Summary of the Symposium on the Conservation of Coastal and Marine Environments

September 21, 2009 – Monday

Theme of the day: Overview on Marine Protected Areas.

Lecture: Vulnerability, threats, and conservation measures for endangered sea fish.

Lecturer: Monica Brick Peres (Director of Biodiversity Conservation, Instituto Chico Mendes de Conservação da Biodiversidade).

Lecture synthesis and considerations: the lecture was about the establishment of a methodology for marine protected areas planning based on attending vital needs for the conservation of some endangered marine species, especially cartilaginous fish. Crossing of information on areas and necessary locations for these species to complete their life cycles must be representative for the other species that occupy the same coastal space and, therefore, must also guarantee the conservation of the other local marine species. On the other hand, the methodology takes into account aspects related to fishing, seeking to conform fauna protection, fishing stocks, and areas necessary for commercial fishing activities, whether industrial or artisanal.

The lecture made it evident that part of the marine fauna in the Brazilian coast, particularly cartilaginous fish, does not have enough integrally protected areas and is still being subject to overfishing in relation to its reproductive capacity, whether by its commercial value or by its being captured as by-product of industrial/artisanal fishing.

Lecture: Monitoring the ecological efficiency of marine PAs: lessons from coral reefs.

Lecturer: Beatrice Padovani Ferreira (Associate Professor at the Oceanography Department at Universidade Federal de Pernambuco)

Lecture synthesis and considerations: Because of global warming and other environmental factors, such as pollutants load, the degradation of coral banks has generated a monitoring effort on the health of corals in oceans all over the world. Because of its sensitivity to small changes in chemical and physical conditions of sea waters, coral are good indicators of the quality and health of marine environments, once they also depend on other marine species whether as shelter source in several stages of their lives, food, or just substrate. A common methodology has been applied, in order to allow the data collected by different groups of researchers and activists can be compared and thus the dynamics of the degradation can be assessed as well as the recovery of the ecosystems associated to corals. In Brazil, the methodology has been applied in marine protected areas and can aid the management of tourist activities in

these areas. Field data are often collected by volunteers trained by teams of technicians responsible for the monitoring project and the analysis of the resulting data.

Brazilian coral reefs possess a number of endemic species and are not uniformly distributed along the coast, so the existing marine protected areas are not sufficient to shelter and protect all this biodiversity. New integrally protected areas must be established and consolidated, which will also contribute for the protection of part of the fishing stock, which depends on coral reefs for at least part of their life cycle.

Lecture: Protected areas as tools for conservation and fishing management: case studies.

Lecturer: Ana Paula Leite Prates (Secretaria de Biodiversidade e Florestas)

Lecture synthesis and considerations: Over the last decades, dead areas in the oceans, which comprise over 400 spots all over the world, have multiplied and increased in size. Besides causing decrease in marine biodiversity, these areas affect the capability of fishing production which has increasingly been reduced because of overfishing. On the other hand, there is an increasing acknowledgement of the role protected areas play as source of fishing stocks recovery and maintenance. Parallelly, the Convention on Biological Diversity has emphasized the need for the broadening of protection of oceans, which currently comprises 1% of their surface. Compared to the 20% recommended by the American Association for the Advancement of Science, the current protection level is less than insignificant. In Brazil, a multi-disciplinary work group was formed which is responsible for the implementation, until 2012, of measures aiming at achieving conservationist goals in our zone of marine influence, 10% belonging to any category, and 10% in zones of exclusion of fishing.

In summary, the main guidelines on this paper recommend that:

- coastal and marine protected areas should be established and managed aiming both the conservation and recovery of fishing stocks;
- the protected areas system must be representative of the diversity of existing ecosystems;
- this system will be comprised of integrally protected areas and others of sustainable use;
- conservation efforts should be allied to efforts of conservation of basins.

Based on some successful experiments in Brazil, related to fishing management in sustainable use protected areas, it is possible to glimpse a system of protected areas networks that allow the establishment of areas where fishing is excluded interposed with sustainable use areas, in order to achieve goals of protection of marine biodiversity representativeness as well as of maintenance of fishing stocks.

September 22, 2009 - Tuesday

Theme of the day: Global threats to marine biodiversity

Lecture: Climate changes and coral reefs.

Lecturer: Clóvis Barreira e Castro (Universidade Federal do Rio de Janeiro)

Lecture synthesis and considerations: The coral fauna in Brazil, despite being little diverse, if compared to other areas in the world, present rare and endemic species, besides possessing the only coral banks in the Southern Atlantic. Coral reefs are formations created through the action of coral communities, limestone algae, and several other organisms. They occur in shallow, warm, and clear tropical waters. Algae from the Zooxanthellae family live inside corals in a symbiotic relationship. Corals get breathing oxygen from Zooxanthellae, as well as food and aid in forming its limestone skeleton, and, in exchange, they provide protection and carbon dioxide to fuel photosynthesis by the algae.

Despite its biological richness, a fifth of all coral reefs in the world have been destroyed by human action. The main cause of the degradation is change in the balance of marine environments, such as overfishing, pollution, agriculture, devastation of coastal forests, which cause silting of the waters and climate changes in the planet.

Global warming increases ocean temperatures, causing disturbances in the symbiotic relationship between Zooxanthella algae and coral. The algae – which are responsible for the color of the coral – either dies or is expelled, leaving apparent the coral's white skeleton, in a phenomenon known as bleaching.

Bleaching has been observed in reefs in places located thousands of kilometers away from each other, such as the Australian coast and the Indian Ocean, being an indicator of the influence of climate changes and the increase in temperature of oceans over the corals. According to the IUCN, half existing corals are threatened due to the impact of climate changes, in case nothing is done to contain temperature increase in the planet, caused, to a great extent, by the emission of carbon dioxide and other pollutants into the atmosphere.

Coral reefs will stand a better chance of recovery after bleaching and to adapt to increase in temperature if the other environmental conditions remain favorable. Therefore, in order to avoid greater coral death due to changes in global climate, it is necessary to prevent other forms of degradation of the seas.

Lecture: The gigantic world "ultra-deep" oil reservations and the environmental challenges deriving from its transfer to the surface.

Lecturer: Jules Marcelo Rosa Soto (Universidade do Vale do Itajaí - UNIVALI).

Lecture synthesis and considerations: Ultra-deep oil banks, more commonly known as pre-salt layer, have been identified in several locations in the world. Despite comprising immense reservoirs, their drilling has been postponed because of the high extraction costs and technical difficulties in transferring the oil safely from the depths of kilometers into the Earth's crust, in addition to the great amount of water over these deposits. A little discussed aspect to which is given little importance, however, is the consequence of this type of extraction over existing marine fauna at these depths, especially corals. Corals that occur in this type of environment are unique and belong to distinct groups from those that occur in shallow, transparent, and warm waters in our coast. In Brazil, there are 38 catalogued species of this type of coral until now. Depth corals do not possess symbiotic relationships with algae and live at distances greater than 100m from the surface, surviving in waters presenting temperatures below five degrees Celsius. For this reason, it might take hundreds of years for their colonies to grow only a few centimeters.

Depth corals are associated to fish and crustacean species of great commercial value. Because of this association, depth dragnet fishing and other types of deep ocean fishing have increased their efforts exactly over the areas of these banks, causing a great impact on existing colonies. Oil extraction will, therefore, add to the impacts already suffered by these colonies, further threatening their existence, as well as potentially directly impacting productivity and profitability of commercial depth fishing.

September 23, 2009 – Wednesday

Theme of the day: Coastal and marine conservation strategies: study cases

Lecture: Coral Vivo Project.

Lecturer: Clóvis Barreira e Castro (Universidade Federal do Rio de Janeiro).

Lecture synthesis and considerations: In addition to all aggressions that corals have been suffering due to different historical and economic cycles which our coast has endured, biological invasion has increasingly become a great threat. With the advent of ballast water in modern commercial ships, larvae from a number of marine species have been transported to and from all the corners of the world, causing some successful introductions of exotic species. Among them there are some coral species possessing more efficient reproductive and colonizing abilities than some of our coral species. Native species that are little abundant in nature are particularly impacted. As a way of countering the impact of these species, the Coral Vivo Project has developed *in vitro* reproduction techniques for the dissemination in areas where exotic species might be mechanically eliminated so that areas of coral banks damaged by invading coral species or other environmental or anthropic factors can be replenished.

Lecture: Decrease in accidental captures during fishing: Albatroz Project.

Lecturer: Tatiana Neves. Projeto Albatroz.

Lecture synthesis and considerations: It is estimated that over 300,000 marine birds die every year due to incidental capture by spinning fishing of tuna, marlins, and sharks. It is known that of the 22 albatross species recorded in the world, 19 are globally endangered. In Brazil, there are 10 albatross species and 24 petrel species that feed in Brazilian waters and where there is a superposition of areas where the fleets of spinning fishing operate. In order to decrease this incidental capture, mitigating measures are being proposed all over the world. The main one is the *tori line*, a type of marine scarecrow consisting of lines full of colored ribbons that are tied to poles near the area where the hooks are launched. The movement of the ribbons scares the birds, who get away from the areas where the hooks haven't sunk and are near the surface. Other known measures are the dying of the baits blue so that they are camouflaged in the blue surface of the ocean, as well as the nocturnal launching of the spinner, among others. The Albatroz Project has been performing a weekly monitoring at the fishing terminals in Santos, SP, and Itajaí, SC, as an essential activity to approach, inform, and provide awareness spinning fishermen on the problems of incidentally capturing albatrosses and petrels, both at the ecological and economic levels. This work was reinforced by research on the efficiency of mitigating measures in Brazilian boats. Between 2207 and 2008, 40% of the pelagic spinner fleet in southeastern and southern Brazil tested and implemented mitigating measures in order to decrease incidental capture of albatrosses and petrels, especially the tori line. Besides, 15% of the fleet also used the dying of baits blue, as a way of reducing the interaction of the birds with the bait. Studies pointed to a decrease of around 60% in incidental capture of these birds using just the tori line. Through this study, the need was evident for the continuous encouragement for the adoption of mitigating measures, especially during the months of May to November, the time of the year these birds are more abundant in Brazilian waters.

Lecture: Artificial reefs as tools for the conservation of marine biodiversity.

Lecturer: Frederico Pereira Brandini (Associação Mar Brasil).

Lecture synthesis and considerations: The practice of deliberately submerging substrates produced by humans (ships, concrete blocks, tires, tabulations, and so forth) in order to generate new aquatic habitats reproducing local marine biodiversity, and use them in the socio-economic development of the coastal zone (fishing and tourism), is commonly known as "artificial reefs." However, more than simple refuges and environments generating new fish populations in areas with few rocky or coralline substrates, artificial reefs possess a great potential for marine management and conservation.

Industrial dragnet fishing, which has been abandoned in parts of the world because of its damages to the marine community, continues creating biodiversity deserts along the Brazilian coast, as well as damaging and impacting communities of local fishermen who until recently earned a living from the so-called artisanal fishing. Besides being a

type of fishing that indiscriminately collects different fish species, therefore needlessly sacrificing non-commercial species that are simply discarded, the technique revolves the bottom of the ocean, destroying the substrate necessary for several components of the marine ecosystem, braking the entire food chain. This very industrial fishing besides providing an unfair commercial competition reduces through overfishing the stocks previously available to artisanal fishermen who find increased fishing efforts and costs.

Departing from the premise of a coastal zoning and planning, artificial reefs might create exclusion zones for industrial fishing, generating integrally protected areas and areas dedicated to the management of artisanal fishing, thus contributing to the creation of protection and fishing sustainability mosaics along the coast.

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Conclusions of the Symposium:

Despite countless benefits provided by natural resources originating in the oceans, they remain subject to great global threat that are conspicuously causing great coral mortality and increasingly generating spaces with dead zones and floating dumpsters. Less than 1% of the oceans are protected under some kind of use restriction. However, besides not being enough to shelter all the diversity of global marine life, these areas are unable to face the threats that collectively affect the planet, such as climate changes and pollution. Additionally, isolation and fragmentation of unprotected environments, whether through inefficient and abusive fishing techniques or exploitation of mineral resources such as oil, might cause genetic erosion of biodiversity in a similar fashion to what happens in terrestrial fragmented natural environments. Unfortunately, areas presenting the greatest biodiversity and abundance of marine fauna such as coral reefs (both in shallow and in deep waters) are the areas most intensively used by demersal fishing and limestone extraction.

From the international recognition that the world's fishing stocks are being exhausted and that protected marine areas are an important element for fishing management and sustainability, a new perspective is opened for protected areas and areas of exclusion of fishing are valued, increased, and properly managed. There is no lack of tools. Coastal planning systems that contemplate mosaics of protected areas with sustainable use areas using key and endangered marine species, artificial reefs, and techniques aiming at decreasing bycatch (including seabirds) and even techniques of replenishing corals via *in vitro* reproduction might be applied in order to counter or at least minimize some global factors and threats to marine biodiversity and existing protected areas.