India has been identified as one among the most vulnerable countries to the impacts of global warming related accelerated sea level rise. This is mainly due to the extensive low-lying coastal area, high and increasing population density, frequent occurrence of cyclonic storms, high rate of coastal environmental degradation due to pollution and non-sustainable development. Possible global warming and change in regional climate may be reflected in sea surface temperature, frequency, intensity and tracks of storms, and sea level. Rise in sea level could result in the loss of rich cultivable land due to inundation, saltwater intrusion into coastal ecosystems and into groundwater systems and damage to coastal biodiversity. Though the 11 major and 130 minor ports and numerous fishing harbours located in the coastal zones are economically very important, they add a lot to the degradation of coastal environment through ballasting and introduction of invasive species and releasing of grease, oil and solid wastes. Increasing number of factories pollute the coastal freshwater resources. Coastal aquaculture invites saltwater intrusion far inland. Overdraft of groundwater in coastal zones has permanently degraded the groundwater in of some of the States. Sand quarrying, construction of buildings and unscientific coastal protection walls have impact on both land and water resources. Rivers joining the coastal seas and backwaters carry tremendous loads of domestic wastes and industrial pollutants. Agricultural development release pesticides and fertilizers into the water far above permissible limits. East and west coasts are vulnerable to severe tropical storms. Storms of various intensities hit the coasts almost every year, causing casualties and widespread damage. Rules and regulations at the national and state levels to protect the coastal zones and the coastal resources become farce because of various political, financial and social reasons. Government machinery is often slow and without coordination among different departments involved. Coastal zones are becoming more and more environmentally significant, as life and economy of the country are largely dependent on it and increasing population, urbanization, industrialization and agricultural expansion are posing threat to it, making sustainable management a challenging issue. This paper is an assessment of the environmental significance of the coastal zones of India in the changing scenarios of population, environment, economy and politics. A review of existing coastal zone regulation act, constitutional provisions, efficiency of the institutional mechanism in the implementation of regulations and various social issues in the coastal zones in view of the new trends associated with globalisation have been made. Suggestions for effective implementation of the coastal protection strategies and adaptation measures have been provided.

Ecohydrology - The interplay between biota and hydrology for the sustainable ecologic functioning of estuarine and marine areas in south-eastern Portugal

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The Ecohydrology approach applied to estuaries and coastal areas is based on the interplay between hydrology and biota, which can be tuned for restoring, improving and sustaining water quality and ecosystem functions. This approach considers the entire river basin and its ecologic and hydrologic processes as a template for the implementation of integrated solutions. The Guadiana estuary and adjacent coast, in the south east of Portugal, have been used for developing and testing ecohydrologic solutions and approaches. This area has been affected by the construction of the largest dam in Europe, the Alqueva dam, completed in 2002. Changes in ecosystems functions and associated uses by human populations were observed, particularly in terms of estuarine nursery functions and coastal fisheries. We propose several solutions based on the dual regulation hydrology-biota to improve water quality and to allow long term sustainable uses of estuarine and coastal resources.

Lessons learned in the development of coastal management strategy for Trat Province, Thailand

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Trat Province is located in the east of Thailand and has borders with Cambodia to the east, and the Gulf of Thailand to the south. The second biggest island of Thailand is Koh Chang, belonging to this province, together with more than 50 surrounding smaller islands, forms the popular tourist destination of Thailand. The Thai Government declared Mu Koh Chang as a special administrative zone for sustainable tourism development in 2002. An estimated 30% of the coral reef areas are within the jurisdiction of Mu Koh Chang National Park which was established in 1982. Mu Koh Chang was also selected as one of the demonstration sites for coral reef subcomponent under the UNEP/GEF Project on Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand. Pollution Control Department and relevant government agencies in consultation with local administration offices and local communities develop a management strategy for natural resource conservation, pollution control, reversing environmental degradation and best land uses in the coastal area of Trat Province. Based on the root cause analysis, the main environmental problems are solid waste, wastewater, coastal erosion, sediment load from coastal development, inappropriate land use in coastal area, unsustainable fisheries, inappropriate tourism activities and oil spill. The natural resources degradation includes coral reefs, seagrass beds, mangroves, terrestrial forest, sandy beaches, endangered species and fishery resources. Five management policies are proposed, i.e., solid waste management, wastewater management, land use management, coastal and marine resources management and sustainable tourism practices. Each management policy consists of five measures. i.e., scientific research support, promoting knowledge to support effective management of natural resources and environment, coordination and participation of relevant agencies, raising public awareness, improvement of laws and regulations for effective management, financial support for management and monitoring and evaluation. Under each proposed measure, there are projects/activities, priority, key agencies, supporting agencies, budget, key performance indicator (KPI) and status. There is a total of 245 proposed projects and needs about seventy million USD for implementation. Long-term financial support and better coordination among government agencies and stakeholders are important factors for sustainable use of coastal resources in the area.

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Social responsibility, awareness and participation of local communities are key to effective CZM: a case study in Orissa, East Coast of India

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Fishers, fishing households and fishing communities worldwide are not homogeneous. Each location has its unique social and ecological context that needs to be considered for implementation of coastal zone management (CZM) and awareness programmes and their impact assessment. Coastal communities in many locations around the world face a growing degree of insecurity as a result of poverty and high dependence upon natural resources. This vulnerability is often compounded by declining resources, high population growth, limited alternative livelihoods, limited access to land, economic and political marginalization, unsustainable land use practices and development, competition and conflicts over resources, health burdens, and civil strife. In Orissa, a state along east coast of India, some villages along the shore are situated a few meters (< 2 m) above mean sea level(MSL) in the Kendrapara district and are frequently prone to the fury of tidal waves causing erosion and sea water intrusion. As a result, most of the agricultural fields are lost due to sand filling and saline intrusion. In two villages, Satabhaya and Pentha, people mostly depend on marine fishery and agriculture. However, due to severe coastal erosion and seawater intrusion, the life and property of these coastal people and the communities are at stake. The major problems faced by these people are; i) Constant shifting of households, ii) shifting of livelihoods, iii) loss of