GEF-UNDP-HCLME PROJECT

THEMATIC REPORT: MODULE 2: RESOURCES AND FISHERIES

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EXTENDED SUMMARY

The Humboldt Current Large Marine Ecosystem **HCLME** is part of a group that includes four main upwelling areas in the planet. It is characterized by its high phytoplankton productivity and a significant production derived from its trophic chain; it is base to one of the most productive fisheries worldwide and it represents a biodiversity area of global significance.

The cyclic readjustment of the ecosystem, derived from the disturbances caused by the coastal upwellings and the El Niño Southern Oscillation **ENSO**, contribute to this extraordinary productivity. Both factors determine wide environmental variability, with significant impact on the ecosystem productivity and trophic structure. Moreover, the increasing pressure caused by several anthropogenic activities endangers the continuity of the goods and services it currently provides.

The Global Environment Fund **GEF**, together with the governments of Peru and Chile, are co-financing and developing the **GEF-Humboldt Project**, with the participation of the Instituto del Mar from Peru **IMARPE** and the Instituto de Fomento Pesquero **IFOP**. The objective of the Project is to strengthen the governance and the sustainable use of marine living resources and the services of the environment that have a significant impact on the ecosystem productivity and trophic structure. With this aim, it intends to move towards EBM, by means of a coordinated framework that strengthens the governance and the sustainable use of marine living resources and the services of the **HCLME**.

The idea is both for Peru and Chile to present a Strategic Diagnostic Analysis **ADE** and a National Action Plan **PAN**. Thereafter, a Straddling Diagnostic Analysis **ADT** and a Bi-national Strategic Action Plan **PAEB** would be drafted, thus contributing to a reduction of the impact on the **HCLME**.

By request of the **GEF-Humboldt** Project, data contained in the 2002 Thematic Report Resources and Fisheries and in the 2003 **ADT** have been reviewed and updated. Updated results are summarised here below.

The Humboldt Current Large Marine Ecosystem extends along the coast of Chile and Peru, in front of the South American western region, between the bifurcation of the West Wind Drift Current (42°S) and close to the border of the Equatorial Current (5°S). Moreover, it extends from the tidal influence line far beyond the 200 nautical miles of EEZ off Chile and Peru, although the oceanographic limit is difficult to determine.

The Andes mountain range creates a steep barrier facing the atmospheric flow in the area, forcing Trade Winds blowing south to east to blow in parallel towards the costs of Chile and Peru, producing strong coastal winds that bring about intense oceanic upwellings along the coast, emerging deep waters, cold and rich in nutrients (Bertrand et al., 2010).

Six main upwelling centres have been identified in Peru: 1.- Aguja (5°47´S); 2.- Chimbote (9°5´S); 3.- Callao (12°59´S); 4.-Paracas (13°45´S); 5.-Punta San Juan (15°22´S); 6.- Punta Atico (16°14´S). The upwelling is produced mainly by the wind parallel to the coastline. However, this physical process in modified by other factors such as the thermoclyne depth depending on remote effects from the Equatorial area (Chávez et al., 1999); also by coastal morphology and sea bed topography (Takesue and van Geen, 2002).

Even thought the upwelling events occur throughout the year in front of Peru, there is high oceanographic variability of local and/ or remote origin, at different time scales (intra-seasonal, seasonal, interannual and decadal). This oceanographic variability determines important fluctuations in the Equatorial Front, in the southern extension of the Cromwell Current and coastal upwelling. It has an impact on the abundance and distribution of the biological resources. In addition, one of the most intense signals associated with the **ENSO** cycle is also observed (Graco et al., 2007).

Intense upwellings are due to the Ekman transport, resulting from the confluence of the South Pacific Anticyclone and the earth rotation. The weakening or strengthening of the South Pacific Anticyclone is tightly linked to the **ENSO** phase and the Intertropical Convergence Zone ITCZ latitudinal location (Ayón et. al. 2008).

Regional impacts in the biomass productivity for decades, variation of low frequencies, represented by warm periods (El Viejo) and cold periods (La Vieja) (Chávez et al., 2003) and high frequency variations, such as El Niño and La Niña events, are part of the climate natural variation (Schwartzlose et al. 1999).

The water column is dominated by strong vertical stratification and a steep oxygen gradient in the first 50 m. Oxicline appears in the 10 to 50 m range and the upper limit of the Oxygen Minimum Zone **OMZ** can be found at its base. The mere presence of the **OMZ** limits the plankton vertical habitat that depends on oxygenated waters, favouring a strong vertical aggregation of the phytoplankton, zooplankton and small pelagic fish. Such aggregation could accelerate the carbon transfer among the different trophic levels, creating a highly efficient system for the production of fish and other trophic levels.

This feature clearly differentiates it from other coastal upwelling ecosystems, in terms of higher comparative fishing production (Kudela, 2005; Chávez & Messié, 2009). Moreover, the **OMZ** of the **HCLME** northern region has a strong impact, not only on the local ecosystem, but also in the global climate through the active exchange of greenhouse gases (CO_2 and N_2O) with the atmosphere.

Large Marine Ecosystems **LMEs** worldwide show an increase in Sea Surface Temperature **SST**; whereas the **GHCLME** and the California Current, show a cooling trend, as shown by the interdecadal variations in the ocean that changed from a "warming period" into a "cooling period" at the end of the eighties (Lluch-Belda et al., 1989, 1992, Schwartzlose et al., 1999).

Since the nineteen century, there has been acceleration on global warming, more pronounced in the northern hemisphere, as well as in the equatorial and tropical areas. Moreover, there has been an increase in coastal winds in most upwelling regions worldwide, particularly in Peru, over the last fifty years. Indeed, despite global warming, SST trends show a slow down over the last decades.

Peru is one of the countries with wider biodiversity worldwide, it has abundant and diversified natural resources, among them marine resources (plankton, nekton, benthos); guano of the islands; hydrocarbons; metallic and non-metallic mineral deposits; industrial mineral rocks, including diatomites (sedimentary siliceous rocks formed by the accumulation of diatom frustules), etc.

In view of keeping representative samples of marine and coastal biodiversity, three Natural Protected Areas **ANP** have been established within the marine environment: the Reserva Nacional de Paracas **RNP** (335,000 ha), the Reserva Nacional Sistema de Islas, Islotes y Puntas Guaneras **RNSIIPG** (14,833.47 ha) and the Reserva Nacional San Fernando **RNSF** (154,716.37 ha). All of them offer great variety of natural attractions for tourism, enjoying nature and observing wildlife.

In Peru there is an important artisanal fishery that contributes significantly to the national economy and supplies most of the fresh fish. It also contributes with exports for the frozen and canned seashell industry. In 2012, National Institute of Statistics **INEI**, at the request of the Ministry of Production **PRODUCE** carried out the first Artisanal Fishery Census, registering 44,161 fishermen and 12,398 artisanal shipowners, with 16,045 vessels (up to 32.6 m^3 storage capacity); moreover, it registered 184 shipyards and naval carpentries.

In addition, approximately 800 steel vessels and 670 wooden vessels (industrial fleet) have been registered, with a total storage capacity of approximately 230,000 TM. It generates around 12,500 direct employments. This figure rises up to 26,500 if the 139 fishmeal and fish oil plants are included.

One of the main ecological problems present in all oceans is overfishing. It has an impact not just on the populations of the target resource, but also on the accompanying fauna and those species that share the same habitat. Indeed, they are part of the trophic network, either as consumers and/ or as preys.

In this sense, the negative impact of the fishery would be more damaging on the marine and coastal ecosystems than other disorders caused by human populations, such as pollution, reduction in water quality and even global warming.

The fishing sector plays a key role in the Peruvian economy. Traditionally, it was based on pelagic marine resources, mainly Peruvian anchovy (*Engraulis ringens*), horse mackerel (*Trachurus murphyi*) and mackerel (*Scomber japonicus*). In addition, since the last decade, there has been an increase in the presence of other resources in the catch, such as jumbo squid (*Dosidicus gigas*) and dolphinfish (*Coryphaena hippurus*).

Since the fishmeal boom that started in the sixties, Peruvian fishery is among the most important worldwide, with anchovy as its main resource. With the collapse of the anchovy fishery in the seventies, it diversified including in the catch other pelagic resources such as sardine, horse mackerel and mackerel.

In the eighties, there was a steady recovery in the anchovy catch, under the effect of the **ENSO** '82; with the recovery of the environmental factors, anchovy gave signs of recovery with an important increase in the catch. In 1997, there was a reduction in anchovy catch in the Peruvian coast, due to **ENSO** '97-'98, with an impact on the specific composition of the catch. Later on, there was a recovery of the population levels, maintaining a steady level till today.

ENSO impact generates significant changes in the oceanographic conditions of the Peruvian sea, mainly in pelagic resources, altering their biological processes and behaviour and causing a gradual reduction of their population levels.

Next in the list, after the pelagic fishery, comes the demersal fishery. Its main resource is Peruvian hake (*Merluccius gayi peruanus*), using mainly bottom trawling. Its catch began around the mid-sixties; since 1973, volumes caught increased significantly, reaching a peak in 1978. Most likely, this catch level placed the Peruvian hake stock in a delicate situation in later years. Indeed, it plummeted during the **ENSO** '82.

Afterwards, catch increased gradually again till **ENSO** '97-'98, when it dropped significantly once more. Since 2004 Peruvian hake landings remained at very low levels, even decreasing in the last couple of years.

A large diversity of demersal resources inhabit the seabed of the continental shelf, mainly North of 10°S, where Peruvian hake is the main component, above 60% of the total, accompanied by other 70 commercially significant species used regularly for direct human consumption. At a national level, these species are caught by the artisanal fishery, with a slight increase from 1951 till 1984. Since then, it has been on the downtrend.

This situation points at the existence of a mayor environmental problem as fishing discards are not registered. This has an impact not just of the target species, but also on the accompanying fauna.

Moreover, **ENSO** changes the structure of the Peruvian marine ecosystem and the distribution and concentration patterns of the fishing resources. The first reaction is the displacement southwards depending on the intensity and duration of the phenomenon. At the same time, fishing resources can become more coastal, scattered or deep, moving away from their traditional fishing areas and making them less accessible. Once the climatic event is finished, the cooling effects are not immediate and the resources remain longer in the areas already occupied. In the case of recurrent **ENSOs**, there might be serious consequences for the resources, bringing about even the collapse of the fishery.

The environmental and fishery factors bring about changes in the fish populations, with a reduction in sizes, weights and ages in the main fishing area, in addition to changes in reproduction and feeding patterns.

Another important fishery is the so called artisanal or lesser scale. It fishes for resources located mainly in the coastal areas. This fishery develops in 116 landing points throughout the Peruvian coast; the main destination of their catch is direct fresh human consumption.

Registers in 2012 showed 268 hydrobiological resources caught by the artisanal fishery, of which 216 species were fish (pelagic, demersal and coastal). The wide diversity of commercial resources used by the artisanal fishery throughout the Peruvian coastline is an additional evidence of the **HCLME** high productivity and significance.

Since the fifties, the landings of coastal fish (cabinza grunt, palm ruff, flathead mullet, "*lorna*", pacific menhaden, silverside, peruvian morwong, amongst other), show great variability, with significant increase before an **ENSO** event, and a steep drop after the oceanographic event; in addition, we assist to a negative trend over the last three years. The participation of the main coastal resources (palm ruff, flathead mullet, "*lorna*", pacific menhaden and silverside) was significant between the years 1975 and 1997, well ahead of other coastal resources. This trend was repeated between 2000 and 2010; towards 2012, there was steep drop.

Flathead mullet, silverside and "*lorna*"are the species that have sustained artisanal fishery over the last decade, representing in total, more than 60% of the catch of coastal resources; they were destined to direct human consumption.

In 2012, 7,334 fishing areas were recorded, using trolls as fishing gear in 3,895 areas, nets as fishing gear in 2,433 and purse seine en 1,727; these are fishing gears frequently used for the catch of coastal fish. The use of a whole range of fishing gears, the wide distribution of the fishing grounds and the high number of coastal species, together with the lack of knowledge about stock and the absence of Fishing Management Regulations **ROPs**, prevent control and monitoring and the adequate record of catch, thus losing sight of the real impact suffered by coastal resources and the surrounding ecosystem.

Coastal fish suffer as a result of the fishing effort. They are also victims of illegal fishing (explosives, trawling), the destruction of coastal environments (degradation and change in habitats) and the marine pollution due to household and industrial effluents.

In 2012, juveniles were present in the catch of cabinza grunt, flathead mullet, "*lorna*" and pacific menhaden, in percentages above the 10% of tolerance appointed by the current legislation. In the case of silverside, the management measures put in place so far, bring about a reduction in the fishing effort, thus translating in a low percentage of juveniles.

Marine invertebrates are a diverse group, including from molluscs: chilean abalon, limpet, snail (gasteropods); octopus, jumbo squid (cephalopods); clams, mussels, scallops (bivalves); "*chitón*", "*barquillo*" (polyplacophores); crustaceans: crabs, shrimps, king crabs; and echinoderms: sea urchin, sea cucumbers.

The artisanal fishery of the jumbo squid (*Dosidicus gigas*), includes vessels whose storage capacity is below 10 tons. They catch using manual jiggers (trolls). **ENSO** '97-'98 had an impact on this resource growing fishery, reducing its catch to insignificant levels; however, its recovery was quick and since 1999 there is a relevant increase in catch, reaching 600,000 tons in 2008, decreasing slightly around 2012.

Except for the jumbo squid, marine invertebrates are mainly extracted by artisanal divers, by means of diving with compressor and/ or apnea diving (without tank); they also use traps and/ or pots and creels (for some crustaceans). The landing registers of coastal marine invertebrates (excluding jumbo squid), show a slight increase and sustainability in catches between 1950 and 2012. However, this relative sustainability would be masked by the production of mussels, shrimps and scallops, that due to environmental factors (**ENSO**) and/ or anthropic activities (repopulation and/ or culture), contribute to an "apparent" sustainability due to landed volumes.

When excluding these three species of coastal marine invertebrates, there is a negative trend in the catch of other resources since 2008, with extremely alarming figures in 2012.

The demand pushed forward by the gastronomic boom and by the export contracts favoured by the Free Trade Agreements **FTAs**, account for an increase in the number of sellfish processing plants and, in turn, of the fishing effort. This has a serious impact on the availability of benthic resources in their natural fishing grounds.

ENSO favours significantly the population growth of scallops and octopus, reducing the availability of resources in cold environments, such as mussels, clams, razor clams and hard substrate molluscs (such as chilean abalon, sea urchin and limpet).

The volume of scallops increased significantly, so much so that the effects lasted for over two years. The increase of the fishing effort, due to the high economic reward involved has an impact on the natural fishing grounds. Unfortunately, this cannot be controlled with the current regulations and monitoring system.

The situation of invertebrate resources is linked to the lack of registers regarding catch on the coastline. According to a priori estimates, they would represent similar volumes to those obtained by catch on board of vessels that, in contrast, are registered in the official landing points. Finally, the lack of specific Fishing Management Regulations for coastal invertebrates hinders the application of measures that would guarantee the sustainability of those resources.

In general, between 1950 and 2012, the total landings of hydrobiological resources show high variability, influenced by human actions (overfishing, regulations), and by the high variability of the **HCLME** (**ENSO**, **OMZ**); being anchovy *E. ringes* the main resource extracted, granting for many years the First Fishing Country worldwide position to Peru. The ranking with the top ten fish producing countries worldwide has not changed since 1992, with China, Peru and USA occupying the top positions since 2001.

The appearance and bloom of the anchovy fishery with reproductive purposes to supply raw material for fishmeal produced an increase in catch from 76,000 metric tons (TM) registered in 1950 to more than 12 million TM in 1970; henceforth, the fishery collapsed, causing a deep economic crisis in the fishing sector.

The catch of other hydrobiological resources showed an important increase, reaching a peak at the end of the eighties and beginning of the nineties (close to 4 million TM), with a gradual decrease thereafter and a slight recovery during the ENSO ´97 - ´98 period. Henceforth, the reduction in catch was significant, stabilizing after 2000 with catch below one million TM per annum (Fig. 01).

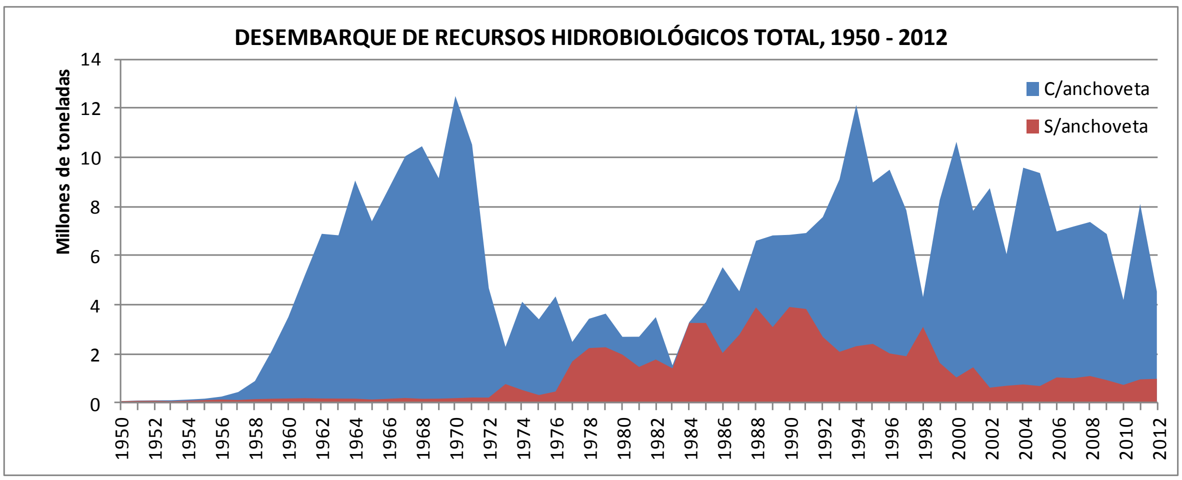

Fig. 01.- Landing of hydrobiological resources in Peru, 1950 – 2012. (Data Source: PRODUCE & IMARPE)

Even if the measures taken by Peru to recover and maintain the anchovy biomass have been very effective, this type of management is limited to anchovy and a few other resources, such as Peruvian hake and jumbo squid; but they are not considering the whole of the ecosystem. So much so, that the anchovy artisanal fishery for human consumption is a relatively new activity and it has been clearly mismanaged.

In order to manage anchovy fishing activity and to promote direct human consumption, **PRODUCE** issued Supreme Decree 005-2012, establishing three strips for anchovy fishing destined to direct human consumption **DHC**: from zero to five miles for artisanal vessels, from five to ten miles for minor scale vessels and beyond ten miles for industrial vessels.

This has not been well received by the stakeholders that resent the lack of consensus and participatory process and denounce poor technical and scientific data.

Population studies have focused in very few resources, the biomass of species caught by artisanal fishery is unknown and there are no fishing quotas, exploitation levels or fishing management regulations except for a limited number of resources.

Fishing Management Regulations include the technical and legal mechanisms that guarantee sustainability of a fishing resource; even if its implementation could achieve the general purpose, they are far from an EBM because they offer a traditional mono-species approach.

Due to the lack of knowledge regarding the stock of resources caught by artisanal fishery, the increasing fishing effort is not regulated. This increase is the result both of unemployment as well as of the increase in national and foreign demand for hydrobiological resources destined to direct human consumption. This situation causes the reduction in coastal fisheries, as shown by the reduction in landings and the increasing presence of juveniles.

The reduction in the population of benthic resources has contributed to the creation of mechanisms that would allow for population recovery through repopulation and/ or culture. In both cases, administrative rights are assigned to Artisanal Fishermen Social Organizations **OSPAs**, with the objective of charging them with the recovery of the populations and the administration and benefit of the production surplus. This legal figure maintains the mono-species approach although, in the case of repopulation, it could adapt to a more holistic approach.

Currently, scallop is completely exploited and it still supports strong fishing pressure in the main fishing grounds throughout the Peruvian coastline. Mariculture is presented as a feasible alternative to satisfy current demand, if developed with a holistic approach, establishing corporative management systems with the active participation of **OSPAs**.

There have been certain isolated experiences developed by artisanal fishermen that got organised to recover depleted populations; however, despite the fact that target populations have been recovered, success was not achieved because there were legal gaps that prevented these fishermen to take exclusive advantage of the surplus from the recovered populations. The surplus ended up been exploited by unscrupulous artisanal fishermen confronted with the presence of an exploitable stock yielding high profits.

The lack of fishing management regulation and the recent decentralization (without adequate planning and suffering from regulatory gaps), favour the appearance of illegal fishing and the development of destructive fisheries. All this is difficult to quantify due to an inefficient statistical information register system. The **PRODUCE** official figures show results quite different from those included in other sources, such as **IMARPE** and the Production Regional Directorates **DIREPROs**.

Hence the significance of assessing the behaviour of the catch of main species in the Peruvian sea, to verify if their ecosystems are in a healthy state.

Moreover, population increase and the diversification of human activities along the coastline (industry, tourism, construction, mining, harbours, etc.) alter or destroy coastal habitats, increasing marine coastal pollution.

Despite the fact that the total budget allocated to the fishing sector has gradually risen, it is impossible to verify if it encompasses sectorial objectives, if these figures are enough to finance the fishing sector or if the current budget will be capable of allowing for the implementation of EBM in the Peruvian fishery. This implementation will be costly, not only scientifically speaking but also as regards introducing changes within the **PRODUCE** and the attitude of its staff.

To identify the main problems related with resources and fisheries, the Regional Coordination Unit UCR of the HCLME organised a Causal Chain Analysis Workshop CCAW (TACC by its Spanish acronym), that took place in the Auditorium of the House of the United Nations - Peru, with the participation of national experts that created the National Intersectorial Commission CIN; they indicated underlying, immediate and root causes and their effects. They used the methodology of the IWLEARN (International Waters Learning Exchange and Resource Network) Program; moreover, several solutions (policies and actions) were proposed that would require the participation of stakeholders.

After reviewing the situation of resources and fisheries, thirteen problems were identified, in order of priority:

- Change and/ or degradation of coastal and subtidal habitats
- Marine and coastal pollution
- Significant changes in marine communities
- Loss of marine biodiversity
- Reduction of landing volumes in coastal resources
- Increase of juvenile fishing
- Biomass reduction of anchovy and other pelagic fishing resources
- Disappearance of coastal fisheries

- Increase in fishing discards
- Overexploitation of fishing resources
- By-catches
- Inadequate and poor report of fishing activities
- Increase of unreported fishing and development of destructive fisheries (illegal)

These problems identified were put in groups, bearing in mind their characteristics. Thus, the list remains as follows:

- Change and/ or degradation of coastal and subtidal habitats
- Impact on biodiversity
- Reduction in landings
- Changes in the availability of fishing resources
- By-catches and discards
- Illegal, unreported, unregistered

The increase in demand and fishing effort, the lack of regulations with an EBM approach, the dismal fishing management currently in existence, the lack of budget for science and technology, surveillance and infrastructure, are the root causes that account for the current status of resources and fisheries.

Based on the problems identified in the fisheries, we should work on improving governance. These problems are the result of the failure of the institutions in charge of managing the resources; moreover, those in charge of management were not even acquainted with the correct EBM terminology.

After analysing the main problems regarding fisheries governance, they have been summarized in the following groups:

- Weak institutions to implement EBM approach.
- Little capacity for enforcing sanctions.
- Lack of information in public management.
- Development of destructive fisheries.

This results from:

- Lack of training in environmental programs based on EBM approach.
- Lack of knowledge on how to apply administrative sanctions.
- Too much rotation of public officers specialised in fishing technical issues.
- Destructive and illegal fisheries cause overexploitation of resources. Informal fisheries carry out their illegal activities without being reported or registered.

The root causes of the problems related to resources and fisheries are not only to be found in the fishing sector; there are also other ingredients in the mix, such as the productivity of the ecosystem, socioeconomic issues and governance. This situation points at the need to respond to the HCLME problems with an EBM approach (Fig. 02).

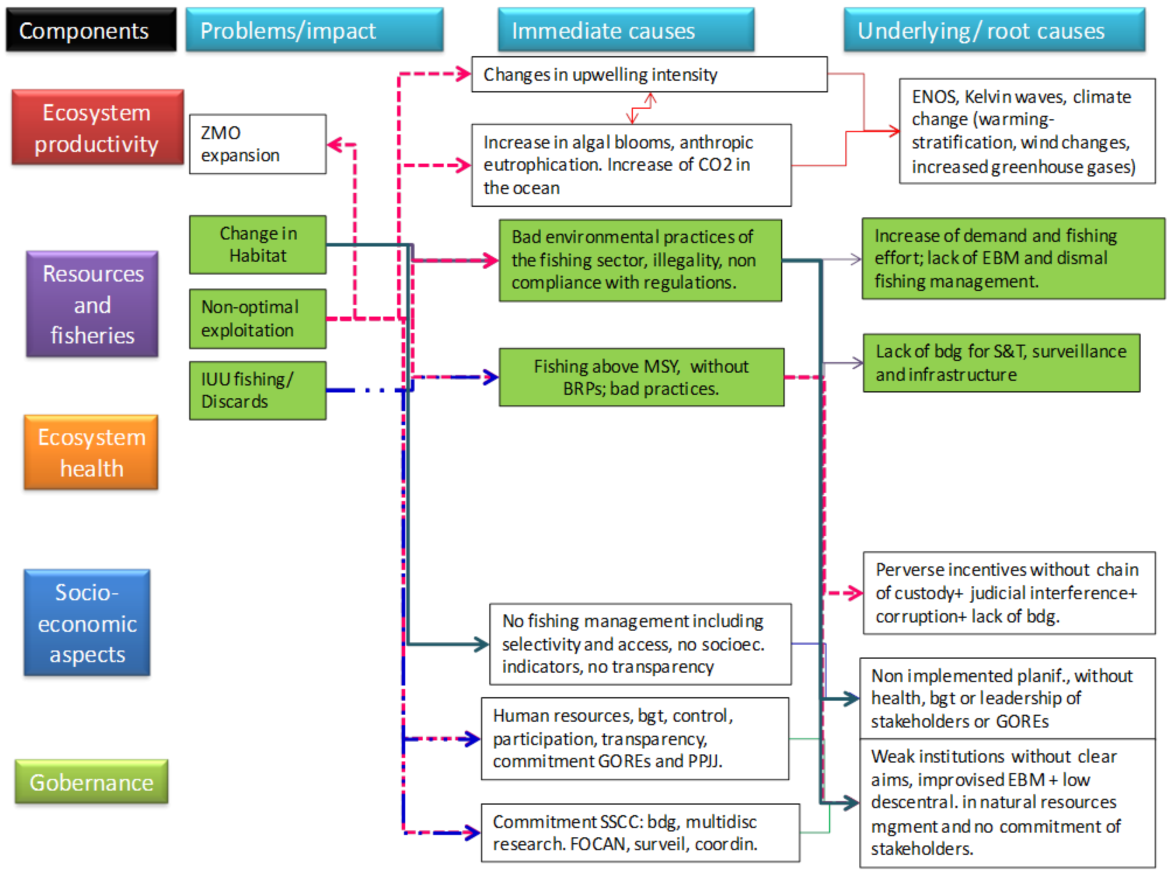

Fig. 02. List of main problems/impacts of the resources and fisheries, with immediate and underlying/ root causes from other aspects of the HCLME.

The mitigation measures and management actions to solve the problems in the fishing sector should necessarily consider the socioeconomic and governance issues, bearing in mind the variability of the ecosystem.

According to the situation identified, the environmental variability plays a significant role in the availability of fishing resources, as they become more vulnerable to the fishery and human activities that damage the habitat. Therefore, it is necessary to adopt an EBM approach, with governance and participatory process to guarantee the success of the measures implemented.

Potential solutions to fishing problems:

- Plan activities and effort, guiding administrative policies towards the implementation of EBM approach.
- Development of strategic annual and pluriannual plans, establishing short and long term objectives within the sector. Performance and efficiency measures of fishing activities should be included.
- The implementation cost in the fishery should be assessed from an EBM approach.
- Encourage fishing management and pluriannual strategic sectorial plans with a clear budget and mechanisms for financial and efficiency monitoring within institutions.

It is expected that governance in the fishing sector will establish primary principles, with clear objectives. Rules and regulations should be implemented, connecting government with civil society, harmonising individual, sectorial and social interests.

Stakeholders participation plays a key role in public policies and governance. Their right to participate should be recognized legally, aiming at their participation in the government decision making process at all levels: national, regional or local; thus contributing to a better public management and quality of life.

We believe that stakeholders participation is necessary to achieve consensus when taking decisions to improve control over members of the government and reduce the decision making costs. Therefore, their preferences should be taken into account so as to favour agreements.

We should be aware of the fact that decision making on any issue related with fishing in Peru is direct responsibility of the Ministry of Production (Vice-Ministry of Fisheries), which is the regulator within the sector and responsible for hydrobiological resources management.

Depending on the type of fishery and according to available scientific evidence and socioeconomic factors, it establishes the fishing management regulations, the maximum allowable catch, seasons, closures and fishing grounds, fishing effort, fishing gear, minimum catch size and other rules required for the preservation and rational exploitation of the hydrobiological resources according to the General Fishing Act.

It should be noted that the Organic Law establishes that the special laws that may regulate the sustainable use of the natural resources, should need public sector institutions responsible for resources management, creating coordination mechanisms with the other stakeholders to avoid conflict when granting rights due to overlapping or incompatibility of the rights granted or the degradation of the natural resources.

The legislation highlights that, when talking about straddling natural resources, they will be regulated by the related treaties or, otherwise, by special legislation. Therefore, in the absence of a specific treaty, it will be necessary to perform the corresponding analysis to implement an adequate national regulation that would leave room for a sustainable and EBM approach towards the straddling species.

As many other countries, Peru has signed and, in some cases, ratified several International Conventions that illustrate the efforts to achieve the preservation of natural resources. In some cases, those conventions have not been applied in administrative terms. As a result, the commitments undertaken by the country are unknown by the national and international specialists, with no clear position as a sector, turning rules and conventions void of sense.

Therefore, we recommend government institutions with shared responsibilities to coordinate intersectorial actions for the implementations of specific and general national and international guidelines.

Given the importance both of maintaining good international relations with neighbouring countries and of preserving the health of the ecosystem, it is important to assist any economic activity developed in the Peruvian sea. Moreover, we cannot forget the protection of the biodiversity, origin of the riches obtained from the fishing resources. Apparently, there are no sources of pollution derived from hydrocarbons, industry or agricultural activities that may affect the availability of hydrobiological resources or the coastal marine biodiversity among neighbouring countries.

Problems related to pelagic fisheries go beyond borders; therefore, the implementation of management measures agreed by both countries would contribute to the sustainability of the resources involved (indicators, reproductive closure seasons, minimum catch size, stock assessment, etc.).

In addition, the direct ecologic effect of fishing discards, the catch of non-target species and the indirect impact on biodiversity as a result of changes in trophic networks caused by the exploitation of fishing resources, should be considered in the **HCLME** comprehensive management.

So far, the efforts undertaken to implement an EBM approach are preliminary and limited. The task remains to maintain a dialogue with the authorities, coordinating with them the implementation of the suggestions previously mentioned.

Summarising, **HCLME** is host to a large biodiversity. Its unique features are host to the largest mono-specific fishery worldwide; it presents large environmental variability that has a significant influence in the distribution and abundance of hydrobiological resources and on its biodiversity; fishing activity is intense, wide and diverse. The fishing activity and urban and industrial development are significantly reducing the availability of fishing resources; the fisheries administrative and governance measures implemented by the Peruvian state are not sufficient and/ or inadequate to guarantee the sustainability of the fishing resources.

Thus, we recommend:

Create a Technical Working Group in charge of analysing and integrating the technical, social, economic, environmental, productive, regulatory and ecosystem elements, in order to draft the Guidelines of the Institutional Policy of the Peruvian State for the Fishing Management Regulation in the Humboldt Current Large Marine Ecosystem, offering solutions to the problems of resources and fisheries, mainly straddling stocks.

Involve in the process the different actors that use the good and services provided by the **HCLME**, aiming at representing, analyzing and integrating the different points of view.

Establish mechanisms that would allow the financing of the studies to determine the environmental, biological and fishing variables in the HCLME, so as to learn about its present state and justify the management measures.

Offer training on fishing management and institutional strengthening to all the different levels that participate in the fishing sector (administrator and those administered).

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