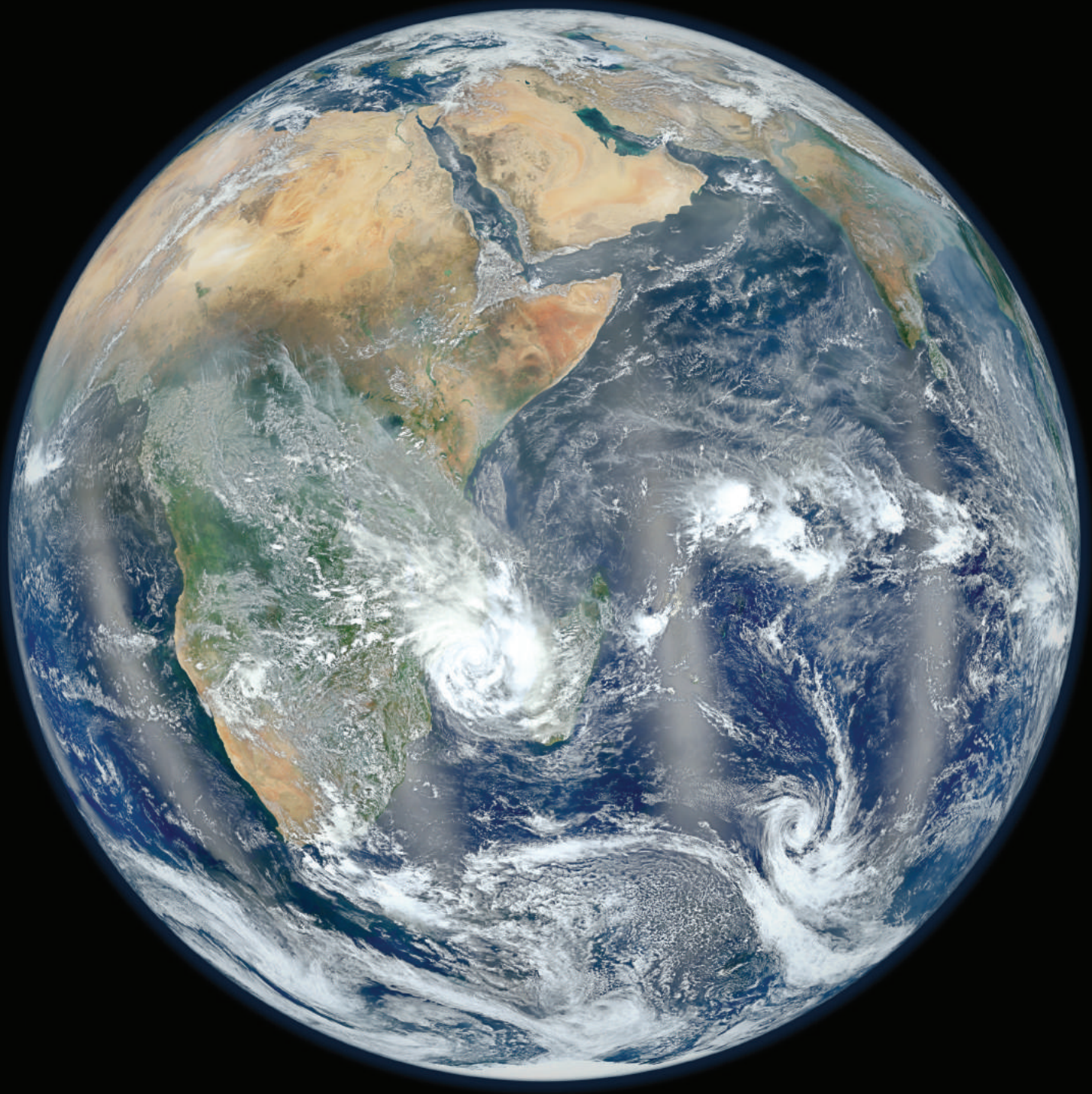

Part II

The Context of the Assessment

José Paula

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Planet: Oceans and Life

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Opposite page: The Suomi NPP blue marble planet centered on the Western Indian Ocean. © NASA/NOAA.

PART I: THE GEOPHYSICAL ENVIRONMENT AND EVOLUTIONARY HISTORY

Unique geological features of the Western Indian Ocean

The Western Indian Ocean (WIO) is construed as an area with unique and age-old geological processes (Obura and others, 2012). Bathymetric features of complex relief and diverse geological origin, in both the deep and shallow water environments, characterize the seafloor topography of the region. The features play a crucial role in influencing water flow, while clearly directing and allowing their passage in intricate pathways (Parson and Evans 2005). The constrained water flow essentially drives all marine ecosystems and species, on evolutionary and ecological scales (Obura and others, 2012). These bathymetric features have significant impacts on the meteorology, ocean circulation, flux of heat and nutrients as well as on the patterns of living marine resources.

Among the prominent features of the WIO region, the Mozambique Channel (>150 million years old) and the Mascarene Plateau (40 million years old) are globally unique, as they comprise distinct elements of the geological history of the Indian Ocean basin (Obura and others, 2012). The Mascarene Plateau, with its emergent land and small islands only at its southern extreme, forms the shallow banks of Saya de Malha, Nazareth and Cargados Carajos, comprising the arcuate collection of shoals, blocks and seamounts (Parson and Evans 2005). Unique habitats of the plateau include the largest seagrass beds in the world,

species endemism and significant aggregations of marine mammals and seabirds (Obura and others, 2012). The plateau's water flow fields, and the doming and raising of the elevation of the ocean mixed water layer, influence nutrient concentrations, which in turn affect ocean productivity (Spencer and others, 2005).

The Mozambique Channel's seafloor topography is believed to influence a highly energetic and variable regime of meso-scale eddies. These in turn affect the diversity and productivity of marine ecosystems. It is asserted that the geology (and oceanography) of the Mozambique Channel may have played a key role in driving the evolutionary dynamics of the WIO, maintaining and accumulating species in the Channel's northern area (Obura and others, 2012). It is further believed that the Mozambique Channel forms the main source of genetic diversity for the Indian Ocean (Muths and others, 2014, Obura 2012b, Samoily and others, 2014).

The coral reefs in the northern Mozambique Channel represent the world's second hotspot of tropical marine biodiversity after the Coral Triangle region (in SE Asia), but with a unique evolutionary history and genetic diversity (Obura, 2012a, Obura and others, 2012). Corals that are unique to the WIO and are of rare and ancient lineage are also found in the Mozambique Channel (Samoily and others, 2014). The open water food webs in the channel are highly productive and dynamic, resulting in concentrations of fish, marine turtles, marine mammals and seabirds (Obura and others, 2012).

Oceanographic processes

The oceanography of the WIO is driven by three distinct features arising from its geology and tectonic history: the Asian continent in the north; the island of Madagascar and the Mascarene Plateau; and the interactions of these with the equatorial and western boundary currents of the Ocean basin (Obura and others, 2012). Due to the location of Madagascar and the Mascarene Plateau in the path of the South Equatorial Current (SEC), and of the Asian monsoon system with its opposing trade winds, the WIO experiences a highly energetic and seasonally variable western boundary current system found nowhere else on the planet (Obura and others, 2012). The Asian continent drives the seasonal monsoon system that dominates the climate of this region of the globe, while Madagascar and the Mascarene Plateau interact with the currents imparting meso-scale dynamics that are unique to the ocean (Obura and others, 2012).

The main oceanic circulation processes in the WIO region are the South Equatorial Current (SEC), South Equatorial Counter Current (SECC), Somali Current, Northeast and Southeast Madagascar Current (NEMC and SEMC), East African Coastal Current (EACC), Southern Gyre, Great Whirl, Agulhas Current and associated upwelling wedges (Schott and others, 2009). The striking seasonal reversal of the Somali Current is a unique feature of the Indian Ocean. The Agulhas Current, which retroflects and meanders back into the Indian Ocean, is also one of the most dramatic oceanographic features of the WIO region (Spencer and others, 2005).

These oceanographic processes have a substantial impact on the ecology of the region, influencing the availability of nutrients and driving the productivity, distribution and abundance of phytoplankton and fisheries, through convergence/divergence and upwelling. The processes thus affect the health and productivity of the marine ecosystems, including biodiversity. Coastal currents such as the EACC for instance, are especially important as agents of larval dispersal. The currents are mainly important on inshore areas, open fringing reefs and inlets, where local currents coupled with freshwater inputs, provide the major source of food and nutrients to adjacent inshore waters. The currents mix and distribute the nearshore waters with its sediments, plankton, and other floating marine life. Seeds of many coastal plants such as mangroves also depend on currents for their dispersal. Other specialist swimmers use the currents to navigate and carry

them to reach feeding and breeding sites. The mixing of these currents also enhances oxygen availability for marine life.

Meteorological and climatic processes

The meteorology of the Indian Ocean is dominated by the seasonal cycle of the Asian and Australian monsoons, with the major reversal of the prevailing winds between winter and summer. The geography of the Indian Ocean, compared to other ocean basins, is quite unique. It is bounded to the north by Asia, the Indian Subcontinent and the Himalayan Mountain range, which exerts a profound influence on the meteorology of the region. This leads to a complex annual cycle associated with substantial seasonal reversal of the annual monsoon winds. The reversal is most pronounced over the WIO, where the strong cross-equatorial winds of the Somali Jet during the Asian summer monsoon force strong coastal upwelling and a dramatic cooling of the ocean surface temperatures (Slingo and others, 2005). Nowhere on earth is the monsoon as pronounced as over this region, where the seasonal reversal is uniquely strong and sustained (Slingo and others, 2005, Spencer and others, 2005).

Nevertheless, the East African Highlands also play a crucial role in establishing the Asian Summer Monsoon flow, in particular the Somali Jet, which has a substantial impact on the WIO. The highlands influence the climate of Africa, India and SE Asia, as well as the heat and salinity within the WIO region (Slingo and others, 2005, Spencer and others, 2005). The Highlands act to focus the monsoon winds along the coast, leading to greater upwelling and cooler sea-surface temperatures (Slingo and others, 2005).

The meteorology of the Western Indian Ocean is also strongly influenced by large-scale climatic phenomena, especially the El Niño Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD) and the Pacific Decadal Oscillation (PDO), with accompanying variations in sea level, SST, wind and precipitation anomalies (Mahongo 2014, Samoilys and others, 2014). ENSO is a system of interactions between the equatorial Pacific Ocean and the atmosphere above it. Due to asymmetry in ENSO teleconnection, El Niño induces more warming over the WIO than the associated cooling generated by La Niña (Roxy and others, 2014). Positive IOD events are generally characterized by anomalous cooling of SST in the southeastern equatorial Indian Ocean and anomalous warming of SST in the western equatorial Indian Ocean. However, IOD events are

often triggered by ENSO but can also occur independently, subject to eastern tropical preconditioning (Schott and others, 2009). The PDO is a long-term fluctuation of the Pacific Ocean that waxes and wanes between cool and warm phases in the central sub-arctic Pacific and along the North American continental shelf. This remote phenomenon imparts substantial decadal climate variability in the western Indian Ocean (Cole and others, 2000, Mahongo 2014).

At sub-seasonal timescales, the meteorology of the WIO is also characterised by significant variability, the dominant mode being associated with the Madden Julian Oscillation (MJO). This mode describes a large-scale, eastward propagating signal in the winds, convection and pressure fields on a timescale of 30-60 days (Slingo and others, 2005). It has a strong influence on both the meteorology of the Indian Ocean and the evolution of the coupled ocean-atmosphere system in the tropical Pacific (Slingo and others, 2005). As part of the planet's Warm Pool, tropical cyclone activity is an important feature of the meteorology of the WIO region. It is more pronounced during austral summer, particularly over the southwest Indian Ocean.

The growth and survival of marine organisms and plants depend on many variables such as temperature, dissolved oxygen, irradiance, calcium carbonate saturation, turbidity, sedimentation, salinity, pH, and nutrients. Consequently, some of the life forms occur only in selected areas of the world's oceans. Whereas meteorological processes can alter these variables, climate processes and extremes can influence the physiological processes responsible for their growth and survival. For instance during the 1998 ENSO event, which caused the strongest oceanic warming in recorded history, many of the coral reefs around the globe suffered high coral mortality due to bleaching, with the WIO region registering the highest mortality (Ateweberhan and McClanahan 2010). Generally, coral bleaching follows anomalously high seawater temperatures, usually interacting with high levels of irradiation.

PART II: OVERVIEW OF SOCIAL, CULTURAL AND ECONOMIC CHARACTERISTICS OF COASTAL COMMUNITIES

Introduction

The coastal communities, residents of the ten states making up the WIO region, comprise a population with a rich and varied political history, cultural heritage, tradition and

other social and economic features that together render the region a fascinating amalgam with unique challenges for coastal and marine environmental management. The recent successful exploration of oil and gas, which give the region increasing potential for social and economic growth, illustrate the pressing need for the states and people to maintain the delicate balance between environmental management and economic pursuits for people's wellbeing (PWC 2014, UNEP 2012). Pertinent issues include the region's ability to govern its resource wealth in an inclusive process to allow for poverty reduction and the achievement of the Millennium Development Goals (MDGs) among other things. This chapter makes an overview of the key social, cultural and economic characteristics of coastal communities in the WIO region that have an implication on the state of the environment, but also inform management practices.

The people of the region

The WIO region includes the dwelling sites of one of the earliest residents of Earth, evidenced by the most significant and oldest paleoanthropological finds in the world. Among these is the existence of hominids belonging to earlier species of the genus *Homo* (the same genus of modern humans – *Homo sapiens*) whose remains were found in Olduvai Gorge, Tanzania, by Dr Leakey (Morell 1995). One of these hominids was named *Homo habilis*, and its remains are dated from 1.85 to 1.6 million years ago. Traces of early people have also been found in the coastal areas of Kenya, Mozambique and on the west coast of South Africa including in the coastal caves at Klasies River from where traces of *Homo sapiens* were dated to more than 60 000 years (Sinclair and Richmond 2011).

The unique composition of the people is a development of the region's rich history of connections with the trade networks throughout the Indian Ocean and Mediterranean Sea, and colonialism since the 1st century. The multiple interactions of people from various continents, Arabia, India, Europe, China and other places who mingled and intermarried with the native residents of the region generated the current cultural and ethnic diversity of the region. For the island states, particularly Comoros, Madagascar, Mauritius, Reunion and Seychelles, the cultural diversity is even more special given their history of plantation economies, serviced by a large number of African slaves and Indian labourers. This gave rise to the development and co-existence of a multiple of traditions from heterogeneous

backgrounds. The evolution of the Creole languages in Mauritius and Madagascar for example, are strongly linked to the resistance by the largely subordinated and enslaved populations to having their traditional cultures subsumed (Selvon and Anata 2012). Similarly, along the East African coast, the Swahili language emerged between the 10th and 14th centuries as the *lingua franca* of the coastal people from southern Somali to northern Mozambique, existing alongside several other local dialects (Sinclair and Richmond 2011). Swahili remains dominant even as globalization makes an impact on the lives of coastal East Africa (Caplan and Topan 2004). Life-long endeavours associated with the ocean have given coastal people a proud sense of identity, as shown by the ‘Vezo’ people of western Madagascar who refer to the term ‘Vezo’ to identify people who struggle with the sea and live on the coast (Astuti 1995). The interaction of multiple cultures and people results in the rich and fascinating cultural heritage witnessed today, with “numerous religions, languages, architecture, farming and fishing techniques, boat building practices and other activities” of the people in this region (Sinclair and Richmond 2011).

Current Population sizes and growth

Countries in the WIO region are characterized by high

population growth rates, largely attributed to natural growth. Population densities and growth rates in the region vary, particularly between mainland countries and the island states with the exception of Madagascar. The mainland states of Kenya, Tanzania, and Mozambique including Madagascar have growth rates of above 2.0 per cent per year. South Africa, the mainland country with the largest land mass has one of the lowest growth rates (Table 1.1). The pace of population growth in the small island states, while not as significant is however posing one of the biggest challenges to the sustainability of coastal ecosystems because of the high population density and its spread into marginal, environmentally delicate areas. In Reunion for example, it is estimated that the population between 2000 and 2010 grew by 15 per cent and could likely reach over one million by 2020 (Marie and Rallu 2012). The combined population of WIO states in 2014 is estimated to be 212.6 million and expected to double by 2050 as shown in Table 1.1.

Tanzania’s population growth rate for 2014 is comparatively the highest in the region, followed by Madagascar and Mozambique, while South Africa and Mauritius are estimated to experience a decrease in population growth by the year 2050 (UN 2012). Population densities are quite high in Comoros, Mauritius and Seychelles as shown in

Table 1.1. Trends in population sizes and growth in the WIO region

S. No	Country	Size land area (km ²)	Population sizes and growth (000)								Density (km ²) *****
			1950 **	2014* (mid)	2025 **	2050 ***	Growth rates 2010 ****	Growth rates 2013*	Rank 2014 ***	Growth rates 2014 ***	
1	Comoros	2,170	.73	0.7	1.3	1.9	2.6	1.97	62	1.87	395
2	Kenya	582,650	6.2	43.2	44.9	81.3	2.7	2.27	47	2.11	78
3	Madagascar	587,040	4.2	22.4	30.7	52.8	2.8	2.65	25	2.62	39
4	Mauritius	2,040	.49	1.3	1.37	1.4	0.3	0.68	148	0.66	639
5	Mozambique	801,590	6.2	25.1	28.0	63.5	2.6	2.44	34	2.45	33
6	Reunion	2,517	.24	0.9	.91	1.0	-	-	-	-	-
7	Seychelles	455	.34	0.1	.11	0.14	0.9	0.90	129	0.87	194
8	Somalia	637,657	2.26	10.8	21.2	27.1	2.6	1.67	70	1.75	17
9	South Africa	1,219,912	13.7	53.7	43.77	64.1	1.3	-0.45	222	-0.48	44
10	Tanzania	946,087	7.88	50.8	60.4	129.4	2.9	2.82	18	2.80	56
Total			-	212.6	-	422.64					

* CIA World Factbook (2014): www.cia.gov/library/publications/resources/the-world-factbook/

** UNFPA (2002)

*** World population prospects: the 2012 revision (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2013): esa.un.org/wpp/

**** HDI Reports (UNDP 2014): hdr.undp.org/en/countries

***** World Bank (IBRD-IDA): worldbank.org/indicator/EN.POP.DNST

Table 1.1. The same is the case for the two islands of Zanzibar (Unguja and Pemba) in Tanzania where a similar high density pattern exists with an average population density of 530 people per km².

Coastal populations

The concentration of populations within coastal areas has increased due to rural-urban migration, with people attracted to the more urbanized and economic centres of the region. Nevertheless, the population density is varied among the states, where “a third of both Mozambicans and South Africans and a quarter of Tanzanians live by the coast, whereas vast tracts of coastal Somalia are almost entirely uninhabited” (Francis and Torell 2004). For the four island states, as illustrated by Table 1.2, there is virtually minimal distinction between coastal and inland populations because of their geographical sizes, except for Madagascar which has a large interior.

With the exception of Kenya, it is expected that by 2020, the mainland countries will have about 50 per cent of their populations living within the coastal zone. The rate of population growth in the Kenyan coastal province is 2.9 per cent almost equivalent to the national rate of 3.0 per cent (Government of Kenya 2009). A significant size of the population in WIO nations is concentrated in coastal urban settlements, which are often national administrative capitals (eg Mogadishu, Dar es Salaam, Maputo, Port Louis) and/or major port cities (Durban and Mombasa). Three African cities - Dar es Salaam, Khartoum and Abidjan - are projected to reach megacity status within a generation from now (UNHABITAT 2014: unhabitat.org/the-state-of-african-cities-2014/, see also Chapter 29). Durban is the sec-

ond most important manufacturing hub in South Africa (after Johannesburg) and a major centre of tourism, similar to Mombasa and Zanzibar.

The economies in the region

Between the period 2012 and 2014, economies in the WIO region demonstrated some vibrancy, albeit at different rates, gauging from the IMF’s estimated African growth of 4.3 per cent and sub-Saharan average growth of 5.5 per cent for 2013. Significant growth rates were experienced by Mozambique, Tanzania, Reunion and Kenya, with the rest having modest growth. Somalia has also shown satisfactory promise, although remains significantly affected by the persistent civil strife. The main drivers of growth reflect some similarities, with areas of significance being the extractive, construction and services sectors, the latter also related to the tourist industry. Policy reforms supporting foreign direct investments (FDI) have enhanced growth, focusing particularly on the extractive industry.

Mozambique’s economy has been one of the most dynamic in the region with a 7 per cent rate of real gross domestic product (GDP) growth in 2013 (Table 1.3) and a forecasted growth to 8 per cent for 2014 and 2015 (Almeida-Santos and others, 2014). The economy of Tanzania has also been growing at a significant rate of around 7 per cent for the year 2013 (Table 1.3), driven largely by communications, transport, financial intermediation, construction, mining, agriculture and manufacturing. The potential for further growth is seen in investments in infrastructure, efforts to stabilize power generation, fiscal reforms and the recently discovered natural gas reserves. Kenya on the

Table 1.2. Total population size versus coastal populations. Sources: UNEP (2009), CIA World Factbook (2014): www.cia.gov/library/publications/resources/the-world-factbook/.

COUNTRY	Population (mid-2014) in millions	Percentage of Population living along the coast
Comoros	0.7	100
Kenya	43.2	8
Madagascar	22.4	34
Mauritius	1.3	100
Mozambique	25.1	70
Reunion	0.9	100
Seychelles	0.1	100
Somalia	10.8	55
South Africa	53.7	40
Tanzania	50.8	25

Table 1.3. Trends in GDP Growth – 2013-2015. *Source:* Almeida-Santos and others, 2014, Charle and others, 2014, Dabire and Bi 2014, Dualeh 2014, Mpande and Kannan 2014, Odero and Reeves 2014, Phiri and Kannan 2014.

Country	Real GDP Growth			Percentage of GDP for some Sectors (2012/2013)			
	2013e	2014e	2015p	Fishing	Mining	Construction	Hotels and restaurants
Comoros	3.6	3.8	4.1	-	-	2.6	-
Kenya	4.9	5.7	5.9	0.5	0.8	4.7	0
Madagascar	2.5	3.7	5.4		0.3	3.5	-
Mauritius	3.3	3.5	4.1	-	0.3	5.5	6.6
Mozambique	7.0	8.5	8.2	1.9	2.4	3.2	1.6
Reunion	-	-	-	-	-	-	-
Seychelles	3.5	3.6	4.3	0.9		4.8	24.0
Somalia	-	-	-	-	-	-	-
South Africa	1.9	2.7	3.0	0.1	9.6	3.7	1.0
Tanzania	7.0	7.2	7.0	1.6	3.8	8.9	2.5
Africa	3.9	4.8	5.7	-	-	-	-

Key: e=estimates; p=projections.

other hand has experienced moderate growth of 4.4 per cent in 2011 and 4.2 per cent in 2012 (Odero and Reeves 2014) and was expected to reach 4.9 per cent in 2013 and 5.9 per cent in 2014 (see Table 1.3).

Economic growth in Comoros was estimated at 3.6 per cent in 2013 (Table 1.3) and driven mainly by the agricultural sector (agriculture, fisheries and forestry), representing almost half of GDP, as well as retail, tourism, construction, banking and other services (Diabate and Meddeb 2014). The extractive industry in Madagascar has supported the country's growth, which has nevertheless been slow, at 2.5 per cent in 2013 (Table 1.3) from a low of 1.9 per cent in 2012. Mauritius on the other hand experienced a slight slowdown in 2013 when real GDP growth rate slowed to 3.3 per cent (Table 1.3) from 3.4 per cent in 2012, caused by weak sugar and textile exports and a fall in construction (Phiri and Kanna 2014).

Somalia's 200 billion cubic feet (bcf) of proven gas reserves, as well as prospective oil fields in the northern zone and in the Nuggal and Dharoor basins, may eventually provide benefits to its people once peace is restored. Reunion's economy is mostly based on services (accounting for 82 per cent of added value) and secondarily on construction (9 per cent), industry (5 per cent) and agriculture (4 per cent). Over the last 40 years, the country has witnessed an annual growth rate of 5 per cent.

After a sharp collapse in GDP growth from 10.4 per cent in 2007 to -2.1 per cent in 2008, Seychelles' economy

has rebounded with a real GDP growth estimated at 3.5 per cent in 2013 (Table 1.3), up from 2.8 per cent in 2012. Growth for South Africa has been sluggish, being 1.9 per cent in 2013 (Table 1.3) compared with 2.5 per cent in 2012. However, projections based on improvements to the global economy and the successful completion of major government projects (including the Medupi Power Station) suggest that growth could rise to 2.7 per cent in 2014. Despite lower than average growth figures compared to the East African countries, South Africa was ranked 3rd out of 148 countries in terms of financial market development by the 2013/14 Global Competitiveness Report (Schwab 2013).

Coastal livelihoods and human wellbeing

Livelihoods of coastal people in the region have been evolving and changing in nature due to population changes, policy measures, global economic expansion and institutional linkages (such as to markets), resource conditions and poverty. Artisanal/small-scale fisheries is the main source of livelihood for many coastal communities. Other activities include tourism, agriculture, subsistence forestry, mariculture, small-scale mining (stone and sand quarrying, lime and salt production), petty trading, small livestock husbandry, trade in handicrafts, employment in services industry (including oil and gas production) and those associated with shipping and ports. Each activity faces general constraints due to capacity limitations, whilst reliance on the land to supplement incomes for coastal households is

being compromised because of the re-designation of land uses. This has come about due to a number of factors, including acquisition of land for tourism and large-scale economic investments such as port expansions, areas for economic promotion zones (EPZs) or large-scale plantations.

Poverty is also quite prevalent, as indicated by the performance of MDG goals, with only South Africa showing some promise. With respect to the MDG goals, many of the states in the WIO region have under-performed on most of the goals, with only Mozambique emerging as one of the three overall best performers in Africa by 2013 (UNECA 2013). Although other countries have improved their rate of progress, it has not been significant. In terms of the Human Development Index (HDI), Mauritius and Seychelles maintain the highest HDI records in the region and are ranked among those countries within the high (medium) Human Development Index level (see Table 1.4). In 2013, Seychelles was ranked 1st in terms of human development in Africa and has met most of the Millennium Development Goals (MDGs). South Africa is among those countries with medium HDIs, while the rest are among those countries with low HDIs.

The trends indicate that even though some countries registered increasing GDP rates, this does not automatically translate to high or improved HDI levels and ranking.

Gender and women's issues in the WIO region

The roles and responsibilities of men and women in the WIO region, their status and the relationship between them are evolving and responding to changing social, political and economic contexts and the opportunities or challenges confronting them. The same can be said of women's

engagement in coastal and marine resource exploitation, which varies from country to country in the region, depending on traditions, supporting policy mechanisms and infrastructure. Women's traditional areas within the fisheries (eg gleaning, small shrimp catching, octopus harvesting) have in many places become contested because of competing technologies and use of space, increase in fisher populations and the expansion of the market for certain marine species, such as octopus and lobster. The resulting intensification of resource exploitation has sometimes led to the marginalization of women from pursuing viable livelihoods (Mwaipopo 2008). In contrast, the development of alternative production systems such as farming of seaweed, sea cucumbers, pearl oysters, and of crab culture and beekeeping have provided women with alternative livelihood opportunities that they can control (Samoilys and Kanye 2008). Women are also increasingly present in coastal community based organisations (CBOs). Their involvement in these structures is seen as critical for enhancing resource management and effective participation.

Women's status in terms of general human development measured at the global level, as seen from the available Gender Inequality Index (GII) ratings of 2013, shows Mauritius and South Africa with the lowest gender inequality rates (see Table 1.5). Kenya has made some improvement in narrowing the inequality ratio between 2012 and 2013 with some achievements in reducing Maternal Mortality Rates (MMR) and Adolescent Birth Rates (ABR) and, increasing access of females to secondary education. Somalia, Mozambique and Tanzania have the highest MMR rates, the latter two dropping in their GII ratings between 2012 and 2013, as Table 1.5 illustrates.

Seychelles, South Africa, Mozambique and Tanzania

Table 1.4. Rank in Human Development Index and its components. *Source:* UNDP Human Development Reports (2014a).

HDI rank 2013	COUNTRY	HDI rank 2012	Life expectancy at birth (year) 2012	Mean years of schooling 2012	Expected years of schooling 2012	GNI per capita (2011 in US\$) 2013
159	Comoros	169	60.9	2.8	12.8	1 505
147	Kenya	145	61.7	6.3	11.0	2 158
155	Madagascar	151	64.7	5.2	10.3	1 333
63	Mauritius	80	73.6	8.5	15.6	16 777
178	Mozambique	185	50.3	3.2	9.5	1 011
-	Reunion	NA	-	-	-	-
71	Seychelles	46	73.2	9.4	11.6	24 632
-	Somalia	Na	55.1			
118	South Africa	121	56.9	9.9	13.1p	11 788
155	Tanzania	152	61.5	5.1	9.2	1 702

Table 1.5. Gender Inequality Index (GII) ranking (2013). Sources: UNDP Human Development Reports (2014b), Gender Equality Index (UNDP): hdr.undp.org/en/content/table-4-gender-inequality-index

HDI	Country	2012 GII rank	2013 GII rank	2010 MMR ratio	ABR 2010- 2015	Seats in parliament 2013	SE (F) 2005-12	SE (M) 2005-12	2012 LF part (F)	2012 LF part (M)
159	Comoros	-	-	280	51.1	3	-	-	35.0	80.2
147	Kenya	130	122	360	93.6	19.9	25.3	31.4	62.0	72.2
155	Madagascar	-	-	240	122.8	15.8	-	-	86.8	90.6
63	Mauritius	70	72	60	30.9	18.8	49.4	58	43.5	74.3
178	Mozambique	125	146	490	137.8	39.2	1.5	6.0	26.3	75.8
Nr	Reunion	-	-	-	-	-	-	-	-	-
71	Seychelles	-	-	-	56.3	43.8	66.9	66.6	-	-
Nr	Somalia			1000	110.4	13.8			37.2	75.6
118	South Africa	90	94	300	50.9	41.1	72.7	75.9	44.2	60
159	Tanzania	119	124	460	122.7	36	5.6	9.2	88.1	90.2
	SIDS	-	0.481	195	61.5	23	50.4	55.2	52.8	73.3
	SSA	-	--	474	109.7	21.7	21.9	31.9	63.6	76.3
	World	-	-	145	47.4	21.1	54.1	64.2	50.6	76.7

Key: MMR = Maternal Mortality Rate; ABR-Adolescent birth rate; SE (F) / SE (M) = Population with at least some secondary education, 25+; LF – Labour force participation rate, 15+.

have attained significant positions with respect to women’s representation in leadership. All countries have committed themselves by law and ratification to international obligations such as the Committee on the Elimination of Discrimination against Women (CEDAW), established by the UN in 1982 to protect the rights of women, albeit in nominal form because women in the region still encounter inadequate access to key livelihood services as shown.

Emerging Issues and Policy responses

Coastal communities in the WIO region are experiencing many changes arising from increasing immigration, and widespread poverty affecting sizeable portions of the population, despite its vast economic potential. These changes are leading to cultural transformations and also challenging

livelihoods. Important policy considerations include the following:

- Identifying mechanisms for preserving the positive aspects of the region’s unique cultural heritage;
- Addressing rapid population growth and the high population densities which have a deleterious impact on marine and coastal environments in the region, including unplanned urbanization, over-exploitation of marine resources, pollution, and habitat destruction;
- Up-scaling education on and family planning awareness in combination with the enhancement of livelihood options; and,
- Addressing women’s practical and strategic needs to enhance their status.

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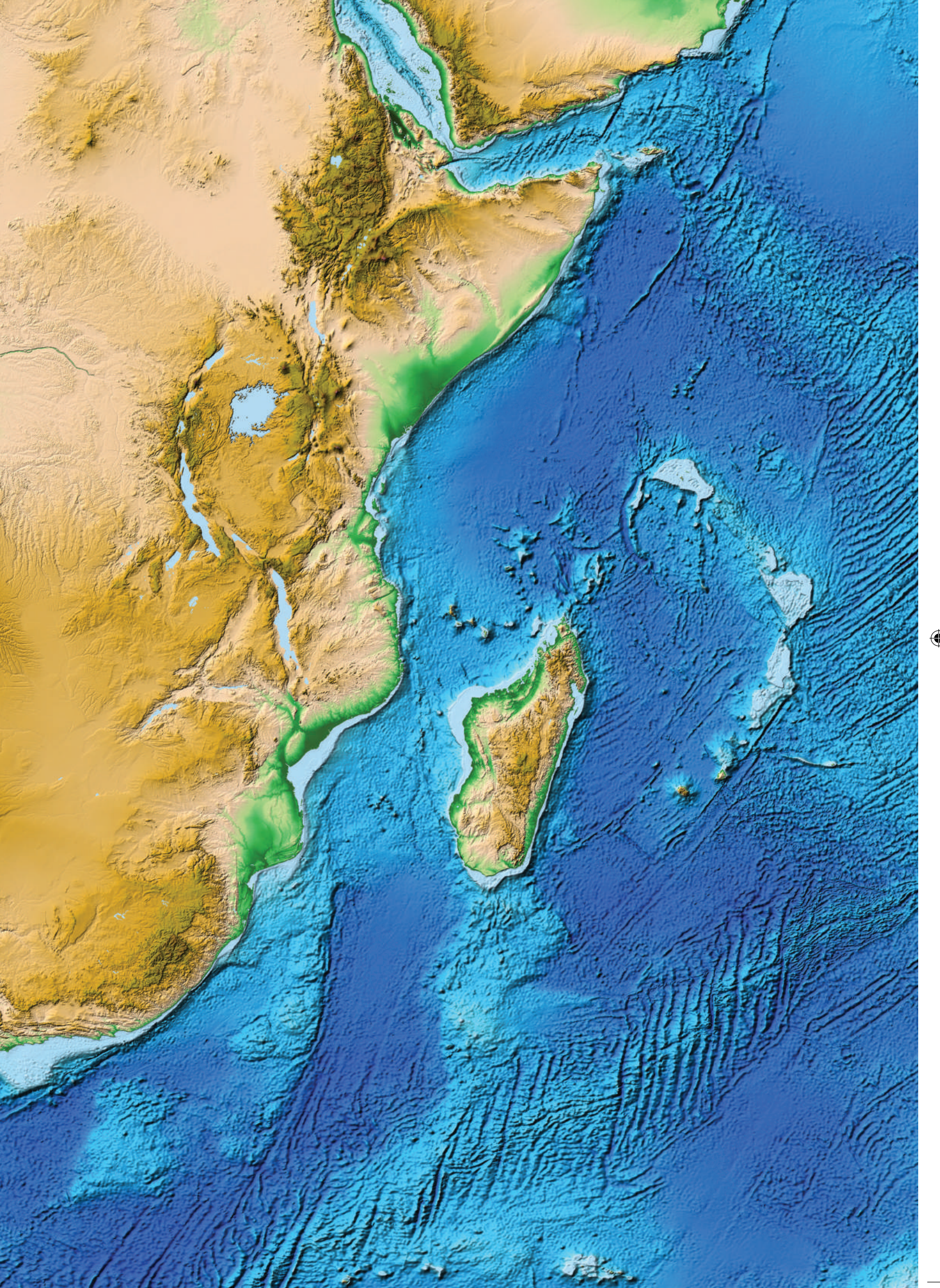
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Mandate and Methodology

Julius Francis

Opposite page: Relief model of the WIO surface that integrates land topography and ocean bathymetry. © Amante and Eakins/ National Geophysical Data Center, NOAA (2009)

The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (Nairobi Convention), comprises five mainland states (Somalia, Kenya, Tanzania, Mozambique and South Africa) and five island states (Seychelles, Comoros, Madagascar, Mauritius and France (Reunion)). The Convention provides a framework for regional cooperation in the protection, management and development of the region's marine and coastal environment, for sustainable socioeconomic growth and prosperity. Amongst others, the Convention, more specifically:

- Offers a legal framework and coordinates the efforts of the countries in the region to plan and develop programmes for strengthening their capacity to protect, manage and develop their coastal and marine environment;
- Provides a forum for inter-governmental discussions that lead to better understanding of regional environmental problems and the strategies needed to address them;
- Promotes the sharing of information and experiences amongst countries in the WIO region and with the rest of the world; and
- Facilitates the periodic assessment by the WIO countries of the state of coastal and marine environment.

The Regional State of the Coast Report (RSOCR) for the WIO is the first comprehensive report of its kind for the region. Beyond providing a good description of the coastal and marine environment of the region, the report is designed to enable the Convention Secretariat meet a stat-

tutory obligation to assess periodically the state of the environment in the region. In addition, it meets other broader obligations by providing a basis for not only understanding the environmental concerns among states and strategies required to address them, but also outlines the opportunities that can be harnessed by sharing information and experiences amongst countries and with the rest of the world. Ultimately the Regional State of the Coast Report will lead to enhanced capacities of the WIO countries to protect, manage and develop their coastal and marine environment, using the best available information.

OBJECTIVES OF THE REPORT

The first Authors' Workshop for the WIO RSOCR that was held in Maputo, Mozambique, in April 2013, amongst others things, discussed the methodology and the outline of the Report. The workshop also discussed and agreed that the main objectives of the report are to:

- i) Provide a comprehensive baseline on the status of coastal and marine environment in the WIO region;
- ii) Highlight main opportunities of coastal and marine resources;
- iii) Describe successes and challenges faced in management of coastal and marine resources;
- iv) Identify main capacity building needs;
- v) Identify existing knowledge gaps; and,
- vi) Propose policy options for effective management of coastal and marine resources.

For purposes of trend analysis, 1985 was set as the baseline year. This was the year the Nairobi Convention was approved by the countries of the Region. For scenario analysis, 2050 was set as the reference year.

For the purpose of this report, its geographical coverage is limited to the region or area for which the Convention and its protocols apply. The Nairobi Convention Act (Amended 2010) defines the Convention area to “comprise the riparian, marine and coastal environment including the watershed of the Contracting Parties”.

The workshop also agreed on the main target audience for the report as policy-makers at national and regional levels, scientific community, civil society and the general public. The report is expected to serve as reliable source of information for policy-making and environmental management, provide materials for educational and research activities, and provide the basis for identification of new research priorities.

MANDATE

The production and submission of the first comprehensive RSOCR to the Meeting of the Contracting Parties to the Nairobi Convention to be held in June 2015 in the Seychelles, is in line with the requirements of the Convention. Additionally, the report provides an important link and contribution to the global processes such as the UNEP-led production of the GEO-6 and the United Nations-led production of the World Ocean Assessment reports.

In December 2012, the countries of the WIO at their Seventh Meeting of the Contracting Parties to the Nairobi Convention, decided to facilitate and organize regional meetings of experts for the purpose of exchanging and consolidating information that will lead to a State of the Coast Report for the WIO region. The Parties decided that the State of the Coast Report for the WIO region should be prepared in a manner that contributes to the United Nations Regular Process on preparation of the first integrated World Oceans Assessment report.

In Article 18 of the Nairobi Convention (Amended 2010) Contracting Parties are obliged to meet biannually to amongst others ‘assess periodically the state of the environment in the Convention Area’. However, Article 18 does not describe how such an assessment will be conducted.

Over the years, there have been attempts by countries of the region to individually prepare status reports. However, the reports have been sector based, the consequently

the methodologies and the reports themselves were often not comparable. As a result, a regional report of the state of coastal and marine environment in the WIO region has never been prepared.

The Convention has supported the preparation of different types of national reports, and in 2010 under the GEF/UNEP Project entitled “Addressing land-based Activities in the Western Indian Ocean” (WIO-LaB Project), numerous State of Coast reports, specifically on Land-based Sources and Activities in the WIO, were prepared. However, none of these and other previous similar efforts led to the production of an integrated Regional State of the Coast Report on both socio-economic and ecological systems for the WIO region.

Most countries in the WIO region have a statutory obligation to report on the state of the environment. For instance in Kenya, the Environment Management and Coordination Act, 1999, stipulates under Section 9(2)(p) that the National Environment Management Authority shall prepare and issue an annual report on the state of the environment. Section 175(1) of the Tanzania Environment Management Act of 2004 requires the Director of Environment to publish the report of the state of the environment and environment management for submission to the National Assembly every two years. The preparation of a periodic state of the coast report is also a requirement in the Tanzania National Integrated Coastal Environment Management Strategy. In South Africa, under the Integrated Coastal Management Act of 2008, in Section 93(3), the Minister responsible is required to prepare and regularly update the national report on the state of the coastal environment.

The RSOCR has been based on national state of environment reports where they exist. Further, the regional status report provides a basis for cooperation among environment regulatory frameworks, responsible national institutions and departments to periodically produce a state of coast report at the national level using similar approaches to assess and to manage trans-boundary resources.

One of the key mandates of the United Nations Environment Programme (UNEP) is to assess global, regional and national environmental conditions and trends. In pursuit of this, UNEP coordinates the production of global and regional environment outlooks on a regular basis. These reports present the state, trends and outlook of the environment through an integrated approach that recog-

nizes the interlinkages between the environmental, social and economic dimensions of development. The process to produce the Sixth edition of the Global Environment Outlook (GEO-6) commenced in October 2014. The regional reports resulting from this process will be launched in 2016, while the global report, which will draw from these and other integrated and thematic assessments as appropriate, will be released in 2017.

At the World Summit on Sustainable Development held in Johannesburg, South Africa, in 2002, the member states agreed, in paragraph 36 (b) of the Johannesburg Plan of Implementation (JPOI), to “establish by 2004 a regular process under the United Nations for global reporting and assessment of the state of the marine environment, including socio-economic aspects, both current and foreseeable, building on existing regional assessments”. This decision was reaffirmed in Rio + 20 Outcome document, ‘The future we want’ paragraph 161. Through the Regular Process, the United Nations was mandated to periodically produce the first World Ocean Assessment (WOA) report, which is scheduled to be launched in 2015.

In recognition of the potential contribution to the first World Ocean Assessment, the meeting of the Focal Points to the Nairobi Convention held in Maputo, Mozambique, in August 2012 recommended the production of the Regional State of the Coast Report that is clearly linked to other global processes and products, but more specifically to the World Ocean Assessment report.

METHODOLOGY

The process

Preparation of the RSOCR involved two parallel but complementary processes, namely; a technical process of selecting the best available regional experts as the contributing authors and for the review process to collect, document and collate the most relevant, credible and up to date data and information; and a political process to mobilize national support at the policy level, as well as of the regional scientific community through capacity building workshops.

The Nairobi Convention Secretariat and UNEP’s Division of Early Warning and Assessment (DEWA) in collaboration with the Government of Mozambique and the Division for Ocean Affairs and the Law of the Sea of the Office of Legal Affairs of the United Nations (UN/

OLA/DOALOS) organized two capacity building workshops in August and December 2012 in Maputo, Mozambique. These workshops were attended by the National Focal Points of the Nairobi Convention and selected scientists from the region. The aim of the workshops was to provide a background to the Regular Process; improve skills and knowledge for conducting integrated assessments of the state of coastal and marine environment; and to introduce a uniform assessment methodology. The workshops presented to the authors the Drivers – Pressures – State – Impact – Response (DPSIR) methodology to be used as a basis for analysis. They also introduced the “opportunities framework” as an underlying theme to be used in the report preparation process. This framework enables appropriate focus to be placed on the need to value, protect and enhance the remaining assets within the coastal and marine environment, rather than dwell on reporting what has already been lost (see Figure 2.1). The capacity building workshops were also used to build consensus on the structure and content of the final report including an agreement on the use of the WOA framework as the basis for preparing the RSOCR. Furthermore, the meetings also made two clear distinctions that set the RSOCR and WOA apart through recommending the inclusion of chapters focusing on governance and policy options, scenario setting and recommendations. The capacity building workshops also played a key role in galvanizing support for the process amongst the government officials and the regional scientific community.

The process for preparation of the RSOCR from its conceptualization to finalization was presented to Contracting Parties at the Seventh Meeting of the Contracting Parties (COP7) and in four meetings of the National Focal Points (Figure 2.2). The COP7 decision provided the political support and mandate for initiation of the report preparation process, whilst the Focal Points meetings were used to report on the progress being made and to provide any further essential guidance. The RSOCR was prepared with the full participation and support of the policy organs of the Convention.

The technical process on the other hand was guided by WIOMSA as the coordinating institution. WIOMSA was appointed to this role by the Nairobi Convention Secretariat because of its multidisciplinary membership, extensive network of regional scientists and broad experience and good reputation in designing and implementing large regional projects/programs.

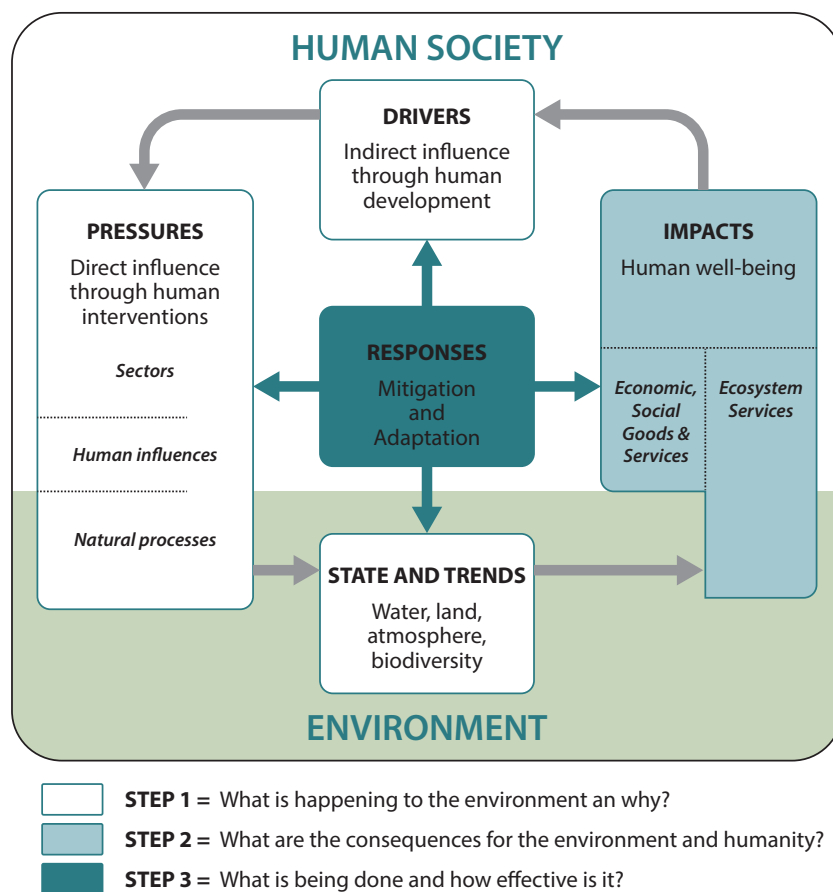


Figure 2.1. The DPSIR Analytical Framework (UNEP 2011).

The Nairobi Convention Secretariat and WIOMSA issued a “Call for Expression of Interest” to participate in the development of the RSOCR. Over 50 regional scientists from all the countries, except Somalia and Comoros, expressed interest to be involved. Based on their CVs, their publishing and reporting record, and their availability to fully engage with the process, the final list of 29 authors was prepared.

Four Authors Meetings were organized during the preparation of the report. The first one was held in Maputo, Mozambique, in April 2013 and focused on introduction of the authors to the process and methodology to be used to develop the report. It was also used to develop the report outline, identify sources of data and information, provide an opportunity for different actors involved in the process to interact and agree on timelines for the process. In the second and third meetings, the emphasis was placed on agreeing on the final structure of the report, identification of visual and graphics needs, facilitation of scenario building and development of policy options, and management

of the internal and the external chapter review processes. Analysis of balance and consistency and final report, including its layout, were the main issues discussed in the last Authors Meeting held in May 2015 in Nairobi, Kenya.

Organization structure

Preparation of the RSOCR involved several experts and organizations, including the following:

- i) The Contracting Parties and the Focal Points to the Convention. Provision of the mandate, political support and framework for preparation and approval of the report.
- ii) The Nairobi Convention Secretariat. The Secretariat provided leadership and financial resources for preparation of the report as well as oversaw the process. It also organized and financially supported the capacity building workshops, Focal Points meetings, the Meeting of the Contracting Parties and Authors Meetings.
- iii) WIOMSA. WIOMSA coordinated the technical process of preparing the report, selected and recruited the Editor, Lead authors, authors and researchers and sup-

ported the organization of the Authors Meetings.

iv) UNEP’s Division of the Early Warning and Assessments (DEWA). Based on its experience in preparation of global and regional environment outlooks, provided technical support to the whole process. It also contributed financial resources to the process.

v) Editor. The editor played a dual role of supervising the overall technical and style editing of the report and synthesizing the main messages from the report and writing the Parts I (Summary) & VIII (Overall assessment).

vi) Lead authors. Each lead author oversaw the work of the contributing authors in their respective Parts. Each part had three or more chapters written by different contributing authors. Lead authors ensured that they were

technically sound and consistent with the recommended guidelines. They were also responsible for writing the Conclusion chapters under their Parts.

vii) Contributing Authors. These were responsible for at least one chapter.

viii) Researchers. WIOMSA selected emerging scientists to assist the Lead authors and authors particularly in undertaking research on specific issues, collecting and compiling data and information needed for specific topic.

Each Chapter was reviewed by at least two external reviewers, who checked and confirmed the adequacy of the chapter in terms of form and contents; accuracy and completeness of facts and information presented, including accuracy of references cited and listed. The appropriate

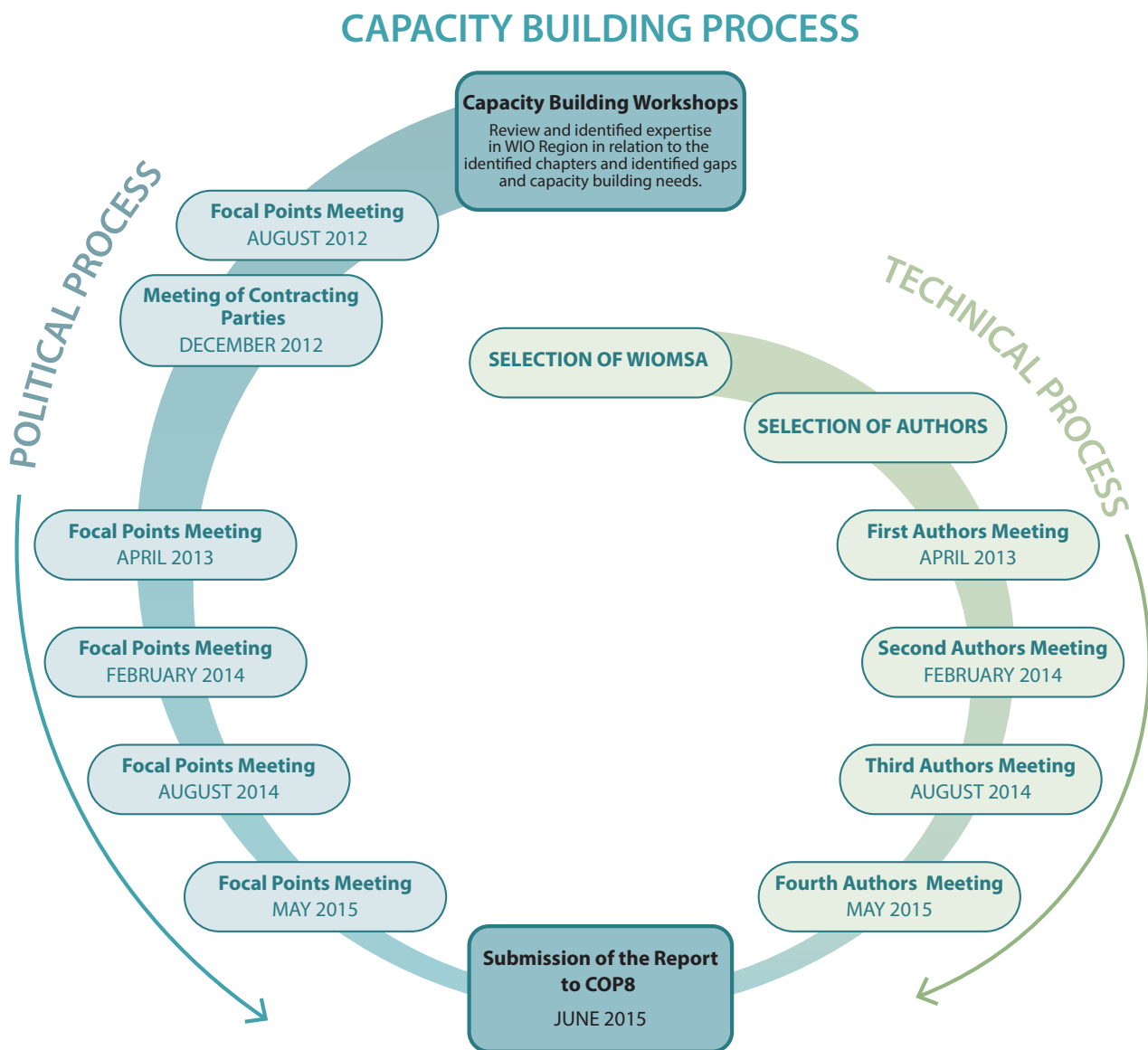


Figure 2.2. Description of the process for development of the RSOCR.

and correctness of language and grammar used as well as consistency of format and presentation for the chapters were checked by the Language Editor.

The production of RSOCR was widely participatory and inclusive of a wide range of expert analysis and opinion. The process has been enriched with inputs from different meetings of the organs of the Convention, UNEP and the

Convention staff, involved authors and external reviewers. The RSOCR reflects the commitment and interests of a wide range of stakeholders who ensured it was more than a comprehensive baseline of the status of coastal and marine environment in the WIO region, but also provides policy options and future scenarios for effective management of coastal and marine resources in the WIO region.

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