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Predicting Ecological Impacts of Sea-Level Change on Coastal Conservation Areas in India

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Abstract : In addition to the mounting empirical data on direct implications of climate change for natural and human systems, evidence is increasing for other, indirect climate change phenomena such as sea-level rise. Rising sea levels and associated marine intrusion into terrestrial environments are predicted to be among the most serious eventual consequences of climate change. The many complex and interacting factors affecting sea levels create considerable uncertainty in sea-level rise projections: conservative estimates are on the order of 0.5-1.0 m globally, while other estimates are much higher, approaching 6 m. Marine intrusion associated with 1– 6 m sea-level rise will impact species and habitats in coastal ecosystems severely. Examining areas most vulnerable to such impacts may allow design of appropriate adaptation and mitigation strategies. We present an overview of potential effects of 1 and 6 m sea level rise for coastal conservation areas in the Indian Subcontinent. In particular, we examine the projected magnitude of areal losses in relevant biogeographic zones, ecoregions, protected areas (PAs), and Important Bird Areas (IBAs). In addition, we provide a more detailed and quantitative analysis of likely effects of marine intrusion on 22 coastal PAs and IBAs that provide critical habitat for birds in the form of breeding areas, migratory stopover sites, and overwintering habitats. Several coastal PAs and IBAs are predicted to experience higher than 50% losses to marine intrusion. We explore consequences of such inundation levels on species and habitat in these areas.

Keywords : sea-level change, coastal inundation, marine intrusion, biogeographic zones, ecoregions, protected areas, important bird areas, adaptation, mitigation
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