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## Tundi's Take: Acknowledge the land-sea connection, even if it takes you from your comfort zone as a marine manager

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By its very nature, EBM requires that we address how ecosystems are connected and factor that into management. But what does it mean for our community of marine and coastal managers when inland ecosystems are among those connections?

Although the community generally acknowledges that being "ecosystem-based" requires considering both land and aquatic systems when developing our management regimes, doing that is not easy. And it does not come naturally to most marine management agencies.

Part of the problem is our age-old reliance on looking at structure instead of function. Shorelines provide nice boundaries that we can see - leading us into the trap of treating our marine systems as separate. And because the oceans have been marginalized for too long, we in the conservation community have been marketing them as special, different, even unique. While oceans are indeed special, their care must be built on systematic and coordinated management of inland, coastal, and offshore areas simultaneously, using tools developed for land use but adapted for sea use.

It starts with basic understanding of the physiology of the coastal or marine ecosystem of interest. In *Marsimas Nacionales* - a vast area of mangroves and associated habitats along the Pacific coast of Mexico - government agencies and NGOs work side by side to try to maintain mangrove health. Nonetheless, mangrove dieback continues, affecting the livelihoods of coastal peoples and the socio-economic viability of *ejidos* (cooperatives). There are many factors contributing to the degradation:

- A channel on the seaward side of the mangrove that was widened for navigation, for example, continues to grow to this day due to erosion; this widening has changed the physical processes of water flow and sediment deposition.
- Freshwater flows to the mangrove have been compromised by upland irrigation and hydroelectric installations. Too little water reaching the coast means that typically not enough sediment is being delivered, so mangroves cannot accrete land to keep up with encroaching seas.
- The quality of the reduced water flow to the mangroves has also declined, as the water brings with it the pollutants from farming and municipalities.
- And perhaps most important of all is the problem of occasional pulsing of sediments downstream. Farmers upland construct small earthen dams to divert water to their crops (often illegally), and when the intense rain events characteristic of this region occur, the dams get washed out, bringing huge quantities of soil into the mangrove basin. These pulses of sediment effectively block natural channels in the mangrove, restricting flushing and the passage of organisms that live there or use mangroves as nursery areas.

As a result, no amount of *Marismas Nacionales* protection alone - be it in the form of National Parks and other protected areas that already cover large areas, or enforcement of regulations concerning mangrove cutting, fisheries, aquaculture, or navigation - will be able to save this vast and valuable mangrove area from decline. The only thing that will be adopting an EBM approach that forces a full diagnosis of pressures and impacts, and uses this information to pinpoint priority management interventions on land, in river systems, on the coast, and at sea.

It is not EBM when we ignore the fundamental ecology, after all. Acknowledging the connections is necessary - no matter how much that acknowledgement may take us from our expertise and comfort zone as marine managers.

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