Coastal ecosystems for countless benefits

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Conserve coastal habitat today, preserve income for tomorrow

Playa del Carmen, Mexico, like many coastal areas of developing countries, is dominated by "sun and sand" tourism with a focus on rapid coastal development and population growth. Photo: M. Paterson

"What effect will this decision have on the natural habitat along my coastline 20 years from now?" It's a question local councils and planning officials in coastal towns and cities need to ask every time they consider a proposal for local development. For coastal municipalities, especially, the answer holds lasting consequences for the livelihoods and wellbeing of the next generation of residents, investors and business owners.

Nowhere else is the prosperity of a community so directly linked to the condition of the natural habitat - the beaches, coral reefs, estuaries, mangroves and seagrasses.

After all, it is the splendour of the ocean and beaches, together with the abundance of marine life, which lures hundreds of millions of people to live, work and play along coastlines worldwide.

Each of the following enterprises generates income for coastal communities and each depends 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

But for how long will coastal habitats serve their communities as a destination for tourists, a source of food and investment, a workplace for jobs and a playground for families?

Not long, say scientists with the Coral Reef Targeted Research & Capacity Building for Management Program (CRTR), who anticipate that the harmful impacts on the natural habitat from coastal development will accumulate, if not accelerate, over time.

The damage to important habitats and their biological and physical support systems caused by coastal and inland construction can be diverse, they can often be irreversible, and some are invisible. For example, the removal of mangroves to create beaches reduces natural filtration which increases pollution; reduces storm protection; and builds a system that requires continual management (beach restoration).

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 social benefits to long-term residents and keep children emotionally in contact with the natural world. Protection of coastal habitats is a wise cultural investment, as well as a means to lever economic production for the long-term.

The Coral Reef Targeted Research & Capacity Building for Management Program (CRTR) is a leading international coral reef research initiative that provides a coordinated approach to credible, factual and scientifically-proven knowledge for improved coral reef management.

The CRTR Program is a proactive research and capacity building partnership that aims to lay the foundation in filling crucial knowledge gaps in the core research areas of Coral Bleaching, Connectivity, Coral Diseases, Coral Restoration and Remediation, Remote Sensing and Modeling and Decision Support.

Each of these research areas are facilitated by Working Groups underpinned by the skills of many of the world's leading coral reef researchers. The CRTR also supports four Centres of Excellence in priority regions, serving as important regional centres for building confidence and skills in research, training and capacity building.

The CRTR Program is a partnership between the Global Environment Facility, the World Bank, The University of Queensland (Australia), the United States National Oceanic and Atmospheric Administration (NOAA) and approximately 50 research institutes & other third parties around the world.

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Long-term thinking required

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Be warned: think long, not short

Local councils and planning officials should anticipate, and plan for, changes in coastal habitat on five- to 20-year time scales, not on scales of two to three years. The challenge for planners and developers in coastal municipalities is to anticipate the cumulative impacts caused by their decisions beyond a political election cycle. After all, these decisions eventually define a current administration's legacy and commitment to the future.

It is estimated that by 2050, 91% of the world's coastlines will be affected by development. Today, some 80% of ocean pollution originates from land-based activities.

The CRTR Program's Connectivity Working Group (CWG) advises that coastal development is a continuous process – one that needs to be managed to ensure continuity of ecosystem processes. 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.

New challenges will soon be layered onto unresolved problems involving coastal habitats, including sea-level rise, ocean acidification and additional growth in coastal populations.

Independent research into the condition of nursery habitats and movement routes for coastal animals, above and below the ocean surface, is paramount to helping guide policy decisions. Photo: Annick Cros

In this time of major coastal change, individuals, businesses, recreational and commercial users, academics and agencies can all assist in improved planning and management of coastal development. The need to fully apply objective science is paramount to help in guiding policy decisions for the benefit of all stake-holder groups. This requires thinking and acting on longer-term time scales.

Earth lights -This photograph of the earth at night reveals how much of the world's population lives near and relies upon coastal regions. Burgeoning populations and increased resource use and transformation pose a threat to the health of coastal habitats. Source: C. Mayhew & R. Simmon. simmon@climate.gsfc.nasa.gov NASA http://www.nasa.gov GSFC http://www.gsfc.nasa.gov

What planners can do, today

It's smart business for town planners and elected officials to conserve coastal marine ecosystems because of the economic activity they support.

Developing countries with coral reefs, especially those located in Latin America, the Caribbean and East Africa, typically generate more than 50% of GDP from coastal marine environments.

By balancing profits and long-term conservation, the economic production generated by commercial fishing, coastal tourism, shipping and recreation is compounded over time.

Significant steps to achieve more sustainable management of coastlines include:

- Anticipate, and plan for, changes in coastal habitats on five- to 20-year time scales, not on scales of 2-3 years.
- Anticipate cumulative impacts – coastal development is a continuous process and negative impacts can build up over time, leading to profound changes in the condition of the coastal environment.
- Provide incentives so that coastal tourism, fisheries and other coastal enterprises adopt sustainable business practices.
- Ensure all coastal stakeholders, particularly the resident water-users, are involved publicly when making decisions about coastal development.
- Avoid urban sprawl by applying strict zoning rules to land use plans; strengthen and rigorously enforce regulations governing coastal development.
- Adopt best practices in waste management to reduce coastal pollution, and maintain and improve water quality.
- Acquire objective and comprehensive environmental assessments for coastal development proposals.
- Use independent environmental experts to evaluate complex proposals for coastal development.

By balancing profits and long term conservation, the economic production generated by commercial fishing and coastal recreation is compounded over time. Photo: G. Dews

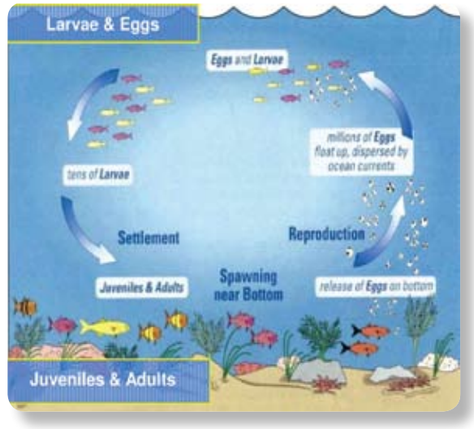
Cause and effect: it's inevitable along a coastline

Remarkable connections exist among animals and habitats, and are an indelible part of the life cycle.

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 most fish, lobsters, and shrimp need access to certain near-shore habitats, and many move from one habitat to another as they grow towards adulthood.



By conserving natural habitat, and the pathways between habitats, 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 connected by the flows of nutrients, sediments and water.

A mangrove, seagrass or reef habitat can be seriously damaged through coastal developments 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.

Healthy natural habitats provide shoreline protection, water quality maintenance, nursery habitats for fisheries, destinations for tourists, and a healthy lifestyle for coastal residents.

Long-term thinking required

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Coastal growth: calculating the long-term costs

Many coastal areas of developing countries are dominated by "sun and sand" tourism with a focus on rapid and speculative coastal growth.

For example, Cancún, on the tip of the Yucatan Peninsula in north-east México, represents some of the most concentrated tourism in the world, processing five 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.

Tourist precinct, Playa del Carmen. Photo: M Paterson

Development increases demands for water, and produces millions of gallons of waste that must go somewhere – frequently into underground freshwater river systems and via these to the ocean. The less obvious impacts from runoff – pollution, chronic turbidity on coral reefs and disruption to food webs – can also cascade into deeper waters.

The overall result is slow and steady destruction of important coastal habitats. Over time, such habitat changes reduce fishery production, disrupt or destroy connections among habitats, and diminish coastal protection (a service that grows in value as climate change brings more severe storms and rising sea levels).

Coastal development projects in developing countries often 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 of inappropriate development in lost ecosystem goods and services, inefficient allocation of tax revenue, degraded local culture, and other neglected impacts are estimated to be far greater.

South of Cancún is the town of Puerto Morelos, home to 15,000 inhabitants. There are plans to develop Puerto Morelos into a city with 250,000 people and to develop a large harbour for cruiseliners.

As a result of these plans, there are two immediate challenges:

- Puerto Morelos has coastal reef, mangrove and jungle ecosystems to sustain for the future (the reef is actually a Marine Protected Area); and
- Puerto Morelos lacks basic social services (security, waste disposal services, water treatment plants, etc.) and unplanned development will cause social problems like poverty and violence, much like what has happened in Cancún and Playa del Carmen.

How government officials and investors treat the fragility and importance (in ecological, economic and structural terms) of the township will determine the long-term prosperity of its people.

Coastal management - not just about controlling development

While protecting coastal connectivity is an important principle when evaluating proposed developments, guarding against inappropriate development is not sufficient by itself to ensure the sustainability of coastal ecosystems.

It is necessary, also, to:

a) Manage fisheries appropriately by rigorously limiting catch, preventing fishing at critical sites or at times when fish are spawning, and preventing use of inappropriate methods such as blast fishing, trawling, and use of nondegradable nets.
Note: It is estimated by the Food and Agriculture Organisation that almost 70% of global fishery stocks are either "fully-" or "over-" exploited.

b) Minimize pollution of coastal waters by rigorously controlling release to the environment of wastes, including pesticides, pharmaceuticals and other novel chemicals, and by foregoing deep-well injection technologies as a solution to waste disposal in coastal regions.
Note: Outside of Europe and North America, more than 80% of sewage enters the coastal ocean untreated.

c) Build public awareness among coastal communities of the long-term economic and noneconomic value of sustainably-managed coastal environments.
Note: 40% of all people on the planet live with 50 kilometres of a coast and the world's enthusiasm for coastal living is creating ever more environmental damage.