Bolinao Rallies Around Its Reef

With its cascading waterfalls, rolling hills, white beaches, and spectacular sunsets, Bolinao has been called nature's masterpiece. But the most valuable asset in this northern Philippines municipality may be its 200 km^2 of coral reefs. About one-third of Bolinao's 30 villages and 50,000 people depend on fishing to make a living (McManus et al. 1992:43), and the Bolinao-Anda coral reef complex serves as the spawning ground for 90 percent of Bolinao's fish catch. More than 350 species of vertebrates, invertebrates, and plants are harvested from the reef and appear in Bolinao's markets each year (Maragos et al. 1996:89).

Imagine, then, the dismay among local residents, marine researchers, and NGOs who learned in 1993 that an international consortium intended to build what was claimed to be the world's largest cement factory right on Bolinao's coral reef-covered shoreline. The cement industry ranks among the three biggest polluters in the Philippines (Surbano 1998), and the plans for the Bolinao complex included a quarry, power plant, and wharf. It can take 3,500 pounds of raw materials to produce 1 ton of finished cement; pollutants commonly emitted from this energy-intensive industry include carbon dioxide, sulphur dioxide, nitrous oxide, and dust–about 360 pounds of particulates per ton of cement produced. Another by-product is highly alkaline water that is toxic to fish and other aquatic life (Environmental Building News 1993).

The ensuing debate over the plant's construction brought a new urgency and focus to local efforts to ensure the long-term viability of Bolinao's coastal resources. Pitted against a politically and economically powerful business consortium, residents successfully challenged the idea that a cement plant's short-term economic benefits would offset the risk of long-term ecosystem ruin. That outcome is an unusual and significant achievement, particularly in developing countries, where citizen advocacy and broad-based participation in natural resource management is likely to face daunting obstacles, including limited access to both environmental information and the political process.

Bolinao's Threatened Marine Ecosystem

Bolinao's environmental fragility had been recognized, in some quarters, long before a Taiwanese business group called Tuntex announced its plans to build a mammoth cement complex. A 1986 study by the Marine Science Institute at the University of the Philippines, for example, documented significant damage to Bolinao's coral reef system. Researchers found that about 60 percent of the region's corals had been killed, mostly through destructive fishing practices that relied on dynamite and cyanide to enhance catches (McManus et al. 1992:44). In 1992, Bolinao's once-booming sea urchin industry was shut down indefinitely after the urchins had been exploited nearly to extinction to satisfy export demand for roe (Talaue-McManus and Kesner 1995:229). Fishers, fish vendors, and shell craftspeople had noted diminished catches, changes in dominant species, and decreases in the size of mature fish.

But it took the possibility that a cement factory would cause further deterioration of the area's marine resources to galvanize widespread action on behalf of the ecosystem. "We launched a vigorous education campaign focused on the cement plant's potential environmental impacts," explains Liana Talaue-McManus, a researcher from the Marine Science Institute (Talaue-McManus 1999). For many, this was the first time that they fully understood the extent and richness of their community's natural resources, as well as its vulnerability.

The plant complex would be located in the middle of the reef system, within 3 km of the municipal center. This was an ideal spot from investors' perspectives, given its abundance of limestone, the deep channel for marine transport, and Bolinao's proximity to Taiwan. Investors argued that the cement production complex would not cause any pollution, but local residents soon began to suspect otherwise.

With support from the University of Philippine's researchers, a local NGO–the Movement of Bolinao Concerned Citizens–challenged the Tuntex consortium. They played a critical role in the 2-year struggle against the cement

plant, rallying opposition and raising awareness of the complex's potential impacts. Those impacts, as their research revealed, could include air pollution, erosion from the quarrying of limestone, damage to the reefs from the widening of the shipping channel, oil pollution from shipping, and the threat to their limited freshwater supply.

Their efforts were rewarded. In August 1996, the Philippines Department of Environment and Natural Resources (DENR) denied "with finality" the application for an environmental permit, citing the unacceptable environmental risks the cement plant would pose to aquatic life and coral reefs, and the conflicts that would arise with existing land and marine uses (Ramos 1996).

Crafting a Long-Term Management Plan

The hard work of ecosystem protection didn't end with the cement plant fight. In fact, for Bolinao residents and NGOs, the toughest part of ecosystem management was ahead. Local NGOs are still working toward a larger goal: developing a coastal resource management plan that empowers fishers and other community members to participate in long-term decisions about the management and health of their resources.

Consensus on how to conserve and protect the marine areas has long been elusive. Since the early 1990s, a coastal planning team composed of representatives from the Haribon Foundation and from the Marine Science Institute and College of Social Work and Development (both at the University of the Philippines) sought to mobilize Bolinao's villages on behalf of marine protection. But many issues polarized the community:

- Most of Bolinao's fish harvesters are poor, with the reefs serving as their sole source of food and income. As farmlands deteriorated, many farmers migrated to reef areas, exacerbating competition for marine resources. Increased population in the coastal areas increased the amount of organic pollution; the pollution, in turn, reduced the resilience of Bolinao's coral reef ecosystems. Because of poverty, resource depletion, tradition, and lax enforcement of bans, fishing methods known to be destructive were sometimes still used.

- The town leadership lacked adequate information about the marine ecosystem and needed technical assistance to make sound resource decisions.

- Access to milkfish fry and siganid fishing in Bolinao was governed by an inequitable but ingrained system. Those who won concessions from the local government–through a sometimes corrupt bidding process–garnered exclusive privileges to fish in an area. Subsistence fishers were banned from the area or forced to sell their catch to the concession holders at below-market prices. The result was illegal fishing and minimal incentive to regulate the harvest, but significant income for the local government.

- One survey found that the number of aquaculture pens in the Caquiputan Channel between the Bolinao mainland and the islands of Santiago and Anda had increased from 330 in December 1996 to 3,100 in July 1997 (Talaue-McManus et al. 1999). Although they produced revenues for the town's political and economic elite, they reduced fishing grounds and navigation areas, causing water quality declines and fish kills.

- Resort owners wanted the shorefront left open and free of activity, while subsistence and deep sea fishers needed navigation and docking areas.

The challenge of finding a balance between these actors and between the different uses of the coastal resources made it all the more impressive when, in 1997, NGOs successfully crafted "a collective vision for the long-term viability of Bolinao's coastal living resources" (Talaue-McManus et al. 1999). This coastal development plan drew on more than 2 decades of scientific research by investigators from the Marine Science Institute and was drafted by 21 representatives of the municipal government, the religious sector, members of the fishing industry, ferryboat operators, and environmental advocates through community workshops and meetings.

The plan divides the municipal waters of Bolinao into four zones with different use designations–"reef fishing," "ecotourism," "multiple use" (which includes milkfish pens and fish cages), and "trade and navigation." One zone includes a marine protected area. The next steps were to determine exactly what activities were to be allowed or prohibited in each zone, to ensure that the marine protected area remains truly protected, and, of course, to implement the plan. Implementation is still under way.

Most of those involved agree that local input has been a hallmark of Bolinao's ecosystem management process. They credit the participatory process with winning much greater public acceptance for Bolinao's coastal development plan than a traditional plan could have secured; most often, plans are drawn up quickly by outside consultants with little or no local input. Plus, by including direct resource users–subsistence fishers and fish vendors as well as the local government–in the zoning process, there is a greater chance of achieving conservation goals. Local stakeholders are, after all, the people who will ultimately either respect the new rules and regulations or ignore and evade them. An ongoing research program, such as that conducted by the Marine Science Institute, is an important complement to the planning effort. It serves as a source of knowledge and data that public representatives can draw on to make informed decisions.

Perhaps the best news is that Bolinao is part of a growing number of communities, organizations, and sectors of government in the Philippines that are using a "bottom up" rather than "top down" approach to natural resource management, building on a long tradition of strong citizen advocacy. And although Bolinao's coastal development plan is still very much a work in progress, one thing appears certain: more and more people will get involved as the plan is implemented. As word has spread in the Philippines about the Bolinao experience, other municipalities have turned to the University of the Philippines-Haribon team. They seek help in formulating their own coastal development plans, offering the promise of more research and monitoring on the status of coral reef ecosystems, and generating new strategies and models for reef protection and new management abilities within local communities.