated that reach the 512 areas must be added, with a total surface area of 74,216 hectares.

In terms of human resources, there are 03 major players; 1) direct users, those involving small-scale fishermen, sailors and workers in the fishing industry, aquaculture and processing the total more than 190,000 people; 2) public institutions directly linked in work of regulation, control, or security of the activities carried out by the direct users, including the national service of Fisheries and Aquaculture, Ministry of Fisheries and Aquaculture and Chilean Navy through DIRECTEMAR plant borders staff of 1,000 people and 3) academic institutions of research and development that now involve more than 15 institutions.

In relation to fishing activity itself and considering the high number of species involved, we prioritized those of greater economic relevance, productive, social and of biodiversity. In fishing terms, the exploitation of the resources is determined by the different physical conditions of the environment and the biological characteristics of the species. These factors influence the selection of target species, the means used for its fishing and the places where activities are concentrated.

Spider (2012) identifies 11 groups, based on its area of distribution, species composition and fishing gear used in their catches.

1. Resources of the Juan Fernandez archipelago
2. Trawl fisheries in the central coast
3. Fish south of the southern region
4. Pelagic fish and of purse-seine fishing
5. Resources of the area Antarctica
6. Resources of Easter Island
7. Sport fishing and salmon culture
8. Mollusks commercial

9. Coastal fish

10. Resource of inland waters

11. Crustaceans commercial

The particular analysis of each group made it possible to know the current situation, particularly in those resources considered as main fishing activity. In the case of coastal fish shaped by more than 24 species, because of its distribution characteristics are very vulnerable to the direct or indirect intervention of human groups, maintaining stable catch levels at around the 2000 ton. Particularly during the period 2008 to 2011 and at lower levels than those recorded in the period 2003 and 2004. It is advisable problems with the abundance of the species and a reduction in the size, with some evidence of overexploitation.

The mammals such as whales, sea lions and otters, were caught in Chile from the late eighteenth century and until the first part of the nineteenth century to subsequently be subjected to a series of restrictions or protections of the Chilean state. In the case of the sea lions, the latest census estimates a total population of 163,000 copies. Today, the activity is restricted to capture for display purposes in authorized places and in case of those specimens whose aggressive behavior causes serious and imminent risk to life, physical integrity and human health. On the other hand, between 2004 and 2010, under the Article No. 23 of the Convention 169 of the International Labor Office (ILO) and the Article No. 1 of the Indigenous Law, the Ministry of Fisheries has granted quotas for the capture of 60 copies per year, exclusively for the Indigenous Community Kawesqar, resident of Puerto Eden, Region XII, in response to a historical and cultural tradition in the use of mammals in general and of the species of common marine wolf in particular, with multi-port data millennia, for purposes of food, clothing and housing.

In the case of marine turtles, it has been observed by-catch from long line fishing and gill net; apply a series of actions and measures to reduce this negative interaction. For birds is a similar situation, in the case of the fleet demersal longline, particularly with species of albatrosses, petrels and shearwaters. There is currently a national plan of action to reduce the incidental catch of seabirds in long line fishing (PAN-AM/CHILE), which establishes some measures to be considered by the long line fleet, however, their results indicate that although it has decreased the incidence, this should be rather to a reduction in the activity of fishing, which compliance with the suggestions of the plan.

In relation to the benthic resources exploited mainly by the artisanal fishing the situation for general resources is at least worrying. Brown algae are declared in full operation, a similar situation that is repeated with the red urchin, scarlet

macaws, loco, surf clams, octopus, and other in uncertain situation as the locate and oyster of the north.

This is for demersal fishing composed of species such as hake (full exploitation) “besugo” (stock exhausted), Patagonian toothfish (uncertain), Yellownose skate and roughskin skate (full exploitation), orange roughy (uncertain), “Alfonsino” (overexploitation extreme) and Patagonian grenadier (overfishing).

Finally, in the case of the pelagic fishing, the species do not present a very different situation than those recorded in the other groups. For the anchovy the three units of fishing are eligible for full exploitation. The Pacific sardine is declared in state and regime of full exploitation, horse mackerel, is declared in state and regime of full exploitation for the units of Fisheries of the XV-II, III-IV, V-IX, XIV-X regions, the mackerel, which is removed as companion animals of the anchovy and jack mackerel their status is uncertain, in the case of the common sardine is declared in state and regime of full exploitation in the Unit of fishery of V to the Region X, the swordfish would be in phase of dynamic equilibrium and adjustment, the southern Pacific pomfret would be in a state of full exploitation and finally the Humboldt squid would have reached the speed of full exploitation, subject to quotas currently of exploitation.

In relation to regulatory aspects, the recently enacted General Law for Fishing and Aquaculture No. 20,657 provide that at the time of decision management measures must be taken into account. The objective of the Law which is the conservation and sustainable use of fishing resources through the application of the precautionary approach of an ecosystem approach in the new fishing management this to safeguard the marine ecosystems in the existence of such resources. To that end, we must take into consideration, the following:

- a. To establish long-term goals for the conservation and management of the fisheries and the periodic evaluation of the effectiveness of the measures taken.
- b. To apply in the management and conservation of marine resources the precautionary principle, this is understood as:
 - i. Adverse to risk in the management and conservation of the resources when the scientific information is uncertain, unreliable or incomplete
 - ii.

The lack of scientific information, unreliable or incomplete is not grounds for delaying or not to adopt conservation and management measures.

- c. To apply the ecosystem approach to the conservation and management of fishery resources, understanding by such an approach that considers the interrelationship of the predominant species in a given area associated with a fisheries management transparent, accountable and inclusive.

- d. To collect, verify, inform and share in a systematic manner, timely, correct, and public data resources of the hatcheries, fisheries and the environment.
- e. To consider the impact of fishing on the associated or dependent species and the preservation of the aquatic environment.
- f. To seek, avoid or eliminate the overexploitation and excessive fishing capacity.
- g. To overseeing the implementation of the measures, conservation and management.
- h. To attempt to minimize the removal of companion animals, discards, capture caused by arts or fishing equipment lost or abandoned and the impact of fishing on other species or on the most vulnerable marine ecosystems.

On the other hand, the institutional structure that regulates the fishing and aquaculture sector revolves around three key organizations, that have other institutions that offer additional research and support for the implementation (such as the Chilean Navy).

These three organizations have a degree of operational independence to the time that they take a crucial role of interconnecting within the broad institutional framework. These correspond to the Ministry of Fishing and Aquaculture(or SSP), which provides the settings of the policy and regulatory framework for the internal management of the sector, as well as the policy guidance and inputs in matters of fishing at the international level, the service center for National Fishing and Aquaculture (SERNAPESCA) that has as its mission to contribute to the sustainable development and competitiveness of the sector of the fishing industry and aquaculture of the country by enforcing the regulations with regard to fishing, aquaculture, health and the environment, which regulate the activity and guarantee the official security form of the fishing products exported, both institutions are framed within the Ministry of Economy

Demersal Fishing Development Institute, or FIFG and It is the main source of scientific advice of the SSP on management matters of fisheries and aquaculture, including the evaluation of populations and the establishment of total allowable catch levels for the fishing grounds, and the environmental aspects of health and aquaculture production. The mission of the FIFG is to be the supplier of scientific and technical advice for the regulation of the fishing industry and aquaculture, and the conservation of marine resources and their ecosystems. It receives a part of their funding from the SSP, but it also has to participate in the collection of resources on the part of a series of public sources of funding.

In terms of political agreements, the Office of the Assistant Secretary for Fishing and Aquaculture in April 2007 submitted to public consultation a "Proposed

National Fishing Policy" Which its general objective is: "to promote the sustainable development of the fisheries sector, attempting to ensure the economic growth, with mechanisms of governance and in a framework of equity, for the welfare of all Chileans".

This central objective is realized through specific objectives in the field of sustainability, economic growth, governance and equity. This national fishing policy would include in addition, the strategies in the aspects of:

i) sustainability, ii) allocation, iii) governance, iv) monitoring, control, and punitive system; (v) research, and (vi) institutionalism.

However, to this date there are no known results of this public consultation and as the PPN would be formalized for its implementation in the national fishing. What is related with the management of industrial fishing has evolved from one governed by the free access to another that is governed by the total allowable catch and the use of market-based instruments, to assign and market shares in most industrial fisheries. The newly enacted Fishing Act 2013 incorporates international standards of sustainable management, such as the definition of biological reference points to (PBR) and the maximum sustainable yield (MSY).

The latter sets the maximum amount of capture that the fishing resource may be subjected to without affecting its availability in the medium and long term. It was also created for the first time in Chile tradable fishing licenses (LTP) temporarily. Which are divisible and have duration of 20 years, after which they may be renewed or expired, depending on the act of the owner in the environmental, labor and fishing. These licenses will required the payment of a patent and a specific tax, with this ensuring that the State income will be equal to or greater than the current.

To give access to new players, it is indicated that maybe bid up to 15% of the share of industrial fishing of healthy fisheries, for which you need to have the information on the Maximum Sustainable Yield and biological reference points. In the case of overexploited fishing, it is bidding to all events from the fifth year of the entry into force of this act.

The artisanal fishing as in many other countries, presents a greater challenge of management due to the extremely high number of fishermen involved, to the difficulties in enforcing the rules at the national level in a country with a very long coastline and many places of landing, and the high dependence on the fishing industry on the part of artisanal fishing communities with limited alternatives for obtaining food and income. Until recently, this fishing industry had been traditionally administered with a system of free access.

Through a political negotiation that is effective, local fishermen's organizations have obtained exclusive access rights in an area of five nautical miles, adjacent

to the coast of Chile, and have negotiated important parts of various fishing grounds that surround this area through the craft of Regime Removal (SAR). The HKSAR has provided a higher level of stability for the artisanal fishers in terms of their access to resources, although the power of the right of access is open to debate, since it is in the very short term. However, the combination of regulated free access and exclusive access to the artisanal sector to the area of five nautical miles has resulted in the heavy exploitation of a series of coastal fishing areas. There are more ongoing efforts to develop policies aimed at the management and control of the artisanal sector, recognizing that this is a difficult problem of policy and that is a challenge, which will require the involvement of a wide range of policy tools to assume a coherent package, which includes policies related to social welfare, education, regional development and infrastructure, as well as management policy for the fisheries. The studies currently being made by the SSP on the feasibility of extending the VMS system to vessels from 12-18m in length will be important in advancing toward a more efficient monitoring and control of the larger ships within the artisanal fleet.

The introduction of a system of joint management, cooperation and with a zonal approach, in the form of a system of areas of exploitation and management of benthic resources (AMERB) has an innovative development in the artisanal sector. Ten years after the introduction of AMERB, the handicraft sector is still adapting to the system and the potential benefits, with a response that varies considerably throughout the country, depending on the basis of local resources and the power of the organizations of local fishermen. Only in the case of the "Loco" (*Concholepas concholepas*) there has been an increased use of the AMERB. The recent decision to allow aquaculture activities within the AMERB will help make the system more flexible and attractive for coastal communities. However, a long-term solution for the sustainable exploitation of benthic resources along the whole coast using this system, will require more investment in capacity building and education about the concepts of decentralized management and practice within coastal communities, this kingdom to some regulatory systems and control that offer incentives, sanctions and the appropriate responsibility.

On the other hand, for this sector, the new general law on fishing and aquaculture sets the fractionation of the overall market share between the sectors industrial and artisanal fishing for twelve for a period of 20 years from 2013. The five nautical miles coastal and inland waters for artisanal fishing are regulated by law, with the stipulation that these will be for the exclusive use of this sector in the Atacama Region and from the Valparaiso region up to the island of Chiloe.

These are reserved exclusively to the first nautical mile for the handmade boats from smaller size (less than 12 m in length), from the northern boundary of the country up to the southern limit of the "Isla Grande de Chiloé".

Is granted exclusively to small and medium sized fishing industries (SMES) that spent their products to human consumption the possibility to auction up to 1% of the overall share of the fisheries, continues in the benthic and demersal (including algae). These quotas can only be captured by the local fisheries folk duly registered in the corresponding fisheries.

By 2014, all the artisanal fishermen -crew and divers under 65 years - must have a life insurance compulsory, whose benefits may be extended to their families.

It regulates the contract to the part, so that the conclusion of agreements of profit sharing between ship owners craft and its crew members, by restricting the expenses to a discount. It will require the use of satellite position for the handmade boats over 15 meters in length, on siege of more than 12 m in length and transport. The warships for benthic resources will be exempted.

All the artisan crafts of greater size must pay patent, which may deduct the value of acquisition and installation of the satellite position and 50% of their maintenance, in addition to the certification of landings. A certificate of capture will be required for the ships of more than 12 m.

The financial support to the sector consists mainly of transfers of services that cover general expenses on management services, research and application. Preliminary calculations of governmental financial transfers (TFG) for 2007 indicate that the Chilean government has spent around 33.5 billions of Chilean pesos (equivalent to USD 40 million) in general service in that year. Such transfers correspond to the services provided by SERNAPESCA and FIGF.

Chile provides a small amount of direct payments to support artisanal fishermen (offering social aid, training for the retraining for displaced fishers), with a total of 12.8 million pesos in 2007. Do not offer transfers from cost reduction to companies or individual fishermen.

The Law on 20,500 associations and Citizen Participation in governance, enacted in February 2011, correspond to the legal instrument that institutionalizes and legitimate citizen participation in the country. The purpose and scope of the policy are to "promote citizen participation to promote a culture of responsibility, strengthen the spaces for communication between the government and the citizenry, increasing transparency, effectiveness, efficiency and effectiveness of public policies". For this reason there are 3 strategic objectives:

1. Strengthen civil society, promoting a culture of responsibility.

2. Promote and guide the actions of citizen participation toward the improvement of the effectiveness, efficiency and effectiveness of public policies.
3. Improve and strengthen the channels and spaces for information and opinion of the citizenship, promoting a quality response and timely on the part of the organs of State administration.

For the Ministry of Fishing which is the administrator of the fishing activities, the following advisory bodies or councils are established, the National Fishing Board, the National Commission on aquaculture, there are more zonal councils of fishing that more recently have incorporated themselves like the scientific and technical committees (eight in fishing and three in aquaculture).

In international terms Chile is an active member in many of the forums and agreements governing the fishing and oceans. Of course, Chile was in the forefront of the movement to expand the exclusive economic zone of 200 nautical miles, being one of the original signatories of the Declaration of Santiago on Maritime Zone in 1952, in which Chile, Peru and Ecuador proclaimed their exclusive sovereignty and jurisdiction over the waters to 200 nautical miles from its shores. Chile has ratified most of the treaties and conventions related to politics and government of fisheries and oceans at the international level. The notable exception is the agreement of the United Nations on the fish populations (UNFSA or agreement for the implementation of the provisions of the Agreement of the United Nations on the Law of the Sea of December 10 1982, relating to the conservation and management of straddling fish stocks and highly migratory fish stocks). The UNFSA is the implementation framework for the operation of regional fisheries management organizations (RFMOS) and the management of international fisheries, and Chile still must sign or ratify this agreement.

Chile also participates in an initiative with Australia and New Zealand to form a new RFMOS (South Pacific RFMO), addressed to the management of fishing effort which are not regulated in areas adjacent to the exclusive economic zone and in the Chilean South Pacific, where the Chilean interests are primarily focused on the fishing of trans boundary resource horse mackerel. The negotiations began in 2006 and now there are more than 20 states, as well as IGOS and NGOS, involves.

Finally, in relation to common problems in fisheries and compared with the major issues identified in the TDA 2003, succeeded in concluding that these constitute the 2013, essentially the same although with certain nuances that generate certain differences. The issues identified were:

- a. inappropriate role of the State in the administration of the ecosystems and their resources.

- b. non-integration of the environmental variability to the fishing decision-making.
- c. habitat deterioration of the coastal zone
- d. Threats to the biodiversity of the ecosystem, relevant to fisheries production.

The analysis of the issues identified in the TDA 2003, did not show great differences observed in the present analysis, keeping in general terms, its problems and stressing negatively in many fishing activities, and the vulnerability of populations subject to exploitation.

The implementation of plans or specific actions designed to protect the sustainability of the populations, presents a few examples of positive results, not only by the limitations of organs of the state to implement the required actions, but in some cases, by the unwillingness of the direct users to implement them, due to social and economic costs that this implies.

What is required is that coordinated efforts at different institutional levels must be executed, to incorporate the wide range of fishing activities exploited in Chile, studies that will consider the ecosystem approach, not only in the large fishing activities, and this is both a local, regional or national level, being integrated for policy holder-makers to implement the best criteria for its management and achievement of objectives of sustainability.

Finally it is important to place special attention to the development of activities in the coastal edge, linked or not with the fisheries, which have an impact of somewhat uncertain at different time scales in the local populations, ultimately affecting the overall geographic distribution and population health resources.