



NEWS & ANNOUNCEMENTS

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

Executive Summary: Coastal Zones and Small Islands

Coastal zones and small islands are characterized by highly diverse ecosystems that are important as a source of food and as habitat for many species. They also support a variety of economic activities—which, in many places, has led to a high rate of population growth and economic development. Many studies indicate that overexploitation of resources, pollution, sediment starvation, and urbanization have:

- Led to a decrease in the resilience of coastal systems to cope with natural climate variability (High Confidence)
- Adversely affected the natural capability of these systems to adapt to changes in climate, sea level, and human activities (High Confidence)
- Led to increased hazard potential for coastal populations, infrastructure, and investment (High Confidence).

As demands on coastal resources continue to increase with a growing population and expanding economic activity, coastal systems continue to face increasing pressures, which often lead to the degradation of these systems. In many parts of the world, for example, coastal wetlands are presently disappearing due to human activities.

Since the IPCC First Assessment Report (1990) and its supplement (1992), the interrelationships between the impacts of climate change and human activities have become better understood. Although the potential impacts of climate change by itself may not always be the largest threat to natural coastal systems, in conjunction with other stresses they can become a serious issue for coastal societies, particularly in those places where the resilience of natural coastal systems has been reduced. Taking into account the potential impacts of climate change and associated sea-level rise can assist in making future development more sustainable. A proactive approach to enhance resilience and reduce vulnerability would be beneficial to coastal zones and small islands both from an environmental and from an economic perspective. It is also in line with the recommendations of the UN Conference on Environment and Development (UNCED) Agenda 21. Failure to act expeditiously could increase future costs, reduce future options, and lead to irreversible changes.

Important findings by Working Group I that are of relevance to coastal impact assessment include the following:

- Current estimates of global sea-level rise represent a rate that is two to five times higher than what has been experienced over the last 100 years (High Confidence).
- Locally and regionally, the rate, magnitude, and direction of sea-level changes will vary substantially due to changes

in ocean conditions and vertical movements of the land (High Confidence).

- It is not possible to say if the intensity, frequency, or locations of cyclone occurrence would change in a warmer world (High Confidence).

Since 1990, there has been a large increase in research effort directed at understanding the biogeophysical effects of climate change and particularly sea-level rise on coastal zones and small islands. Studies have confirmed that low-lying deltaic and barrier coasts and low-elevation reef islands and coral atolls are especially sensitive to a rising sea level, as well as changes in rainfall, storm frequency, and intensity. Impacts could include inundation, flooding, erosion, and saline intrusion. However, it has also been shown that such responses will be highly variable among and within these areas; impacts are likely to be greatest where local environments are already under stress as a result of human activities.

Studies of natural systems have demonstrated, among other things, that:

- The coast is not a passive system but will respond dynamically to sea-level and climate changes (High Confidence).
- A range of coastal responses can be expected, depending on local circumstances and climatic conditions (High Confidence).
- In the past, estuaries and coastal wetlands could often cope with sea-level rise, although usually by migration landward. Human infrastructure, however, has diminished this possibility in many places (High Confidence).
- Survival of salt marshes and mangroves appears likely where the rate of sedimentation will approximate the rate of local sea-level rise (High Confidence).
- Generally, coral reefs have the capacity to keep pace with projected sea-level rise but may suffer from increases in seawater temperature (Medium Confidence).

The assessment of the latest scientific information regarding socioeconomic impacts of climate change on coastal zones and small islands is derived primarily from vulnerability assessments based on the IPCC Common Methodology. Since 1990, many national case studies have been completed, embracing examples of small islands, deltas, and continental shorelines from around the world. These studies mainly utilize a scenario of a 1-m rise in sea level and generally assume the present socioeconomic situation, with little or no consideration of coastal dynamics. There is concern that these studies understate nonmarket values and stress a protection-oriented response perspective. Despite these limitations, these studies provide some important insights into the socioeconomic implications of sea-level rise, including:

- Sea-level rise would have negative impacts on a number of sectors, including tourism, freshwater supply and quality, fisheries and aquaculture, agriculture, human settlements, financial services, and human health (High Confidence).
- Based on first-order estimates of population distribution, storm-surge probabilities, and existing levels of protection, more than 40 million people are estimated to experience flooding due to storm surge in an average year under present climate and sea-level conditions. Most of these people reside in the developing world. Ignoring possible adaptation and likely population growth, these numbers could roughly double or triple due to sea-level rise in the next century (Medium Confidence).
- Protection of many low-lying island states (*e.g.*, the Marshall Islands, the Maldives) and nations with large deltaic areas (*e.g.*, Bangladesh, Nigeria, Egypt, China) is likely to be very costly (High Confidence).
- Adaptation to sea-level rise and climate change will involve important tradeoffs, which could include environmental, economic, social, and cultural values (High Confidence).

Until recently, the assessment of possible response strategies focused mainly on protection. There is a need to identify better the full range of options within the adaptive response strategies: protect, accommodate, and (planned) retreat. Identifying the most appropriate options and their relative costs, and implementing these options while taking into account contemporary conditions as well as future problems such as climate change and sea-level rise, will be a great challenge in both developing and industrialized countries. It is envisaged that the most suitable range of options will vary among and within countries. An appropriate mechanism for coastal planning under these varying conditions is integrated coastal zone management. There is no single recipe for integrated coastal zone management; rather, it constitutes a portfolio of sociocultural dimensions and structural, legal, financial, economic, and institutional measures.

Integrated coastal zone management, which has already started in many coastal countries, is a continuous and evolutionary process that identifies and implements options to attain sustainable development and adaptation to climate change in coastal zones and small islands. Constraints that could hinder its successful implementation include, but are not limited to:

- Technology and human resources capability
- Financial limitations
- Cultural and social acceptability
- Political and legal frameworks.

Continued exchange of information and experience on the inclusion of climate change and sea-level rise within integrated coastal zone management at local, regional, and international levels would help to overcome some of these constraints. In addition, more research is required on the *process* of integrated coastal zone management to improve the understanding and modeling capability of the implications of climate change and sea-level rise on coastal zones and small islands, including biogeophysical effects, the local interaction

of sea-level rise with other aspects of climate change, and more complete assessment of socioeconomic and cultural impacts.

Note:

To purchase any of the volumes that comprise the IPCC Second Assessment Report, contact Cambridge University Press at 1-800-872-7423 (U.S., Canada, and Mexico), 03-568-0322 (Australia), or +44-1223-325970 (all other countries).

SECOND INDIAN NATIONAL CONFERENCE ON HARBOUR AND OCEAN ENGINEERING (INCHOE-97)

Thiruvananthapuram, 8–10 December 1997

Second Indian National Conference on Harbour and Ocean Engineering (INCHOE-97), a three day conference discussing Marine Hydrodynamics, Port Engineering and Management, Marine Structures and Materials, Dredging and Environmental Aspects, Monitoring and Instrumentation and Coastal processes and Coastal Zone Management is being organized at Thiruvananthapuram, South India. Deadline for submission of extended abstract is 31 January 1997. For more details contact: Dr. M. Baba, Organizing Secretary, INCHOE-97, Centre for Earth Science Studies, Thiruvananthapuram-695 031, India; Phone: +91-471-442453; Fax: +91-471-442280).

FishBase 96

FishBase, dubbed the electronic encyclopedia on fish, is a CD-ROM database which contains data on more than 14,000 species of fish. The biological information it offers for education and research purposes on all aspects of finfish is under continuous development at ICLARM in collaboration with the Food and Agriculture Organization of the United Nations and with support from the European Commission.

FishBase 96 is the second public release of FishBase. Annual releases will be made in the future.

Most of the species covered in the database are those important to humans, that is, in fisheries, aquaculture, game fishing or ornamental trade, or because these are under the threat of extinction. FishBase 96 contains about 3,000 color pictures of fish and other information of use to a wide audience—practically the entire fishing industry workers.

Specifically, FishBase addresses the information needs on fish for the following users:

- university teachers and students—checklists and biological information of fishes by country, by family or by human uses;
- fisheries managers—largest existing compilation of population dynamics data;
- conservationists—all threatened species for a given country as contained in the IUCN Red Book;
- research directors and funding agencies—existing knowledge for each species and research gaps;
- taxonomists—Echmeyer's compilation of all genera and higher taxa of fish;

- policymakers—chronological, annotated list of introductions to their respective countries;
- zoologists and physiologists—largest existing compilation of information on reproduction, morphology, eye pigments, gill area, etc.;
- ecologists—descriptions of preferred habitats, environmental tolerance, prey and predators, food consumptions, etc.;
- aquaculturists—information on gene traits and on culture experiments;
- sports fishers—the occurrence and maximum size of game fishes by country.

JCR Photography by A.W. "Sam" Smith
Broadbeach waters, Queensland, Australia

An Inshore Shallow High Tide Trough and Wave Set-Up Escape Channel Completely Exposed at Low Water. The high tide beach is on the left, the trough is in the photo centre, and the high tide bar on the right. The escape rip channel from the trough is to the right and just behind the photographer. The scale, central in the trough, is 150 mm long.

Note the highly complex 3D ripple pattern in the trough together with the ripple density. These ripples only occur on the Gold Coast in inshore troughs where there is a longitudinal current and broken wave bores flowing over the bar, across the trough and onto the beach. Neither process, on its own, can produce 3D ripples; both processes must be active at the same time. However, in terms of the ripples themselves, the broken bores are the dominant forcing function, as shown by the interlocking barchan ripple pattern matching the broken bore transport from right to left in the photo. Note also the crisp sharp pointed crests of the barchans at right angles to the bore flow, but apparently completely unaffected by the trough escape head flow, which flows from top to bottom of the photo, and then later out to the right. The trough was mirror imaged behind the photographer, into the one central rip escape channel.

A very real feature of this class of 3D trough ripple, that does not show on the photograph, is that the ripple sand density is extremely low. When you try to walk up to the centre of the trough, even when exposed as in the photo, you usually sink 150 to 200 mm into the sand, and when the trough is still under water, you can sink up to 300 mm or more. It can in fact be rather frightening trying to walk along the trough at any time. Most people don't, but our photo was taken at 0600h in this case; it is so early that only one beach walker is visible. As usual, the actual mechanisms that built these extremely soft, complex, and tightly packed ripples remain unknown.

