



Editorial

Vulnerability of inter-tropical littoral areas. Preface



The coastal area is defined as the interface between land and sea. It is a transition zone where land is affected by its proximity to the sea, and the coastal sea is affected by its proximity to the land. Its components are diverse and include river deltas, coastal plains, wetlands, beaches and dunes, reefs, mangrove forests, lagoons, and other coastal features. Coastal areas contribute to a small proportion of the total land area in the Earth system, but they provide a wide variety of ecosystem services (e.g., food through fish production, sand mining, flooding and erosion protection, recreational benefits, etc.) and are home to a large and growing proportion of the world's population.

According to the Intergovernmental Oceanographic Commission of UNESCO¹, more than 40% of the world's population presently live within 100 kilometres from the coast. Thirteen of the world's twenty megacities lie along coasts, and rapid urbanisation will lead to more coastal megacities in the future, especially in developing countries. In North Africa, the Nile Delta is one of the most densely populated areas of the world, while in West Africa the 500 kilometres of coastline between Accra (Ghana) and the Niger delta (Nigeria) are expected to become a continuous urban megalopolis of more than 50 million inhabitants by 2020. This strong population growth has been accompanied by an increased level of economic activity, not only in the fisheries and aquaculture sector, which contributes to feed the cities and helps them ensure their food security, but also in the tourist sector, which represents one of the fastest growing sectors of the global economy. Port and maritime transport also provide jobs and economic benefits, and access to ocean navigation is a factor of attraction for many industrial complexes and plants that are generally more concentrated in coastal areas than elsewhere. In addition to their economic contribution, coastal areas are of major social and cultural significance to the communities that have been inhabiting

and using them for millennia. The aesthetic and historical value of coastal landscapes in particular are often regarded as elements of the non-physical ecosystem services that local communities and tourists derive from this environment.

Yet, as population density and economic activity increase, so do pressures on coastal ecosystems. Among the most important pressures are habitat conversion, land cover change through broad-scale clearing, pollution, dams and water extraction, introduction of invasive species, etc. These changes can have many unintended and sometimes detrimental consequences, including loss of terrestrial and marine biodiversity, new diseases, reduced water quality, siltation, soil salinization, etc. Those human-induced threats are exacerbated by the vulnerability of coastal areas to natural hazards. Most of the very large earthquakes occur along subduction zones strongly affecting coastal areas and islands located nearby. Coastal areas, especially low-lying ones, are also sensitive to subsidence and ocean-related extreme events, including tsunamis, floods, and tropical cyclones, which deeply damage coastal habitats and result in loss of ecosystem services. Small Island Developing States (SIDS) are among the most vulnerable nations to climate change and coastal degradation.

The adverse consequences of anthropogenic pressures and natural hazards raise concerns about the sustainability of present-day coastal development and trends, especially in developing countries where coastal vulnerability is higher and resources and adaptive capacity are lower. This requires, in particular, a delicate balance between the need for economic and social development through the use of coastal areas and their resources, and the need to conserve and manage those resources in a sustainable manner. In some given contexts, however, preserving key ecosystem services provided by coastal areas or restoring altered ones through mitigation or adaptation programs represents a challenge. This explains why the sustainable management and protection of marine and coastal ecosystems consti-

¹ IOC/UNESCO, IMO, FAO, UNDP, 2011. A Blueprint for Ocean and Coastal Sustainability, IOC/UNESCO, Paris.

tute an integral part of the core commitments that the international community has made through the adoption of SDG14 (sustainable development goal “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”). Progress towards the realisation of SDG14’s main goals calls for more scientifically-based knowledge to better assess coastal vulnerability and identify cost-effective solutions that help conserve habitats, protect coastlines, and prevent risks. As an illustration, nature-based solutions have been found to increase coastal resilience by protecting communities against extreme events such as storms and stabilize shorelines against erosion. As part of this effort, IRD, the French National Research Institute for Sustainable Development, has recently initiated an interdisciplinary scientific program on coastal areas with its partners from the intertropical and Mediterranean regions. The aim of this program is to provide insights on some of the following questions: What are the main forcing factors of coastal erosion or degradation? Anthropogenic actions? Climate? How can the exploitation versus conservation dilemma be solved? Which hazards are likely to increase, remain stable or decrease in the next decades? Are ongoing changes bringing new and promising opportunities?

Bringing together contributions from researchers belonging to a wide range of disciplines and from different national and international research institutes and groups, this special issue provides an overview of recent research and analyses conducted on coastal areas characterized by highly vulnerable ecosystems (e.g., mangroves, coral reefs) and communities. The focus is on the intertropical zone, as most countries in this area are developing countries in which coastal zones are particularly vulnerable.

Philippe Charvis*

IRD, Department DISCO (*Dynamiques internes et de surface des continents*), Géoazur (Université Côte d’Azur, IRD, CNRS, OCA), 06560 Sophia-Antipolis, France

Flore Gubert

IRD, Department SOC (*Sociétés et Mondialisation*), DIAL (Université Paris-Dauphine, IRD), 75775 Paris, France

Frédéric Ménard

IRD, Département “OCEANS” (*Océans, climat et ressources*), MIO (Aix Marseille Université, Université de Toulon, CNRS, IRD), 13288 Marseille, France

*Corresponding author.

E-mail address: philippe.charvis@ird.fr
(P. Charvis).