



## Sustainable oceans and coasts: Lessons learnt from Eastern and Western Africa



S. Diop<sup>a,\*</sup>, P.A. Scheren<sup>b</sup>

<sup>a</sup> *Universite Cheikh Anta Diop de Dakar and Academy of Sciences of Senegal, B.P. 5346, Dakar-Fann, Senegal*

<sup>b</sup> *Worldwide Fund for Nature (WWF), P.O. Box 63117, Dar es Salaam, Tanzania*

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### ABSTRACT

Marine and coastal ecosystems in Africa provide valuable cultural (recreational, spiritual), provisioning (such as food, timber and firewood) and regulatory (such as flood protection and climate regulation) services that are not only at the core of coastal ecosystem functioning, but are also an important basis for the economic livelihoods of over 120 million inhabitants living along the continent's coastal zone. However, these valuable ecosystems are being subjected to a range of human pressures, including overfishing and destructive fishing practices, pollution, including excess nutrients (causing eutrophication), loss and degradation of habitats, physical shoreline changes and disturbance of the hydrological regimes of rivers and estuarine systems, aggravated further by the effects of climate change. The effects of these pressures, often acting in cumulative and synergistic manners, readily affect the overall stability of the coastal ecosystems, threatening their resilience over the short- and long-term. This chapter highlights the challenges faced by the coastal states of Eastern and Western Africa in managing their coastal and marine resources for the sustainable benefits of their populations. Current mechanisms for the governance and management of the coastal and marine environment at national to regional scales are reviewed, and their effectiveness appraised, and recommendations for improved management and scientific support are made.

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### 1. Introduction

The coastal and marine environment of Eastern and Western Africa is of high ecological and socioeconomic significance. Its coastal habitats, including coastal forests, sand dunes, beaches, rocky shores, mangroves, seagrass beds and coral reefs, support rich and complex populations of marine species, their diverse ecosystems providing invaluable goods and services to the growing population of the continent. As an example, the direct benefits obtained from coastal goods and services in South Africa, the largest economy in southern Africa, are estimated to be equivalent to approximately 35% of its gross domestic product (DEAT, 2000). The dominant economic activities dependent on these environmental resources include fishing, tourism, and mineral and oil and gas extraction. However, as Africa's coastal populations and the associated demands for its coastal and marine resources continue

to grow, so do the pressures on these valuable ecosystems (Diop et al., 2011, 2014, 2016).

Africa's coasts host most of its major cities, harbours, industries, and other development infrastructure. Unfortunately, the pressures associated with these developments are increasingly threatening the integrity of its coastal and marine ecosystems, including the related livelihood opportunities (Diop, 1990; Diop et al., 2014, 2016).

In addition to these direct anthropogenic pressures, climate change is increasingly affecting the integrity of these ecosystems. In Eastern Africa, for example, unusually high sea-surface temperatures in 1998 caused large-scale coral mortality by bleaching (Sheppard, 2003; McClanahan et al., 2005; Obura, 2005; Graham et al., 2006). The upward global trend in sea level may further aggravate the problems of coastal erosion and flooding, with impacts on coastal settlements and infrastructure, as well as coastal habitats such as mangrove forests (UNEP/Nairobi Convention Secretariat and WIOMSA, 2009). Small island developing states (SIDS) are particularly vulnerable to these impacts of climate change (Mimura et al., 2007).

\* Corresponding author.

E-mail addresses: [sal-fatd@orange.sn](mailto:sal-fatd@orange.sn), [esalifdiop@gmail.com](mailto:esalifdiop@gmail.com) (S. Diop), [pscheren@wwf.panda.org](mailto:pscheren@wwf.panda.org) (P.A. Scheren).

The degradation of the coastal and marine environment of Africa has become increasingly acute during the past 50 years, due to a combination of rapid population growth and urbanization, natural disasters, poverty, and the pressures of overfishing and economic development at local to global scales (Arthurton et al., 2006). Thus, the protection and restoration of Africa's coastal and marine ecosystems and their services are crucial to securing the long-term benefits of these resources at both global and local scales.

## 2. Current status and main challenges

### 2.1. Endowments and opportunities

The Eastern and Western African coastal regions are important in that a large human population depends greatly on the goods and services provided by the coastal and marine environment (Van der Elst and Salm, 1998; Van der Elst et al., 2005). The current population of all the coastal countries in the East and Western regions is close to 600 million (United Nations Population Division, 2008), with more than 120 million residing within the coastal zone.

The direct and indirect benefits accruing from the goods and services provided by the coastal and marine environment are substantial. Dependence on a healthy coastal and marine environment is most prominent in the SIDS, including Cape Verde, São Tomé and Príncipe, Comoros, Seychelles, and Mauritius.

#### 2.1.1. Fisheries resources

The marine waters of the Eastern and Western African regions support important fisheries, notably in locations exhibiting perennial or seasonal upwellings of nutrient-rich ocean bottom waters (Plate 1). The fisheries-related endowments also reflect the specific physical character of the coastal zone, including the extent of the continental shelf, the abundance of freshwater discharged by rivers or as submarine groundwater seepage, the existence of coastal wetlands, and the distribution of coral reefs. Few countries have so far seized the opportunities of aquaculture, although considerable potential exists across the region (MA, 2005). For sub-Saharan Africa, it is estimated that less than 5% of this potential has been utilized, contributing less than 0.2% to world aquaculture production (UNEP, 2005a).

Because of the upwelling of nutrient-rich bottom waters, the Canary Current Large Marine Ecosystem (CCLME) and the Benguela Current Large Marine Ecosystem (BCLME) (See Fig. 1) are highly



Plate 1. Fisheries has a key place in the economies and communities of the region.

productive ecosystems, with productivity greater than  $300 \text{ g C m}^{-2} \text{ yr}^{-1}$  (UNDP, 1999, 2002; UNEP, 2005b, 2005c), supporting diverse marine fisheries resources (Diop et al., 2011). During the 1950–2002 period, the 22 bordering coastal states and 47 distant-water fishing nations reported nearly 190 species or groups of species in the commercial catches obtained in areas influenced by the Canary and Guinea currents (FAO, 2005).

On the other side of the continent, the marine waters of Eastern Africa, particularly their continental shelves, lagoons, and estuaries, are important fishing grounds for a diversity of fisheries, ranging from artisanal to industrial, and generating food, employment, and foreign exchange. The region generates approximately 4.8% of the global fish catch, equivalent to nearly 4.5 million of fish per year (FAO, 2009), and even this total is likely to be an underestimate due to underreporting of catches by some countries (Van der Elst et al., 2005). Fisheries statistics indicates an upward trend in fish catches during the period 1998–2006 period, but recent data indicates a levelling off of fish catches in the Western Indian Ocean (WIO) during the 2003–2006 period, suggesting fish production from wild stocks in the WIO may be approaching its maximum sustainable yield (UNEP/Nairobi Convention Secretariat and WIOMSA, 2009), with several commercial species, such as the yellow fin tuna, already being overfished (IOTC, 2015).

Although most of the many and diverse fisheries of the region are subject to harvesting by the coastal states, the higher-value oceanic resources are being harvested mainly through purse seining and long-lining by foreign fishing vessels from Europe and East Asia, with their transshipment and canning in the region, primarily for export (FAO, 1997). The artisanal fisheries activities in the Eastern African region are restricted to inshore areas, mostly in coastal habitats, including sandy beaches, estuaries, coral reefs, lagoons, wetlands, bays, mangrove forests, and seagrass beds (Van der Elst et al., 2005; WIOFish, 2008).

#### 2.1.2. Recreational endowments and tourism

Linked to the coastal fishery-related endowments of the region are the recreational endowments of coastal areas relevant to the tourism sector. In some countries – particularly in some SIDS – tourism, with its related service industry, is the largest employer, with the tourism economy being the largest contribution to the gross national product (GNP). The sustainability of these endowments depends on the existence of healthy biophysical systems, such as those described in previous sections, and on the maintenance of attractive amenities. Africa as a whole receives nearly 4% of all international travellers and tourists, with tourism being economically significant in more than half of the African countries (Christie and Crompton, 2001). Tourism arrivals have increased by 8% over the past 15 years in sub-Saharan Africa (World Bank, 2009).

In particular on the Eastern African coast (Plate 2), such recreational amenities as a good climate, beautiful sandy beaches, clear tropical seas, and a rich biological and cultural diversity, have long been recognized and appreciated (UNEP/GPA and WIOMSA, 2004). They represent a huge tourism potential, and currently provide an estimated US\$7 billion  $\text{yr}^{-1}$  in revenue to the region (Diop et al., 2011). Coastal tourism and associated service industries are therefore recognized as major foreign exchange earners and increasingly becoming a more important component of development (UNEP, 2006).

#### 2.1.3. Mineral resources

The endowments of minerals, oil, and gas resources in the coastal and marine environment, particularly in Western Africa, are a source of huge potential revenues for some states. The exploration and exploitation of oil and gas is important in the Gulf of Guinea, offshore Senegal and Mauritania, and Angola. During the past

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