Co-Management of the Hookah Diving Fisheries

by: Richard Cudney Bueno *

In 1968, in a seminal paper published in the journal *Science*, Garret Hardin argued that users of a commons are caught in a process that eventually inevitably leads to overexploitation of the natural resources on which these users depend. He argued that when resources are held in common, individuals make "rational" decisions to maximize profits and ignore the costs to others, which eventually culminates in a tragic collective overuse of the resource or resources (hence the popularized name of his theory, the "Tragedy of the Commons"). His theory has been widely and extensively used by scholars and governments throughout the world to justify complete government intervention in the management of resources as well as the establishment of private property rights systems on natural resource use. Although it is clear that the tragedy of the commons does take place under certain circumstances, this theory is a tragedy in itself. It has oversimplified many issues at play in the overexploitation of natural resources that clearly go beyond a mere selfish individual rational decision-making process. It also ignores the self-regulating capabilities of users and the possibilities for collective action and organization of communities or groups of people that depend on the same common pool of resources. In the following paragraphs, I will briefly give an example where collective action for the management of resources held in common is proving to be the rule rather than the exception. This is the "condensed story" of the small-scale hookah diving fisheries of Puerto Peñasco, a story that has gone from what some may consider a tragic situation to an encouraging model of community participation and empowerment.

Hookah fishing involves diving from a boat for benthic resources using a compressor (a modified paint-spraying machine) that supplies air for divers through long (50 m) hoses. In the upper Gulf, divers rely on their bare hands, hooks, knives, spears made out of construction rod, and bags of old trawler fishing nets attached to a bike tire rim to secure their catch. Hookah divers have been harvesting sedentary and semi-sedentary benthic resources (snails, octopus, clams, calico scallops, rock scallops, sea cucumber, and mother of pearl) as well as fish (groupers and snappers) in the upper Gulf for approximately 30 years. They dive in areas as shallow as 1 meter to as deep as 35-40 meters, remaining underwater for stretches of up to six hours at a time. Not surprisingly, almost all divers have experienced some form of decompression-related problem.

Possibly like no other, these diving fisheries activities exemplify the rapid exploitation and diversification of targeted species that have characterized small-scale fisheries in the northern Gulf during the last 20 years. For example, in 1993 the Asian market's demand for meat and operculum of the black murex snail (*Hexaplex* (*Muricanthus*) *nigritus*) led to its being harvested in large quantities in Puerto Peñasco. Fishermen landed over 600 metric tons in one summer, more than what was ever recorded for snail production for the entire state of Sonora. By 1999, production had fallen to approximately 80 tons, divers were venturing into deeper and new fishing zones, and the array of species harvested during the summer diversified to cope with this decline.

The decline of black murex is of particular concern not only for the well being of the fishermen but also for the overall health of the sub-tidal benthic ecosystem of the northern Gulf. Black murex may be acting as a keystone species. They are top predators of the sub-tidal benthic community, preying upon numerous bivalves and gastropods. In addition, they serve as important if not crucial habitat for numerous species of mollusks and arthropods, particularly during their reproductive period. In the upper Gulf, black murex snails form large aggregations to reproduce (up to approximately 5000 snails/aggregation), laying egg cases on conspecific snails. These egg cases act as "nursing" or refuge grounds for other invertebrates in their juvenile stages and provide a food source for various organisms including sea turtles and fish. In essence, they appear to play the role of "temporary reefs," providing substrate, refuge, and food in a region where rocky substrates are not abundant. Benthic sedentary resources are particularly prone to over-exploitation as they are readily accessible in well-defined areas that can be targeted repeatedly by a small number of people. In addition, since most benthic resource species are broadcast spawners (such as rock scallops, calico scallops, and various species of clams), successful reproduction and recruitment is largely affected by density of the organisms. Marine invertebrate populations can be particularly susceptible to sudden collapse when gradually increasing habitat destruction or fishing pressure can cause populations to drop below the densities necessary for adequate recruitment.

The lesson of the pearl fishery in the Gulf of California gives a sense of how mollusk beds can be over harvested. In the gulf the pearl fishery was one of the earliest commercial operations. In fact, pearls from the mother of pearl (*Pinctada mazatlanica)* and western wing oyster (*Pteria sterna*) were primary reasons why Spaniards ventured into the Gulf of California. The pearl fishery was also one of the first in Mexico to show signs of overexploitation. The first expedition into the gulf was organized by Hernán Cortés and led by Diego Hurtado de Mendoza in 1532. This expedition landed in the Bahía de la Santa Cruz (today known as La Paz) in the Baja California peninsula. Rumors quickly spread about the discovery of beautiful pearls and bountiful pearl beds. Pearling expeditions were launched that relied on black slaves from the mainland as well as local Indians for labor. There are reports that pearls were harvested at this time from up to 20 fathoms deep (~40 m) using wooden bells. Of course many people died in this process. By the early 1700s, Father Eusebio Kino observed that "in all the coast, and especially in the adjacent islands, there are so many pearl fisheries that they can be counted by the thousands" (cited in Donkin 1998). By the end of the Jesuit period (late 1700s), the pearl banks of the Gulf of California had been greatly depleted, making their harvest unprofitable.

The diving sector is concerned about catch decreases and availability of black murex snail and other benthic resources. In order to protect the remaining healthy stocks and productive scallop beds, the diving sector has taken the initiative to gain more and better control over the resources they are harvesting. In the past two years, as part of the divers' petitions, CEDO has conducted basic ecological and ethnographic participatory research of benthic resources, combining local knowledge with experimental design. Being a neutral and respected NGO (non-governmental organization) in the region, CEDO has also played an important role in facilitating the communication between this sector and the government.

The results of this participatory work are encouraging. We have expanded our knowledge about the natural history of resources (particularly black murex) and the political ecology

surrounding hookah diving fisheries. The momentum for action is more evident than ever. In a meeting with government officials convened by the divers in October 2000, they petitioned for specific actions:

1) formalize a season closure for snail;
2) shift the opening of the octopus season a month to allow for more recruitment and growth;
3) conduct a certification program to give Puerto Peñasco divers priority in obtaining and using fishing permits and to control access of outsiders;
4) establish San Jorge Island as a temporary marine reserve or "no take" area, and
5) create an exclusive fishing zone for Peñasco divers.

In addition, they asked for an active representation and participation in the management decision-making and implementation process of the Biosphere Reserve by forming part of a fishery commission in which various fishing sectors can be involved.

Divers' petitions have been well received by government officials. The National Institute of Fisheries has formalized a season closure for snail. It is also officially recognizing the ongoing efforts of the diving sector to interrupt fishing around San Jorge Island at least for a year. San Jorge has some of the best rock scallop beds (the best paid resource for divers) as well as relatively healthy black murex, fish, and octopus stocks. Divers want to establish the island as a temporary marine reserve to permit a greater increase in the number and size of these resources and allow the island to act as a source point that may conceivably help in the recruitment of other areas. Without waiting for formalization by the government, divers organized and decided to stop fishing at San Jorge beginning in November 2000. This community-based decision has been very successful. Only once since November did one diver break this rule. Instead of this action leading to the expected chain reaction of "if I am not fishing there, someone else will so I might as well go fish there again before others take what could be my catch," the divers met again and sanctioned the interloper. The sanction? Public humiliation, possibly the most effective sanction of all in cases such as these within a tight-knit group of people. The island is still voluntarily off-limits and, as mentioned before, the government is in the process of officially recommending its temporary closure.

The divers have been empowered by their own actions and by knowing that the government is hearing them, responding to them, and taking action. These results appear to be inspiring other fishing sectors in Puerto Peñasco as well. In a recent meeting with the small-scale fishing sector to discuss the issue of the endangered vaquita (see *Vaquita*, page 20), gillnet fishermen brought up the divers and their efforts as an empowering example to follow. Likewise, crabbers are very actively participating in a monitoring program of the blue crab with the government and CEDO in an effort to provide adequate management for this resource to assure long-term use.

The above conditions have set the stage for an emerging co-management model. Central government management seldom considers the self-regulating capability of users, and management guidelines are not imbedded within the context of the ecological, social, and political realities of local settings. Co-management takes a middle course, in which government agencies and fishers' organizations share the responsibility for management functions. In this case, a non-governmental organization (NGO) such as CEDO is also playing a crucial role in the cooperative

management process by acting as a facilitator, communication link, and providing the scientific knowledge and skills necessary. Co-management becomes especially appealing in developing countries where the central government lacks the financial and human resource capabilities to create, monitor, and enforce management regulations.

In the case of the diving fisheries in the northern gulf, a co-management regime may be successful for various reasons. The unique work of these divers builds pride and unity that enables consensus-building. The government is also willing to decentralize decision-making, particularly regarding those fisheries that are not of primary national concern but are nevertheless very important at a community or regional level, such as most species harvested by divers. In addition, these fisheries do not suffer from being intensely politicized at a national level, which also eases the government's formal recognition of community-based management guidelines. Finally, the sedentary and semi-sedentary nature of resources harvested allows for easy monitoring and assessment of basic population parameters and the spatial distribution of fishing activities. Thus zoning to control access to exploitable stocks or establishment of "no-take" zones become feasible.

Increasingly, co-management is proving to be an ideal way to foster the sustainable use of renewable natural resources. However, it is imperative to learn from the limitations and advantages, the boundaries of its effectiveness and the characteristics of the communities or regions in which it can succeed. It is also necessary to have a clearer understanding of the concept of sustainability in small-scale fisheries and ways to measure it. When do we say that a management regime is working, and on what basis do we say so?

The hookah divers of Puerto Peñasco offer an ideal system for documenting, from its beginnings, the development of a co-management regime and the outcomes of this development. CEDO will certainly continue to be involved in this process. ♦

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