Summary of practice related to sea-level rise

l. Ministry of Energy Transition and Sustainable Development

The Moroccan coastal ecosystem is suffering the effects of climate change, in particular sea-level rise, which has several consequences for biodiversity and biological productivity. Climate change-induced sea-level rise is affecting coastal systems. The average rate of sea-level rise of 1 to 1.7 mm per year would be sufficient to explain the general trend towards coastal erosion, especially the erosion of beaches and low cliffs comprising unconsolidated material.

Climate change is also expected to have a growing impact on coastal zones owing to coastal erosion processes that are already affecting two thirds of Moroccan beaches. Rising sea levels will aggravate and amplify these processes, causing the coastlines to retreat. Sand beaches that are still in their natural state may retreat by as much as 15 m by 2030.

As far back as 1993 and 1994, the Ministry of Infrastructure found that of the 47 documented beaches along the country's Mediterranean coast, 7 had already disappeared and 16 were in a state of severe degradation. More recent studies have shown that still more beaches are under threat and that those beaches that were already subject to erosion have further eroded.

Two instruments – a law and a regulation – have been adopted in an effort to ensure the sustainable development of the national coastline: Act 81-12 on the coastline, published in Official Gazette No. 6404 on 15 October 2015, and Decree No. 2-15-769, published in Official Gazette No. 6428 on 7 January 2016, addressed the composition, mandates and operational aspects of the national and regional commissions for integrated coastal management and the development of the national coastal management plan and the regional coastal schemes.

In line with these two instruments, the Department of Sustainable Development launched a national coastal management plan that is aimed at ensuring the sustainable development of the coastline through conservation, protection and development, based on an ecosystem approach and integrated coastal zone management.

The regional coastal schemes are aimed at improving integration and development of the coastline and at furthering coastal preservation and management. The protection of the environment is given priority and special attention is accorded to the use made of each coastal zone. The schemes serve as a point of reference for integrated coastal zone management.

In the development of the regional coastal schemes, attention will be given to the issue of sea-level rise, with a view to minimizing as far as possible its impact on the environment and socioeconomic activity. Other legal instruments that address climate change and coastal degradation include:

1. Framework Act No. 99-12 on the National Charter for the Environment and Sustainable Development:

- Articles 6 and 7 provide for the adoption of legislative, institutional, economic, financial and other measures aimed at bolstering efforts to combat air pollution and adapt to the changing climate.

- Article 8 provides for the introduction of rules aimed at preventing and managing natural and technological hazards.

2. Act No. 11-03 on environmental protection and development:

- Articles 33 and 35 provide for the introduction of legislative and regulatory measures aimed at discontinuing activity that can affect water quality and marine resources, thereby ensuring integrated and sustainable management of the coastal ecosystem.

- Article 5 sets out a procedure for drafting emergency response plans to be used in the event of disasters and crisis situations.

Lastly, a draft bill on climate change currently under review would provide for the development of a national adaptation plan that would specify the measures to be taken to ensure successful adaptation to the changes brought about by global warming.

2. Ministry of Infrastructure and Water

1. Coastal erosion data

The Ministry of the Interior, as part of its priority action plan for the period 2020–2023 and its national natural disaster risk management strategy for the period 2020–2030, is working on a map of all Moroccan coastal regions showing their vulnerability to natural threats and to accidental marine pollution. The purpose of this study is to develop a method for identifying areas along the Moroccan coastline that are vulnerable to erosion, silting or inundation. Both environmental and socioeconomic factors are taken into account to assist in the selection and prioritization of response measures.

In phase 1 of the study, areas that are particularly vulnerable to the aforementioned threats will be identified, while in phase 2, digital models will be used to forecast how those threats might evolve. In phase 3, vulnerability maps will be drawn up, and in phase 4, preventive measures and measures to protect the coastline against natural threats and accidental marine pollution will be proposed.

The study was launched in 2019 and is currently at the phase 1 validation stage in all regions. The findings will enable an assessment of the extent of the aforementioned threats to the Moroccan coast, in particular erosion, and will serve as the basis for coastal protection and threat prevention programmes, including in-depth studies and protection measures to be carried out jointly with all stakeholders.

2. Coastline monitoring data

As part of coastline monitoring, public maritime areas are being monitored through space-based remote sensing that tracks changes to the coastline and land use in those areas using very high-resolution satellite images. The project covers the following regions: Rabat-Salé-Kénitra (60 per cent), Dakhla-Oued Eddahab (50 per cent), Tanger-Tétouan-Al Hoceima (1.5 per cent) and Marrakech-Safi (15 per cent). The region of Casablanca-Settat is in the process of signing on to the project, which will also include the rest of the coastal regions starting in 2022.

3. Protection of coastal areas against erosion and rising sea levels

Several projects aimed at protecting the coast against erosion are under way in a number of regions in the Kingdom. The main projects concern the coast of Jebha, at a cost of 80,000,000 Moroccan dirhams (MAD); Larache, MAD 70,000,000; Jorf Amouni (Safi), MAD 109,000,000; and Foum l'Oued (Laayoune) (section 1, completed, MAD 54,500,000; section 2, MAD 120,000,000).

4. Incorporating climate change into port and maritime projects

In the absence of national regulations, the following international guidance relating to climate change is taken into account when calculating water levels in connection with the design of harbour and maritime infrastructure projects, including:

- the 2011 World Bank report on climate change adaptation and natural disasters preparedness in the coastal cities of North Africa

- Reports of the Intergovernmental Panel on Climate Change

- Reports of the French General Directorate for Energy and Climate, in particular *Le climat de le France au XXIe siècle*, vol. 5, *Changement climatique et niveau de la mer: de la planète aux côtes françaises*, February 2015

In the context of port projects in Morocco, the increase in water levels is thus estimated at 0.5 to 0.6 m.

5. Tidal monitoring stations

Several tide gauges have been installed in the Kingdom's main ports through a joint effort by the members of the national coordinating committee for hydrography, oceanography and marine cartography headed by the Royal Navy. These monitoring stations will be permanent and will enable the collection of tidal data and the monitoring of changes in this key parameter.