COISHCO BAY, CHIMBOTE, PERÚ: AN INTEGRATED VIEW OF ITS LIVING RESOURCES AND ENVIRONMENT. 2001-2005

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We have studied the Bay of Coishco in order to know about the artisan and industrial activities carried out in this area, and we have reviewed the information on the activities and projects done by the Coastal Laboratory of Chimbote, as part of the IMARPE´s annual program.
The authors present a description of the morphology, topography and sedimentology of the Coishco Bay, as well as of the physical, chemical and biological characteristics of its masses of water. They also include a description of the sources and levels of contamination, produced by waste waters from industrial plants, fishing vessels and domestic use. The species that support the artisan and industrial fishing are mentioned, as well as the instruments and fishing areas, the natural banks of marine invertebrates, the tonnages of extraction of artisan extraction and the industrial activities.
The Coishco Bay, with an approximated area of 11.655 km^2 is an opened bay, surrounded by the Santa and Moñaque islands. In their depths the isobaths predominate from 12 to 16 m and in the center of the bay, there is high concentration of organic matter. The masses of water are generally Cold Coastal Waters, from 15 to 20°C; the salinity near the coastal line is lower than 35 ups, however in the south of the bay it average 35.1 ups.
The waste water, coming from industrial fishing and domestic use, influences in superficial as well as in bottom oxygen content, where has been detected anoxia conditions; also the nutrients were affected; for instance, the phosphate levels increased during the period of intense fishing activity, and it diminished during the time of prohibition.
A total of 60 species of planktonic organisms have been identified mainly the upwelling diatoms: *Chaetoceros decipiens*, *Thalassiosira rotula* and *Skeletonema costatum.* Fishes constitute the main source of artisan *fishing (28% of the catches), specially: ''lorna drum''* Sciaena deliciosa, *''Peruvian silverside'' Odontesthes regia regia,* "Pacific menhaden" *Etmidium maculatum*, "Peruvian weakfish" *Cynoscion analis*, "Cabinza grunt" *Isacia conceptionis.* The Peruvian anchovy is the main raw material for the elaboration of flour and oil of fish. The most common invertebrates were: "Snail" *Stramonita chocolate,* "clam" Semele spp.,. "Scallop" *Argopecten purpuratus,* "Octopus" *Octopus mimus.*
The operating industrial vessels reduced in 2005, because they were operating in other ports. The industrial fleet provided more anchoveta to the different factories. Hayduk Company made the greatest reception of raw material.
The levels of contamination in Coishco Bay increased during the last two years, as a result of the fishing industrial increase, and the waste waters of domestic use, having affected the sediment and, and in some opportunities, the quality of the water, by causing anoxia.
Authors conclude that, despite the levels of increasing contamination that affects the Coishco Bay, due to the magnitude and diversity of hydrobiologic resources, the Santa Island is considered as the most important artisan fishing areas of the Coishco Bay, followed by the Corcovado Island and the Pampa of the Caleta Santa.

EL FERROL BAY, CHIMBOTE, PERU: AN INTEGRATED VIEW OF ITS LIVING RESOURCES AND ENVIRONMENT. 2001-2005

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Authors describe morphometry, bathymetry and sedimentology of El Ferrol Bay, as well as the physical, chemical and biological characteristics of its masses of water, including sources and levels of contamination produced by waste waters spill. Besides, they report species supporting the artisan and industrial fishing, instruments and fishing areas and natural banks of marine invertebrates. Data about the tonnages extracted by artisan fishery was obtained from the Chimbote´s fishing artisan wharf; and volumes treated industrially were received from the processing factories. Authors also report an information about the activities and projects carried out by the IMARPE´s Chimbote Coastal Laboratory, as part of its Annual Institutional Working Plan reviewed.

El Ferrol Bays is a semi enclosed bay, surrounded by four islands: Blanca, Ferrol Norte, Ferrol Centro and Ferrol Sur; it is approximately 73,518 km², the greatest depths are identified at the surroundings of the main mouth; isobaths of 8 to 15 m predominate in the center. Generally, the sediment texture predominantly comprehended fine grain with mud textures; these high concentrations of organic matter were found in the center of the bay, and near to the coastal edge, in front of the fish processing plants.

Mixed waters entering to the bay came from the south, the north and west, flowing intensely through the central zone, next to the main mouth, between the Blanca and Ferrol Sur islands; and moves out through the northern mouth between Blanca island and the Mineral wharf. Surface temperatures at the north of the bay were >20~´C, due to waste waters of Siderperú; however, at the south they were between 15 to 20~´C, In the north and the south, salinity, dissolved oxygen and nutrients were affected by domestic and industrial effluents, producing anoxia conditions during periods of intense fishing industrial activity.

Species of upwelling typical diatoms (*Skeletonema costatum, Thalassiosira subtilis*) species of dinoflagellates of oceanic (*Dinophysis tripos, Protoperidinium oceanicum*), and of cold coastal waters (*Protoperidinium obtusum*); and also five macroalgae, or "seaweeds", species (emphasizing *Rhodomenia flabellifolia*) associated to the natural banks of the clam *Argopecten purpuratus* were identified. According to the benthonic communities analysis, a diminution in the richness of the species in Blanca island was observed, caused by the human contamination effects; this impact was not found in the area Agua Fría - Hueco de la Vela.

Contamination levels in El Ferrol bay have increased during the five years observed, as a result of the growing fishing industrial activity, waste waters spills of domestic use and agricultural run off affected the sediments and the water quality, causing anoxia conditions, elevated biochemical oxygen demand and thermo tolerant coliformes, surpassing the limits allowed by the General Water Law for classes IV,V, heavy metals as lead and zing were also found, surpassing the international standards.

Around 96 species, including fishes, invertebrates and seaweeds, supported the artisan fishing in El Ferrol bay. The most important species, among invertebrates were: "scallop" *Argopecten purpuratus* and “jaiva crab” Cancer porteri Among fishes, they were: “Peruvian silverside” *Odontesthes regia regia*, “striped mullet” *Mugil cephalus*, “Pacific menhaden” *Etmidium maculatum, ‘‘lorna drum’’ Sciaena deliciosa*, “cabinza grunt” *Isacia conceptionis*, “*minor stardrum*”

Stellifer minor, "Peruvian hake" *Merlucius gayi peruanus*, "*Peruvian banded croacker*" *Paralonchurus peruanus*, "Pacific kingcroacker" *Menticirrhus analis* "Peruvian weakfish" *Cynoscion analis*, "Peruvian norwong" *Cheilodactylus variegates* catches of Peruvian anchovy for the direct human comsumption (DHC) were variable during 2001-2005. Nevertheless, the percentage of youngster fishes and marine invertebrates surpassed the minimum legally permitted; this situation makes risky the future species recruitment.
A total 350 artisan fishing vessels were estimated; and the gill nets were the fishing arts most commonly used. The operative industrial boats in El Ferrol Bay diminished during the year 2005, because of the paralization of the extractive activities in the fishing area; this situation motivated these units operated in other ports.
The industrial vessel made the greatest contribution to industrial fishing (with Peruvian anchovy); the RSW (Refrigerated Sea Water) provided Jack mackerel (*Trachurus murphyi*) and Pacific mackerel (*Scomber japonicus*) to the different factories operating in El Ferrol bay. The highest provision of raw material was received by three companies: Corporation Fish Protein (CFP), Sindicato Pesquero S.A. (Sipesa) and Pesquera Industrial El Angel (Piangesa).
It is concluded that, despite the increasing contamination levels supported by El Ferrol bay, the fishing areas Blanca island, Ferrol islands, Agua Fría, Punta Gorda and Poza El Dorado, must be considered as the most important zones for artisan fishing, because of the magnitude and diversity of its hydro-biological resources. Nevertheless, lack of commitment with allowed youngsters catches legislation, puts fishing sustainability in danger.

SAMANCO BAY, CHIMBOTE, PERÚ: MARINE INVERTEBRATES MARINOS. NATURALES BANKS, CATCHING LEVELS AND COMUNITARIAN PARAMETERS. 2001-2004

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In Samanco Bay, Chimbote, Perú, (9°10´- 09°17´S), the variation of the number of species and volumes of extraction of sedentary benthic invertebrates, during the period 2001-2004 have been studied. The bioceanographic characteristics, bathymetry, nature of the substrate and configuration that determine the potential of the bay, are described; some communitarian parameters of diversity and similarity of the fauna associated are analyzed. Since the year 2001, has been a clear process of recovery as much of the population levels as of the number of species of the commercial invertebrates, with ascending tendency did the 2004, after slow recovery after the event El Niño 1997-98. Among the 23 extracted commercial species in the bay, the most important were eight (Common squid, *Loligo gahi, marucha, donax marincovichi*,; leg of mule, *Trachycardium procerum*; snail; *Thais chocolata*; scallop, shell of fan, *Argopecten purpuratus*; clam, Semele sp.; shell knife, *Tagelus dombeii*; and octopus, *Octopus mimus*) by their volumes of extraction, that represented 95% of the total capture in the period of study, being the same ascending tendency for the capture curves, effort and relative abundance 2004 appears like a year of maximum marine productivity, which must consider adopting measures of handling and sustainability of the resources.