Long Term Conservation Ensures Lasting Economic Value

Human populations in coastal regions are growing rapidly and causing substantial changes to coastal marine areas. Why bother to conserve coastal habitats?

It is business-smart to conserve coastal marine ecosystems because of the economic activity they support. By balancing profits and long term conservation, economic production is compounded through time. In the Greater Caribbean, the following all depend on the market and non-market services that coastal habitats provide:

- Commercial and Recreational Fisheries
- Mass Coastal Tourism
- Community and Recreational Services
- Ports and Shipping
- Nature and Adventure Tourism
- Real Estate and Coastal Development

The economic services that healthy habitats provide include shoreline protection, water quality maintenance, nursery habitats for fisheries, and destinations for valuable tourist industries.

Connectivity

Remarkable connections exist among animals and habitats, especially when the life cycles of the fishery species we humans feed upon are considered. These animal-habitat connections are central to the ecological integrity of coastal habitats, and to the production of their environmental goods and services.

A tropical shoreline contains different coastal habitats: estuaries, beaches, mangroves, seagrasses, and shallow and deep reefs. Following a brief, larval life offshore, the early stages of many fishes, lobsters, and shrimp need access to certain nearshore habitats, and many move from one habitat to another as they grow towards adulthood. By conserving natural habitat, we ensure this critical connectivity is sustained, and production of fisheries resources remains high.

As well as animal connectivity among different habitats, the coastal environment is highly interconnected through the flows of nutrients, sediments, and water itself. A mangrove, seagrass or reef habitat can be seriously damaged through development activities that block, divert, slow, or enhance water flow (and transfer of substances) from one habitat to another, even when the construction occurs some distance away.
Survival of Early Stages = More Adult Spawners

Death rates of larval and juvenile marine animals are usually very high even under best natural conditions. When death rates are increased by the loss or degradation of the coastal habitats used by the early stages, the impacts upon adult populations and the fisheries they support can be severe. Yet these nursery habitats are often in the shallowest areas that are most subject to impacts from coastal development.

Scientists and managers often use the word, recruitment, to refer to the progress of marine animals from one life stage to another.

- **Larval Recruitment**: Addition of new individuals to a population through settlement to bottom habitats following completion of larval life.

- **Inter-Habitat Recruitment**: Movement of a life stage to a new habitat – not the first larval settlement event but a later habitat shift; these may occur for years after.

- **Fishery Recruitment**: Growth to the size at which individuals are first retained by fishing gears (i.e., when they enter the fishery). This can occur many years and habitats after larval recruitment.

In the Caribbean, fishery species that move among habitats during their lives include groupers, snappers, lobsters, conch, por- gies, parrotfishes, grunts, and jacks. Spiny lobster, the most important fishery resource in the Greater Caribbean, completes its lengthy larval life and recruits to shallow vegetation in back-reef, seagrass and mangrove systems; months later it moves to deeper hardbottom habitats.

A number of marine species also make nightly feeding migrations to different habitats than are used during the day. Annual spawning migrations that may occupy 1 to 3 months also occur in adults of many groupers, snappers, and other fishery species. Development which impedes these movements or the quantity/quality of the destination habitats, or failure to protect organisms during critical spawning times, can result in serious declines in availability of fishery resources.
Coastal and inland construction can degrade important habitats and their biological and physical support systems in diverse, often unseen ways. Some impacts are largely apparent and irreversible (the removal of mangroves and loss of their important nursery and filtering functions). Many coastal areas are dominated by “sun and sand” or “sol y playa” tourism with a focus on rapid and speculative coastal growth. This represents some of the most concentrated tourism in the world, with Cancun alone processing 5 million tourists annually. High density residential sprawl as well as mass tourism frequently damages the nursery areas and connected habitats used by recruiting fishes while creating beaches that must be artificially maintained. Development also increases demands for water, and produces millions of gallons of waste that must go somewhere—frequently into the ocean. The less obvious impacts from run-off: pollution, chronic turbidity on reefs, and food web shifts, can also cascade into deeper waters.

The overall result is slow and steady destruction of important coastal habitats by many indirect and direct impacts that interact in unseen manners. Over time, these habitat changes reduce fishery production, disrupt connections among habitats, and diminish coastal protection.

Coastal development projects can receive governmental approval without a full evaluation of long-term impacts because of inadequate regulations or political pressures. Development often proceeds because it seemingly brings jobs and revenue in the short term. But the long-term costs in lost ecosystem goods and services, inefficient allocation of tax revenue, degraded local cultures, and other neglected impacts can be far greater.

While protecting coastal connectivity is an important principle when valuing proposed coastal developments, this is not sufficient by itself to ensure the sustainability of coastal ecosystems, and their continued production of goods and services. It is necessary also to a) manage fisheries appropriately by limiting catch, preventing fishing at critical sites or times when fish are spawning, and preventing use of inappropriate fishing methods, b) minimize pollution of coastal waters, and c) build public awareness of and support for coastal conservation.
WHAT ARE OPTIMAL APPROACHES FOR THE FUTURE?

Recognizing the importance of nursery habitats and the movement routes used by fishery species, and the critical need to conserve these is an important first step. Yet, many new challenges are soon going to be layered onto past unresolved problems involving coastal habitats, including sea-level rise, ocean acidification, and even more coastal population growth. In this century of major coastal change, individuals, businesses, recreational and commercial users, academics and agencies can all assist in improved planning and management of coastal development. We need to fully apply objective science to help guide policy decisions for the benefit of all stakeholder groups. This requires thinking and acting on time scales longer than political election cycles.

Significant steps to achieve more sustainable coastal management include:

- Anticipate and plan for changes in coastal habitats on 5-20 yr time scales, not on scales of 2-3 years. Anticipate cumulative impacts – coastal development is a continuous process.
- Ensure long-term profits by incentivizing sustainable business practices in coastal tourism, fisheries and other coastal enterprises.
- Ensure full public participation of all coastal stakeholders, particularly the resident water-users, when making decisions about coastal development.
- Avoid urban sprawl by applying strict zoning rules to land use plans.
- Adopt best practices in waste management to reduce coastal pollution and maintain and improve water quality.
- Expect and require objective and comprehensive environmental assessments for coastal development proposals; use independent experts to evaluate complex proposals for environmental criteria.
- Expect and require agencies to enforce existing coastal environmental laws.

In addition to the cascading impacts on coastal ecological systems, inappropriate coastal development has social impacts that are seldom adequately evaluated. Sustainable coastal ecosystems deliver countless recreational and family development benefits to long-term residents and keep children emotionally in contact with the natural world they inhabit. Protection of coastal habitats is a wise cultural investment as well as a means to lever economic production for the long term.

Preparation of this brochure was made possible with support from the Connectivity Program of the Coral Reef Targeted Research (CRTR) Project and The Nature Conservancy. The CRTR Project is a partnership between the Global Environment Facility, the World Bank, The University of Queensland, the United States National Oceanic and Atmospheric Administration (NOAA), and approximately 40 other institutions around the world. The Connectivity program is managed by UNU-INWEH. Authors: K. Lindeman and P. Sale.

Photos credits: Pg 1: H. vanLavieren; K. Alkin; Stillpictures.com; Pojogo.com; Pg 2: R. Smalling; K. Lindeman; J. Bohnsack; D. DeMaria; Pg 3: R. Smalling; CEMDA, QR, Mexico; K. Lindeman; K. Drouillard; Pg 4: H. vanLavieren; T. Gibson; R. Smalling.