Special Report

Appendix 4

Country Review: Tanzania

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Marine and Coastal EbA for Enhanced Resilience in Southern Africa

Country Review: Tanzania

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African perspectives
Global insights

SAIIA
SOUTH AFRICAN INSTITUTE OF INTERNATIONAL AFFAIRS

Executive summary

Tanzania's coastal zone is home to approximately 10 million people, many of whom are highly dependent on coastal and marine resources, and the ecosystem services they provide. These marine ecosystems support the country's national economic income and help to sustain the livelihoods of local people through small-scale artisanal fishing and related marine industries. Furthermore, valuable ecosystems like coral reefs and mangrove forests buffer the Tanzanian coastline in the face of sea-level rise and storm surge, protecting a vast number of informal, unplanned settlements close to the coastline. Climate change risk projections show increasingly worrying trends for Tanzania, with serious economic consequences for its coastal cities and inhabitants. While its extensive coastal belt is rich in diversity, coastal and marine resources in Tanzania are increasingly threatened by pressure demands from a fast-growing population and an expanding economy that often leads to uncontrolled and irresponsible exploitation.

Some of the issues it faces are competing desires for industrial and agricultural development; illegal and destructive fishing practices, such as coral and sand mining; extensive trampling of seagrasses; municipal wastewater discharge and pollution; and the clearing of mangrove and coastal forests for commercial and domestic purposes – such as for aquaculture ponds, solar salt works, timber, settlements, infrastructure and property development (especially for tourist facilities), fuelwood and construction materials. All these activities lead to habitat degradation, biodiversity loss and, ultimately, the loss of ecological integrity.

Given Tanzania's vulnerability to climate change and the increasing trend towards the degradation of vital ecosystems, mainland Tanzania and Zanzibar must urgently consider opportunities for conserving, restoring and regulating marine and coastal ecosystems, in an attempt to protect the ecosystem services they offer for enhanced coastal resilience, climate adaptation and carbon sequestration. Climate adaptation actions that are centred on sustainably managing and protecting ecosystems, namely ecosystem-based adaptation (EbA), also have valuable development outcomes that are aligned with Tanzania's national pursuit of poverty reduction and economic development. Among others, marine and coastal ecosystems provide fisheries habitats and breeding grounds, sequester carbon, stabilise sediment and prevent erosion and damage to shorelines by storms, hurricanes and floods.

Despite Tanzania's numerous climate change adaptation strategies and natural resource governance frameworks, it is yet to explicitly include marine and coastal EbA in its current policy architecture. Furthermore, to date only a few EbA projects are operational in Tanzania, and those that do exist tend to be isolated and limited in scale.

This national research report on EbA in mainland Tanzania reviews the country's thinking regarding climate change adaptation and ecosystem management, identifying key opportunities and challenges in the uptake of EbA in both policy and practice. It also considers key barriers and opportunities related to community empowerment, policy coherence, institutional make-up and the implementation of EbA at scale.

Abbreviations & acronyms

BMU	Beach Management Unit
CBO	community-based organisation
CHICOP	Chumbe Island Coral Park Limited
COP	Conference of the Parties
DoE–VPO	Division of Environment, Vice President's Office
EbA	ecosystem-based adaptation
EIA	environment impact assessment
ESIA	environmental and social impact assessment
EMA	Environmental Management Act
FBD	Forest and Beekeeping Division
GDP	gross domestic product
GIS	Geographic Information Systems
FYDPII	Five-Year Development Plan II
IMS	Institute of Marine Science
INDC	Intended Nationally Determined Contribution
MCA	marine conservation area
MCU	Marine Conservation Unit
MKUZA	Zanzibar Strategy for Growth and Reduction of Poverty
MMP	Mangrove Management Plan
MNRT	Ministry of Natural Resources and Tourism
MPA	marine protected area
MPRU	Marine Parks and Reserves Unit
NAPA	National Adaptation Programme of Action
NCCS	National Climate Change Strategy
NCCTC	National Climate Change Technical Committee
NDC	Nationally Determined Contribution
NEMC	National Environment Management Council
NGO	non-governmental organisation
NICEMS	National Integrated Coastal Environment Management Strategy
REDD+	Reduced Emissions from Deforestation and Forest Degradation
SDG	Sustainable Development Goal

SFC	*shehia* fishermen committee
TFS	Tanzanian Forest Service Agency
TAWFA	Tanzania Women Fish Workers Association
UNDP	UN Development Programme
UNFCCC	UN Framework Convention on Climate Change
USAID	US Agency for International Development
USFS	US Forest Service
WIO	Western Indian Ocean
WIOMSA	Western Indian Ocean Marine Science Association
WWF	World Wide Fund for Nature
ZEMA	Zanzibar Environmental Management Authority

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SAIIA'S special reports are fairly lengthy analytical papers, usually reflecting on and analysing the findings of field research.

Cover image

Marine and coastal ecosystems support the livelihoods and income of many Tanzanians. This traditional dhow is used to transport goods from Zanzibar to the mainland (Romy Chevallier)

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Introduction

Tanzania's coastal zone, including Zanzibar, is home to approximately 10 million people, many of whom are highly dependent on coastal and marine resources, and the ecosystem services these provide. These marine ecosystems support the national economic income of Tanzania and help to sustain the livelihoods and income of local people through small-scale artisanal fishing and other related marine industries. In addition, these same ecosystems buffer the Tanzanian coastline from sea-level rise and storm surge, protecting a vast number of informal, unplanned settlements close to the coastline. Climate change risk projections show increasingly worrying trends for Tanzania, with serious economic consequences for its coastal cities and inhabitants.

Tanzania's coastal zone, including Zanzibar, is home to approximately 10 million people, many of whom are highly dependent on coastal and marine resources, and the ecosystem services these provide

Tanzania's extensive coastal belt is rich in diversity and includes some of the Western Indian Ocean's (WIO) most valuable coral reef and mangrove ecosystems. However, despite their importance, coastal and marine resources in Tanzania are increasingly threatened by the demands of a fast-growing population and an expanding economy that often leads to uncontrolled and irresponsible exploitation. This includes competing desires for industrial and agricultural development; illegal and destructive fishing practices, such as coral and sand mining; extensive trampling of seagrasses; municipal wastewater discharge and pollution; and the clearing of mangrove and coastal forests for commercial and domestic purposes – such as for aquaculture ponds, solar salt works, timber, settlements, infrastructure and property development (especially tourist facilities), fuelwood and construction materials. All these activities amount to habitat degradation, biodiversity loss and the ultimate loss of ecological integrity.

Given Tanzania's vulnerability to climate change and the increasing trend of vital ecosystem degradation, mainland Tanzania and Zanzibar must urgently consider opportunities to conserve, restore and regulate marine and coastal ecosystems, in an attempt to protect the valuable ecosystem services these offer for enhanced coastal resilience, climate adaptation and carbon sequestration. Climate adaptation actions that are centred on sustainably managing and protecting ecosystems, namely ecosystem-based adaptation (EbA), have valuable development outcomes that are aligned with the country's national pursuit of poverty reduction and economic development. Among others, marine and coastal ecosystems provide fisheries habitats and breeding grounds, sequester carbon, stabilise sediment and prevent erosion and damage to shorelines by storms, hurricanes and floods.

However, despite Tanzania's numerous climate change adaptation strategies and natural resource governance frameworks, it is yet to explicitly include marine and coastal EbA in its current policy architecture. This includes the absence of marine and coastal EbA in Tanzania's current Nationally Determined Contribution (NDC) to the UN Framework Convention on Climate Change (UNFCCC).

This national research report on EbA in mainland Tanzania reviews the country's thinking related to climate change adaptation and ecosystem management, identifying key opportunities and challenges in the uptake of EbA in both policy and practice. This review will consider key barriers and opportunities related to community empowerment, policy coherence, institutional make-up and the implementation of EbA at scale.

Tanzania's vulnerability to climate change impacts

According to Tanzania's NDC, submitted to the UN climate change secretariat in 2015, the average annual temperature in the country increased by 1˚C from 1960–2006, with models indicating future increases in the range of 1–3˚C by the 2050s.[1] These models also show that precipitation will become increasingly unpredictable, with a shift in the onset of the rainy season(s) and changes in rainfall quantity.[2] Mean seasonal rainfall will decrease over most parts of the country, but most significantly over the north-eastern highlands, where rainfall is projected to drop by up to 12% in 2100. Currently, more than 70% of natural disasters in Tanzania are related to climate change and linked to recurrent droughts and floods.[3] The frequency and severity of these extreme climate change-related events are also likely to increase, and will come with vast economic costs for the country. According to the NDC, the net economic costs of addressing climate change impacts could be equivalent to a further 1–2% of gross domestic product (GDP) per year by 2030.

> The average annual temperature in the country increased by 1°C from 1960–2006, with models indicating future increases in the range of 1–3°C by the 2050s

1 United Republic of Tanzania, 'Intended Nationally Determined Contribution', September 2015, https://www.climatelearningplatform.org/sites/default/files/resources/INDCs_The United Republic of Tanzania.pdf, accessed 20 August 2019..

2 Rohli RV *et al.*, 'Inter-annual hydroclimatic variability in coastal Tanzania', *International Journal of Climatology*, 2019.

3 Irish Aid, Resilience and Economic Inclusion Team, 'Tanzania Climate Action report for 2016', November 2017, https://www.irishaid.ie/media/irishaid/allwebsitemedia/30whatwedo/climatechange/Tanzania-Country-Climate-Action-Report-2016.pdf, accessed 20 August 2019.

The vulnerability of Tanzanian coastal communities largely depends on both their physical exposure and their socio-economic susceptibility, which is related to the types of coastal structures and their predisposition to being affected by physical or socio-economic change. Some 70% of Tanzania's population live in urban areas, the vast majority of whom live in informal settlements that are increasingly at risk from water scarcity, flooding and heat extremes. Rural areas are highly dependent on rain-fed agriculture and have limited access to healthcare, education and electricity. Yields of critical crops, including maize, beans, sorghum and rice, are projected to drop in coming decades, endangering livelihoods and food security. Livelihoods and food supply also depend on coastal and inland fisheries, which are increasingly threatened by warming ocean and freshwater temperatures, and sedimentation after heavy rains.

Some 70% of Tanzania's population live in informal settlements that are increasingly at risk from water scarcity, flooding and heat extremes

Within the higher population density districts, such as the Dar es Salaam area, impacts directly affect coastal communities where there is significant infrastructure close to the shore. This is confirmed by Kebede and Nicholls,[4] who note that 'on average about 400m of landward retreat would occur due to erosion in Dar es Salaam under a 1m sea-level rise' scenario. A total land loss estimated at 2470 and 494km^2 is expected for a 0.5m and 1m rise in sea level, which makes 'infrastructure worth US$48 and US$82 million vulnerable to a 0.5m and 1m sea-level rise, respectively'.[5] Although unlikely to be at the same scale of cost, the urban areas of Pangani, Lindi, Mtwara and Mikindani are likely to be impacted by rises of less than 5m. Numerous other small, scattered villages are located close to the shore, for example in the Rufiji Delta, on smaller islands around Mafia and Kilwa and around Mnazi Bay. These are experiencing coastal erosion, which is likely to increase in intensity, if not from sea level rise per se then from increases in severe weather and storm surges.

The US Agency for International Development's (USAID) latest climate risk profile report for Tanzania, released in June 2018,[6] notes that sea-level rise is expected to cause damages of about $200 million per year in lost land and infrastructure damage countrywide, and public and private assets of approximately $5.3 billion are at risk from flooding and sea-level rise. Similarly, in a World Bank study examining climate change, disaster risk and the urban poor

4 Kebede B & R Nicholls, 'The Implications of Climate Change and Sea-Level Rise in Tanzania: The Coastal Zone', Stockholm Environment Institute, Synthesis Report, November 2010, https://www.researchgate.net/publication/307210254_The_Implications_of_Climate_Change_and_Sea-Level_Rise_in_Tanzania_-_The_Coastal_Zones, accessed 23 March 2019.

5 *Ibid*., p. 13.

6 USAID (US Agency for International Development), Climate Risk Profile: Tanzania', June 2018, p. 3, https://www.climatelinks.org/sites/default/files/asset/document/20180629_USAID-ATLAS_Climate-Risk-Profile-Tanzania.pdf, accessed 20 August 2019.

in Dar es Salaam,[7] research highlights additional threats to informal, unplanned settlements. Saltwater intrusion from rising seas increases the salinity of inland water resources such as water wells, rendering them unusable for drinking, cooking and washing. Spikes in the salinity of groundwater are also harmful to native vegetation, causing trees and other plants to die and be uprooted, thereby accelerating erosion and pushing communities further from the coast. Dar es Salaam's backwater phenomenon has been well documented.

Sea-level rise is expected to cause damages of about $200 million per year in lost land and infrastructure damage countrywide

Tanzania's socio-economic circumstances make people even more susceptible to the impacts of climate change and sea-level rise

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Political economy of mainland Tanzania

Tanzania is a union between the mainland and semi-autonomous Zanzibar (which consists of the two main islands of Pemba and Unguja and several smaller islets). Natural resource management and environmental matters, including coastal and marine resources and activities, are non-union matters and therefore dealt with in separate policy, legal and institutional frameworks for the mainland and Zanzibar. For the purpose of this review, the focus will be on EbA policy activities on mainland Tanzania. However, governance mechanisms and practical EbA examples from Zanzibar will the used to highlight key developments and peer learning for the mainland (and the region more broadly).

7 World Bank Group, *Dar Es Salaam Case Study Overview: Climate Change, Disaster Risk and the Urban Poor – Cities Building Resilience for a Changing World*. Washington DC: IBRD (International Bank for Reconstruction and Development), World Bank, 2011, p. 6.

Tanzania is currently implementing its second National Five-Year Development Plan (FYDP II) (2016/17 to 2020/21). This framework focuses on achieving the development aspirations articulated in the Tanzania Development Vision 2025,[8] namely the transformation into a middle-income and semi-industrialised state by 2025, while maximising human development outcomes.[9] The FYDP II sets the direction for policymaking, planning and budgeting. It recognises that economic growth needs to be achieved in an environmentally sustainable manner, highlighting the integration of environmental concerns, in addition to the economic and social needs. Importantly, the FYDP II also recognises that the unsustainable use of natural resources and environmental degradation will inhibit future economic growth, exacerbate multidimensional poverty, and undermine the achievement of poverty reduction and food security goals, particularly in rural areas. However, while this policy document does include 'environment' as a discussion area, this appears within a broader agenda of poverty alleviation, food security and land management. There is no direct reference to climate change per se and a stronger focus is needed to address the conflicting goals and contradictory practices across sectors. For example, the current union government is pursuing economic transformation through industrialisation and large-scale infrastructural development, primarily based on fossil fuels.[10] While this is vital, in many cases it contributes to environmental degradation, and air and water contamination.

Tanzania has sustained relatively high economic growth over the last decade, averaging 6–7% a year.[11] However, while the poverty rate in the country has dropped, the absolute number of poor people has grown, owing to the high population growth rate. About 30% of the country's overall population lives in severe poverty and 70% lives on less than $2 a day. To build on this growth and reach more people, the World Bank Assessment for 2015 recommends promoting growth in labour-intensive sectors such as agriculture, where three-quarters of the local population are currently employed.[12] The agricultural sector (including livestock) performs below par, is dominated by subsistence production and simple technologies, and is highly vulnerable to poor weather conditions.

According to the Tanzanian National Bureau of Statistics, the country's population was 54.2 million in 2018.[13] The number is expected to increase to 77.5 million by 2030, of which 50% will consist of children below the age of 18. This rapid growth poses a considerable challenge to the government's capacity to meet the demand for public infrastructure,

8 United Republic of Tanzania, National Planning Commission, 'Tanzania's Development Vision 2025', 2000, http://www.mof.go.tz/mofdocs/overarch/vision2025.htm, accessed 20 August 2019.

9 Tanzania is currently a member of the least developed countries (LDCs) group.

10 Nachmany M, 'Climate Change Governance in Tanzania: Challenges and Opportunities', Grantham Research Institute on Climate Change and the Environment & Centre for Climate Change Economics and Policy, Policy Brief, October 2018, http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2018/10/Climate-change-governance-in-Tanzania-challenges-and-opportunities.pdf, accessed 20 August 2019.

11 UNDP (UN Development Programme) & United Republic of Tanzania, *Tanzania Human Development Report 2017: Social Policy in the Context of Economic Transformation*. Dar es Salaam: ESRF (Economic and Social Research Foundation), 2018, p. 14.

12 World Bank Group, 'Tanzania Mainland Poverty Assessment Report', Vol 2. Washington DC: World Bank Group, 2015.

13 *The Citizen*, 'Tanzania's population projected at 54.2 million', 28 February 2018, https://www.thecitizen.co.tz/News/Tanzania-s-population-projected-at-54-2-million/1840340-4323118-kbblhv/index.html, accessed 14 July 2019.

housing, employment and social services, particularly in the areas of education, health and water supplies. There is thus an urgent need to reduce Tanzania's population growth and high fertility rate by empowering its people through education and family planning, as well as through employment support. In addition, although women make up 50% of the population, gender inequities persist.[14] The country has developed slowly, according to the Gender Inequality Index, and is ranked 129 out of 159 countries.[15]

While Tanzania has made improvements in the past decade in its Human Development Index results, it continues to rank 151 out of 188 countries, categorised among the countries with the lowest human development.[16] Social exclusion is extensive and structurally ingrained, and there is a strong divide between urban and rural areas, and human development by region and by household wealth status. According to the World Bank's 2015 Tanzania Mainland Poverty Assessment Report,[17] extreme poverty is less rampant in urban areas, where 70% of the population resides.

The mainland Tanzanian coast is made up of five administrative regions – Tanga, Dar es Salaam, Coast, Lindi and Mtwara, and 16 coastal districts. The port city of Dar es Salaam is the hub of the national economy and dominates the coastal zone in terms of both population size and economic activities. A total of 75% of the country's economic industries are located in urban coastal areas, with a large concentration in Dar es Salaam. The coastal ports of Dar es Salaam, Tanga and Mtwara not only handle national cargo but are also transit routes for landlocked countries in the region.

Zanzibar has witnessed significant changes over past 20 years. Its population has doubled – and now exceeds 1.3 million – and the trade in agricultural products (mostly cloves and other spices) has been surpassed in economic significance by the tourism industry. Zanzibar is now a global destination for coastal tourism. Also, the cultivation and export of seaweed (and to a lesser extent pearl oysters) have increased the livelihoods of tens of thousands of Zanzibari women.

Tanzania's coastal and marine habitats and ecosystems

The coast of Tanzania, including Zanzibar's islands and islets, stretches across some 1 424km,[18] from the northern border with Kenya to the southern border with Mozambique.

14 USAID, 'Tanzania: Country Development Cooperation Strategy (2014–2019)', 2014, p. 6, https://www.usaid.gov/sites/default/files/documents/1860/CDCS%20Tanzania%20Final.pdf, accessed 13 March 2019.

15 UNDP, 'Gender Inequality Index, Human Development Report'. New York: UNDP Evaluation Office, 2016.

16 UNDP & United Republic of Tanzania, *op. cit.*, p. 14.

17 World Bank Group, 2015, *op. cit.*

18 Mngulwi B, 'Fisheries Division, Ministry of Natural Resources and Tourism'. Dodoma: Government of Tanzania, December 2003.

The coast is exposed to the Southern Indian Ocean and is subject to incoming waves generated by the monsoon winds and local storms.[19] There are a number of islands that shelter the mainland from the waves and many smaller islands that almost fringe the mainland. The most prominent features along the coast include fringing platforms and reefs, limestone cliffs, sandy ridges and beaches, and mangrove forests and seagrasses in riverine estuaries and deltas. The coastline has numerous river outlets, such as the Rufiji, Pangani, Ruvuma, Wami and Ruvu, influencing the coastal environment by creating productive brackish water environments in estuaries, deltas, tidal flats and shorelines, and nourishing mangroves and seagrass beds. These coastal ecosystems subsequently interact with each other and together sustain a tremendous diversity of marine life, which supports the livelihood of coastal communities.

Various important and valued species are found along the coast, including an estimated 150 species of corals in 13 families; 10 mangrove species; 300 species of seaweed and 12 of seagrasses, 8 000 species of invertebrates; 1 000 species of fish; five species of marine turtles; at least 20 species of marine mammals; and many seabirds.[20]

These ecosystems provide a variety of natural services that contribute to the national income of Tanzania, as well as that of its communities. Coastal fisheries, for example, generate income and employment locally, the latter mostly artisanal with a small semi-industrial component. The farming of fish, invertebrates and seaweed also provides income. Tanzania's numerous deltas, estuaries and mangrove swamps support fisheries and hold future potential for expanded mariculture activities, especially prawns. Intact coastal and marine ecosystems are also central to the quality of ecotourism experiences. Many tourists visit mainland Tanzania and Zanzibar for their beautiful beaches, scuba diving, snorkelling and water-based sports, and other recreational activities. This sector contributes a significant amount to Tanzania's GDP, as well as to its foreign income

19 Rohli RV *et al.*, *op. cit.*

20 ASCLME (Agulhas and Somali Current Large Marine Ecosystem), 'National Marine Ecosystem Diagnostic Analysis, Tanzania: Contribution to the Agulhas and Somali Current Large Marine Ecosystems Project'. Dar es Salaam: IMS (Institute of Marine Sciences), 2012, p. 23.

earnings.[21] Additionally, ecosystems such as mangroves provide a large variety of direct uses and services for coastal inhabitants, including fuelwood, poles for construction and dhow building, leaves, fruit, bark and roots for medicinal benefits, etc.

However, these coastal and marine ecosystems are being affected by climate change and warmer temperatures, ocean acidification and larger sediment supply from more frequent flooding events in rivers running into the sea. The signs of coastal and marine degradation and biodiversity loss are obvious, evidenced by decreasing fish yields, deteriorating coral reefs and a continuing reduction in mangroves and coastal forests.[22]

Mangrove forests: Tanzania accounts for roughly 1% of mangrove coverage worldwide. These forests are found in the tidal inlets, estuaries and creeks along the mainland coast, as well as in Zanzibar. The largest block, extending over 500km^2, is in the Rufiji Delta. Other important mangrove sites also include deltas and estuaries of the Ruvu, Pangani and Wami rivers, and the coasts of Unguja, Pemba and Mafia islands. There are seven protected areas that currently have mangroves in them, and 115km^2 of mangroves in effective protected areas.[23]

There has been inconsistent reporting on mangrove coverage in Tanzania,[24] with remote sensing data also giving a mixed picture of their status and health. According to one report, mangroves are spread over an area of about 1 335km^2 (of which 1 155km^2 are found on mainland Tanzania and 180km^2 on Zanzibar).[25] However, the National Forest Resources Monitoring and Assessment Report of 2015[26] indicated mangrove cover of 1 581km^2 on mainland Tanzania, suggesting mangrove expansion but without an explicit indication of where and the reasons for this. This adds a further complication related to the reliability of data on the extent of mangroves for effective management.

Because mangroves sit between the land and the sea, their principal forest management jurisdiction is the Tanzanian Forest Service Agency (TFS), under the Ministry of Natural Resources and Tourism (MNRT). However, fisheries activities in mangroves (including mariculture) are the jurisdictional responsibility of the Ministry of Livestock and Fisheries Development.

For more information see Box 1 on the history of mangrove governance in mainland Tanzania.

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21 Oxford Business Group, 'Tanzania to diversify its tourism offerings and address growth challenges', in *The Report: Tanzania 2018*, 2019, https://oxfordbusinessgroup.com/overview/achieving-potential-taking-steps-diversify-offerings-and-address-remaining-challenges-growth, accessed 20 August 2019.

22 Francis J & I Bryceson, 'Tanzanian Coastal and Marine Resources: Some Examples Illustrating Questions of Sustainable Use'. Gland: IUCN (International Union for Conservation of Nature), 2001, pp. 76–102.

23 Helliwell K *et al.*, 'Tanzania Forest Research Programme, Utende Village, Mafia Island, Tanzania', TZF Phase 142 Science Report. Switzerland: Frontier, 2004; Mangora MM, 'Poverty and institutional management stand-off: A restoration and conservation dilemma for mangrove forests of Tanzania', *Wetlands Ecology and Management*, 19, 2011, pp. 533–54.

24 Mangora M *et al.*, 'Mangroves in Tanzania', in Bosire J *et al.* (eds), *Mangroves of the Western Indian Ocean: Status and Management*. Zanzibar town: WIOMSA, 2016, p. 35.

25 Bosire J *et al.* (eds), *op. cit.*

26 MNRT (Ministry of Natural Resources and Tourism), *National Forest Resource Monitoring and Assessment (NAFORMA) Report: Main Results*. Dar es Salaam: Tanzania Forest Service Agency, 2015.

BOX 1 THE HISTORY OF MANGROVE GOVERNANCE IN TANZANIA

Mangrove forest in northern Tanzania

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The governance and management of mangroves has undergone various phases in the history of Tanzania.[a] In 1928 mangroves in Tanzania were gazetted as forest reserves and their extraction regulated by law.[b] The devolution of rights to mangroves was limited, with the government retaining ultimate ownership and regulating access, use, management and income. The government controlled the harvest and export of mangrove products to other colonial destinations, as well as to Arab countries. In 1987 it banned the harvesting of mangrove products (partly to give way to the development of the national mangrove management plan).

There have been various historical management challenges related to mangroves, many of which persist today. These include conflicts over forest use between local residents and users from other areas; an increased demand for mangrove products; land scarcity owing to the recent influx of pastoralists and large-scale land-based investments; and limited human and financial resources for effective forest extension services and rule enforcement. These challenges resulted in mangrove losses in the 1970s and 1980s. In the Rufiji Delta specifically the introduction of paddy rice farming (pre-independence) had the most significant negative impacts on mangroves owing to associated extensive clearing. From 2010 onwards the state actively prevented rice paddy expansion in the Rufiji Delta.[c]

In an attempt to halt mangrove conversion, in 1991 the government established the national-wide Mangrove Management Plan (MMP) to regulate their use and monitor mangrove habitats over time, based on zonation and the delineation for different uses. The MMP was developed by the Forest and Beekeeping Division (FBD). However, this plan was never fully implemented owing to the absence of an enabling institutional framework and inadequate financial and technical resources. Also, since the development of the MMP a lot has changed in the context of managing mangroves,

which means it is outdated. It is therefore imperative to revive and update this strategy at the national level and apply it through local plans at the sub-national level. The introduction of new policies and legislation in other related sectors (forestry, wildlife, fisheries, land and agriculture) directly affects mangrove forests. A well-implemented national MMP will fill the vacuum resulting from the lack of mangrove-specific policy and legislation and provide coherence to mangrove conservation and management.

Today, Tanzania has no specific policy that deals with mangrove forests; instead, the Forest Act of 2002 is the basis of the legal framework for forest management. In 2012 the Forest Service Agency (TFS) was established as the executing agency for forest management, while the FBD retained its policy and legislative role. Despite a legal framework for forest management, there have been several institutional challenges in mangrove management. This includes the lack of coordination between conservation agencies, resulting in ineffective management. For instance, forestry agents cannot patrol areas of the high sea, on which illegal mangrove loggers often transport logs and poles. Overlapping jurisdictions between forest management authorities and marine and coastal resource management authorities have often led to conflict.

Mangrove management is also challenged by a mismatch of rules between mainland Tanzania and Zanzibar. While mainland Tanzania has banned charcoal exports, the Zanzibar government allows importation of charcoal from the mainland. As a result, charcoal produced (legally and illegally) from mangrove forests on the mainland is often transported to Zanzibar before being exported. Both governments signed a memorandum of understanding on forest management that is expected to address these discrepancies and loopholes.[d]

With regard to the Rufiji Delta specifically, Tanzania's Parliament commissioned a special task force to review the situation and propose recommendations to reconcile the range of competing land demands.[e] The task force review considered various significant land and development issues in the delta, including mangrove conservation; the relocation of pastoralists; the relocation of delta people; large- and medium-scale and land-based investments; and human settlements. While the report has not yet been publicly released, there is evidence that the government has begun adopting those of its recommendations that focus on facilitating the identification of land for investments in the delta. However, its recommendations that have direct implications for mangrove conservation and management (such as addressing the pastoralist problem and finding land outside mangrove areas to which to relocate delta residents) remain unimplemented. Efforts to revive and update the national MMP should consider the task force's findings and recommendations, as these provide a sound basis for a landscape approach to mangrove management. At the sub-national level, such as in the Rufiji Delta, such plans should adopt a landscape approach that includes processes that take place outside the delta area but impact delta mangroves.

In terms of the inclusion of marginalised groupings within existing laws and guidelines, provisions now enhance women's participation in village leadership and the more equitable distribution of benefits from mangrove forests. However, existing socio-cultural and religious norms undermine any joint management proposals because they prevent women from active participation in leadership roles and decision-making processes that occur in public spaces. Instituting special women's groups or committees, where women can discuss their issues and make decisions, is one way to achieve meaningful participation.

a Mshale B, Senga M & E Mwangi, 'Governing Mangroves: Unique Challenges for Managing Tanzania's Coastal Forests', Bogor & Washington DC: CIFOR (Center for International Forestry Research) & USAID Tenure and Global Climate Change Program, July 2017.

b *Ibid*., p. 15.

c *Ibid*., p. viii.

d *Ibid*., p. 28.

e *Ibid*., p. x.

Coral reefs: More than two-thirds of the coastline supports fringing coral reefs, totalling 3 580km², interrupted only by nearby river estuaries. Owing to the narrowness of the continental shelf, reefs are generally close to shore, within a distance of 1–5km.

Coral reefs provide shelter, feeding, breeding and nursery grounds for fish (supporting 70% of the artisanal fish yield); are natural barriers that restrain beach erosion and slow down waves reaching the shore; and provide aesthetic attractions for eco-tourism opportunities. Their well-being affects the surrounding seagrass beds, intertidal zones and mangrove forests, as well as other marine life.

Over the past few decades, coral reefs have been degraded on a massive scale. Several factors have contributed to this, including the reefs' closeness to land, making them particularly prone to human impact, either from exploitation or the use of destructive practices, or from indirect terrestrial influence such as sedimentation and pollution. The most degraded coral reefs are those found in shallow waters, especially near the urban centres of Tanga, Dar es Salaam and Mtwara. Many reefs have also been severely affected by the global coral bleaching event of 1997–1998, which drastically reduced the average live coral cover. Another bleaching event occurred in the first half of 2016. The institution responsible for the management of coral reefs is the Ministry of Livestock and Fisheries Development.

Seagrass beds: The most extensive seagrass beds are found along the coast of Tanga, in the estuaries and deltas of Ruvu, Wami and Rufiji rivers, and around Mafia and Songo Songo archipelago. However, their precise coverage and the relative species densities are not well known. Through their root base, seagrasses filter and bind sediments and thus prevent sedimentation over coral reefs, protecting the shoreline from erosion. They also enhance primary productivity, are important fishing grounds and a vital food source for turtles and dugong.

Seaweed: Like seagrasses, seaweed provides a habitat for microorganisms and fish. Seaweed farming is an important economic activity particularly in Zanzibar, employing a large number of women. Seaweed aquaculture contributes to climate change adaptation by damping wave energy and protecting shorelines. The canopies of farmed seaweeds, like those of wild seaweeds, serve as coastal protection structures against coastal erosion. By elevating the pH and supplying oxygen to the waters, seaweed reduces the effects of ocean acidification and de-oxygenation.

Coastal forests: Tanzania's coastal forests cover about 700km^2 of its total land mass. These forests are part of the 'Coastal Forests of Eastern Africa biodiversity hotspot' – an area recognised globally for its wealth of wildlife but threatened with destruction, making it a high priority for conservation.[27] Between 1990 and 2007 Tanzania's coastal forest cover decreased by more than a third, and this number has continued to decline in recent years largely as a result of agricultural expansion, charcoal production and logging for timber and firewood.[28] Coastal forests, like mangroves, are also governed by the TFS under the MNRT, which is the custodian of forests and wooded and wildlife reserved areas.

Wetlands: Wetlands cover 10% of the total land area of Tanzania, of which only 5.5% are currently protected in four Ramsar sites (including the coastal wetland of the Rufiji Delta).[29] In their natural state, wetlands play an important role in the water cycle through numerous functions such as groundwater recharge, the filtering of underground aquifers for potable water, and flood prevention. In coastal areas, wetland vegetation such as mangroves stabilise the shorelines by reducing the energy of waves, currents or other erosive forces.

Governance of climate change and marine and coastal ecosystems in mainland Tanzania

Mainland Tanzania and Zanzibar each have independent institutional frameworks to deal with environmental, development and investment issues. For the purposes of this report, the focus will be on governance structures in mainland Tanzania. (Box 2 describes climate and ecosystem governance in Zanzibar.)

Mainland Tanzania has developed national institutional management structures and numerous governance tools for overseeing the development and administration of coastal and marine resources, as well as for the management of climate change adaptation. These policies and frameworks are in line with Tanzania's national development blueprint,

27 Critical Ecosystem Partnership Fund, 'Coastal Forests of Eastern Africa', 2005, https://www.cepf.net/our-work/biodiversity-hotspots/coastal-forests-eastern-africa, accessed 20 September 2019.

28 Sumbi P, 'The fate of unique species in Tanzania's coastal forests hang in the balance', The Conversation, 4 September 2018, https://theconversation.com/the-fate-of-unique-species-in-tanzanias-coastal-forests-hangs-in-the-balance-102281, accessed 13 March 2019.

29 MNRT (Ministry of Natural Resources and Tourism), Environmental Support Programme (ESP), *Sustainable Wetlands Management (2004–2009).* Dar es Salaam: Ministry of Foreign Affairs, Wildlife Division & DANIDA (Danish International Development Agency), 2003.

its Development Vision (2025), its current development plan (FYDP II), as well as national cross-sectoral policies in line with established international policy frameworks.

At the global level Tanzania and Zanzibar have committed to meeting the UN's Sustainable Development Goals (SDGs). SDG 13 on climate action and SDG 14 on the sustainability of coastal and marine ecosystems and resources are of most relevance here. While these SDG commitments will not be reviewed here, they do refer to EbA and climate adaptation. Mostly, however, the national commitments around SDGs are based on existing national policy and strategy frameworks outlined below.

BOX 2 GOVERNANCE OF CLIMATE CHANGE AND MARINE ECOSYSTEMS ON ZANZIBAR

Zanzibar is guided by its own unique development vision. In 2000 the island launched the Zanzibar Development Vision 2020,[a] which serves as the guiding document that informs all development strategies and plans, including the integrated Zanzibar Strategy for Growth and Reduction of Poverty (MKUZA).[b] This strategy has been implemented in three stages, with MKUZA III (2016–2020) currently in effect.

MZUKA III aligns closely with international goals and agendas such as the UN's Agenda 2030 and the 2015 Paris Agreement. Key to this vision is climate change adaptation, the protection of marine and coastal ecosystems and the promotion of gender equality. As such, Zanzibar's Department of Environment, including the Zanzibar Environmental Management Authority (ZEMA), is situated under the Second Vice President's Office of the Revolutionary Government of Zanzibar, as it is a key department in advancing progress towards the nation's vision. The main aim of ZEMA is to enhance the coordination, regulation and management of environmental concerns in Zanzibar. The 2015 Zanzibar Environmental Management Act entrusts ZEMA with the authority to issue environmental certificates and permits, undertake environment impact assessments (EIAs) and promote and enforce awareness and standards. The island also has its own Ministry of Fisheries and Livestock Development and Department of Non-Renewable Resources.

The Department of Environment is the umbrella authority responsible for coordinating climate change and environmental activities on Zanzibar. It consists of seven units:

- pollution, prevention and control;
- natural resources management;
- climate change;
- EIA;
- planning, policy and research;
- environmental education; and
- administration and finance.

As mentioned earlier, the governance of the Department of Environment is informed by three key policy frameworks, namely MZUKA III, the Zanzibar Environmental Policy (2013) and Zanzibar's Climate Change Strategy.

MZUKA III mentions climate change in Key Results Area D, 'Attaining environmental sustainability and climate resilience', which prioritises three outcomes:

- improved gender-responsive climate change adaptation and mitigation measures;
- marine and terrestrial ecosystems protected and restored, with reduced biodiversity loss; and
- environmental degradation prevented with reduced environmental and social risks of economic activities.

In order to address outcome 1, 'Improved gender-responsive climate change adaptation and mitigation measures', Zanzibar's 2016–2022 development agenda suggests the following strategic action plan:

- develop and implement Zanzibar climate change adaptation and mitigation measures/action plans;
- develop and operate the Zanzibar climate change financing mechanism;
- mobilise resources to implement the adaptation and mitigation measures of the climate change action plan; and
- promote the application of climate change mainstreaming and screening guidelines to ministerial plans and programmes.

Furthermore, the Department of Environment, in partnership with the Ministry of Information, Tourism, Culture and Sports, aims to develop Zanzibar's core capacity to respond to climate change, as well as prepare and respond to natural emergencies. One project is the Zanzibar Mapping Initiative, led by the government's Commission for Lands and supported by the World Bank. This project, launched in 2018, is the first of its kind, using drones to create a new aerial base map of Zanzibar. The drones capture images of mangrove forests, sites of seaweed farming, coral reefs and beaches. These images, and others, offer a great opportunity for monitoring change, which can support policy planning for environmental and climate change.[c] The Zanzibari government is also currently developing climate change-financing mechanisms in cooperation with the Ministry of Design.[d]

The Development Plan for 2016–2022 proposes a Climate Change Adaption Programme to strengthen the management of the environment, natural resources and climate change. It stipulates that the main intervention should be through planting mangroves in coastal areas and the construction of sea dikes, which will be funded by the Revolutionary Government of Zanzibar and the UN Development Programme (UNDP), and led by the Ministry of Land, Water, Energy and Environment.

Currently, Zanzibar is recognised under the United Republic of Tanzania climate strategy by the UNFCCC. While it is not officially classified as a small island developing state, it does experience unique climate vulnerabilities and risks from those outlined in the current National Adaptation Programme of Action (NAPA) for Tanzania. Therefore, the Zanzibari government recognises the opportunity for Zanzibar to directly access international climate finance to support critical adaptation projects. In order to do this, it has developed its own climate change strategy[e] and NAPA.[f]

The arrangement for attending the UNFCCC/CBD Conference of the Parties (COP) is like that of the Nairobi Convention, namely that there is one delegation for Tanzania, with representatives from both the mainland and Zanzibar. For example, at the Ninth COP to the Nairobi Convention, Esther Makwaia represented the mainland, and Dr Aboud Jumbe Zanzibar.[g]

a Revolutionary Government of Zanzibar, 'Zanzibar Strategy for Growth and Reduction of Poverty III (MKUZA III), 2016–2020'. Stone Town: Revolutionary Council, January 2007, p. i.

b *Ibid*

c Jumbe A, 'Climate Change Trends, Adaptation and Coastal & Marine Ecosystems in Zanzibar – Policy Aspects', Presentation at EbA Workshop, Dar es Salaam, 10 July 2019.

d *Ibid*.

e Revolutionary Government of Zanzibar, 'Summary of Zanzibar's Climate Change Strategy'. Stone Town: Government Printers, 2013.

f Revolutionary Government of Zanzibar, First Vice President's Office, 'Governance of Climate Adaptation in Small Island Developing States: Inception Report 2015'. The Hague: The Hague Institute of Global Justice, 2015.

g UN Environment, 'Nairobi Convention Focal Points', 20 December 2016, https://wedocs.unep.org/bitstream/handle/20.500.11822/21058/NAIROBI%20CONVENTION%20FOCAL%20POINTS%20AND%20THEIR%20ALTERNATES%20-%20DECEMBER%202016.pdf?sequence=1&isAllowed=y, accessed 30 October 2019.

Institutional and governance frameworks for EbA management in mainland Tanzania

The Division of Environment in the Vice President's Office (DoE–VPO) holds the mandate to coordinate climate change and environmental activities across mainland Tanzania. The VPO also handles Tanzania's international climate engagement, including being the National Climate Change Focal Point for the UNFCCC, as well as being responsible for the formulation and implementation of Tanzania's NDC. The DoE–VPO is also the focal point for other environmental issues, such as for the CBD.[30] It is mandated to enforce the implementation of various strategies, guidelines, policies and legislation in collaboration

30 Tanzania has also made international commitments through its National Biodiversity Strategy and Action Plan (NBSAP) 2015–2020 to the UN Convention for Biological Diversity (CBD). Tanzania's NBSAP sets and realigns national biodiversity targets to the Aichi Biodiversity Targets of the Strategic Plan for Biodiversity (2011–2020). One of its biodiversity targets is to increase the area covered under MPAs from 6.5% (2011) to 10% by 2020. Target 14 also states that, '[b]y 2020, ecosystems are restored and safeguarded, taking into account the needs of women, local and vulnerable communities'. This includes goals on mangrove restoration.

with other sectors, including Tanzania's National Climate Change Strategy (2012). Zanzibar participates in and is represented on the focal point committees.

The National Climate Change Steering Committee and the National Climate Change Technical Committee (NCCTC) are the government bodies responsible for climate change activities, with the former responsible for the analysis, policy guidance and coordination of climate change activities across sectors. The latter is tasked with providing technical advice to the national climate change focal point. Since its establishment in 2009 the NCCTC has had representation from state and non-state actors across a range of sectors. The main function of the committee is to guide research, review reports and advise the DoE–VPO on mitigation and adaptation issues related to climate change. However, it is an opportunity that is not yet fully realised owing to various operational shortcomings to date.

The National Environment Management Council (NEMC), located in the DoE–VPO, is the technical advisory, coordinating and regulatory agency responsible for protecting the environmental and sustainable use of the country's natural resources, including matters related to climate change. This council plays the role of environmental watchdog – supervising national environmental legislation and taking legal action against institutions or companies infringing the law.

The NEMC is also responsible for implementing the Environmental Management Act (EMA) 2004. The EMA is Tanzania's principal legal and institutional framework for the sustainable management of the environment, outlining principles of environmental management, environmental impact and risk assessment, prevention and control of pollution, waste management, environmental quality standards, public participation in environmental decision-making and planning; and for environmental compliance and enforcement implementation of international instruments on the environment. All project activities, especially oil and gas exploration, mining projects, ports and harbours, must comply with its relevant provisions, particularly the need to undertake an environmental and social impact assessment (ESIA) depending on the type of activity and scale.

The NEMC recognises that the way EIAs are currently undertaken does not adequately capture climate change risk and adaptation issues. It also plays an important role with regard to balancing the interests of diverse actors in the coastal zone, including developers, local businesses, institutions, lenders and financial institutions, and development partners. The NEMC is building up the organisational capacity needed to address this gap by developing new partnerships with research organisations and participating in training programmes.

As stipulated in the EMA, environment coordination units have been established in all sector ministries in order to facilitate coordination and communication on environmental management issues. These units are coordinated by the DoE–VPO and must prepare environmental reports every two years. According to the act, there should also be environmental officers in place at the regional, district and ward levels who are mandated to liaise with environmental sub-committees at the village level, forming a bridge between

grassroots realities and national planning and policymaking. These ultimately provide an important institutional structure for mainstreaming climate change issues and supporting the implementation of adaptation strategies within them. However, there is still some way to go in creating these positions, upskilling personnel and putting processes in place for effective coordination within and between different units and levels. In addition, the government has established a Special Environmental Police Unit in the Tanzania Police Force in order to strengthen law enforcement and compliance.

Since 1975 the government of mainland Tanzania has managed coastal and marine protected areas through the Marine Reserves Regulation of 1975. In 1994 the creation of the Marine Parks and Reserve Act led to the establishment of the Marine Parks and Reserves Unit (MPRU). In collaboration with the Ministry of Livestock and Fisheries, this semi-autonomous body is mandated to oversee the sustainable management and administration of marine parks in the terrestrial waters of mainland Tanzania (including Mafia Island). The main decision-making body of the MPRU is the board of trustees, which is made up of representatives from government, coastal communities, non-governmental organisations (NGOs) and the private sector. While mainland Tanzania heralds its achievement in reaching its marine coverage target of 13.5%, equivalent to 4 394.74km^2 of protected area, the government notes the inadequate protection of buffer areas surrounding marine protected areas (MPAs).[31] Given that there are currently no legal protection mechanisms for any ecological sensitive area bordering MPAs or in the exclusive economic zone, the government has expressed interest in expanding the coverage of MPAs by at least 10%, noting that this will be crucial to the 'improve [the] livelihood of local communities'.[32]

MPAs and marine conservation areas (MCAs, as they are known in Zanzibar) are proven to conserve and enhance fishery resources, owing to their ability to provide refuge for spawning fish. Furthermore, MCAs and MPAs have been recognised as 'the most favoured coral reef management tool to address issues of overfishing, habitat degradation, and to foster alternative livelihoods'.[33] In light of the rising incidences of climate-induced coral bleaching, these MCAs and MPAs are becoming increasingly important tools for balancing resource management with the protection of vulnerable ecosystems and biodiversity. These areas also serve as crucial grounds for advancing scientific research and data collection on marine biodiversity and vulnerable coastal communities. This information is vital – not only to enhance the skills and technical capacity of MCA and MPA management but also to inform and enhance government decision-making, particularly in the creation of climate change plans and policies.

Both the Marine Conservation Unit (MCU) in Zanzibar and the MPRU on the mainland recognise the need for greater coordination between government bodies and implementing agents. Furthermore, while the MCU and MPRU have adopted an

31 IUCN, 'Governance of Protected and Conserved Areas in Tanzania'. Gland: IUCN, 2017, p. 2.

32 *Ibid*., p. 9.

33 Kuboja BN, 'Policies and legal frameworks for marine protected areas governance in Tanzania mainland: Their potential and limitations for achieving conservation and livelihood goals', *Oceans & Law of the Sea*, 2013, p. 8.

ecosystem-based approach to the management of marine and coastal ecosystems, there is an opportunity to further this into climate adaptation strategies. At present, MPAs and MCAs play a fundamental role in establishing no-take zones to allow for coral and fishery restoration and rehabilitation, as well as education campaigns that focus on mangrove replanting and the consequences of dynamite fishing and illegal nets. Also, given the need for alternative, more sustainable income sources, there is a great opportunity to develop EbA projects in marine and coastal areas of mainland Tanzania and Zanzibar.

The MPRU currently manages three marine parks and 15 marine reserves, including the Dar es Salaam Marine Reserve System and the Tanga Marine Reserve System. The General Management Plan for the Mainland, created and implemented by the MPRU, serves as the primary management document for a period of between five and 10 years.[34] Developed in collaboration with local stakeholders, these plans identify threats to marine resources and the key management issues and opportunities arising from resource use, in addition to providing a framework for stakeholder participation.[35] Given the importance of local communities and user groups in the planning and management of MPAs and reserves, the government continues to prioritise mechanisms for strengthening the inclusion of local communities in the MPRU.

In Zanzibar, coastal and marine ecosystems are subject to separate government policies and legislative acts. The MCAs of Zanzibar are managed by the MCU, which, according to law, consists of representatives from the private sector, NGOs and local communities.[36] It works in collaboration with the Department of Fisheries and the Department of Forests and Non-Renewable Resources. On Zanzibar there are five MCAs (Tumbatu Island, Mnemba-Chwaka Bay, Menai Bay and Changuu-Bawe and Chumbe Island Sanctuary). Unlike mainland Tanzania, most MCAs are privately funded and managed. Given the government's financial constraints, intergovernmental organisations and NGOs (such as the World Wide Fund for Nature, or WWF), and private tourism companies (such as &Beyond) play a vital role in the promotion and protection of marine and coastal areas.

Policy frameworks and strategies relevant to marine and coastal EbA and climate change adaptation

There are over 30 national legislation documents with some relevance to coastal and marine resources and environment management. An additional 20 to 30 international conventions to which Tanzania is signatory are also relevant to the coastal zone. In many cases financial and human resources have constrained the effective implementation of the various legislative mechanisms, but they do generally complement each other.

34 *Ibid.*, p. 8.
35 *Ibid.*, p. 9.
36 Levine AS, 'Local responses to marine conservation in Zanzibar, Tanzania', *Journal of International Wildlife Law and Policy*, 2006, p. 184.

This report will focus on three climate change strategies: Tanzania's NAPA, National Climate Change Strategy (NCCS) and NDC. The other relevant strategy discussed below is the National Integrated Coastal Environment Management Strategy (NICEMS).

National Adaptation Programme of Action, 2007

The guiding framework for climate change adaptation in Tanzania is the NAPA, developed in 2007 for mainland Tanzania (a corresponding plan was initiated in Zanzibar in 2010).[37] Tanzania's NAPA aims to identify immediate and urgent climate change adaptation actions that can most effectively reduce the risks of climate impacts to sustainable development. The focus was initially on mainstreaming adaptation issues into widespread development processes. In 2009 the NAPA was expanded into the National Adaptation Strategy and Action Plan.

In preparation for the NAPA, vulnerability assessments were performed across key sectors (agriculture, energy, forestry and wetlands, health, human settlements, coastal, marine and freshwater resources), helping to prioritise and rank the top 14 adaptation activities countrywide. Given the importance of agriculture to the Tanzanian economy, it is not surprising that many of the key focal actions are centred on crop production, farming systems and improving yields:

- water efficiency in crop production irrigation to boost production and conserve water;
- alternative farming systems and water harvesting;
- alternative water storage programmes and technology for communities;
- community-based catchment conservation and management programmes;
- exploration and investment in alternative clean energy sources;
- promotion of co-generation in the industry sector for lost hydro potential;
- afforestation in degraded lands using more adaptive and fast-growing tree species;
- development of community forest fire prevention plans and programmes;
- establishment and strengthening of community awareness programmes on preventable major health hazards;
- implementation of sustainable tourism activities in the coastal areas and relocation of vulnerable communities from low-lying areas;
- enhanced wildlife extension services and assistance to rural communities in managing wildlife resources;
- water harvesting and recycling;

37 United Republic of Tanzania, 'Tanzania's National Adaptation Programme of Action (NAPA)'. Dodoma: Vice President's Office, Division of the Environment, January 2007.

- construction of artificial structures, eg, sea walls, artificially placing sand on beaches and coastal drain beach management systems; and
- establishment of a good land tenure system and facilitation of human settlements.

According to a report by the Centre for Climate Change Studies,[38] coastal and marine resources (as a sector) were ranked ninth out of 14 priority sectors for climate adaptation. This ranking is not based on a scientifically credible vulnerability assessment but on expert opinions gathered from multiple interviews, and therefore subject to bias.

In terms of coastal and marine adaptation response options, the NAPA specifically recognises the construction of artificial 'hard' structures, such as seawalls and groins, to protect coastal infrastructure against rising sea levels and more extreme weather events. This includes reinforcing the Pangai sea wall and constructing a new concrete wall along the coast of Dar es Salaam (see Box 3). In conjunction with these artificial engineering solutions, the NAPA also looks to rehabilitate coastal ecosystems to enhance ecological resilience to flooding, such as rehabilitating natural coastal defences through conserving mangroves in the Pangani, Rufiji and Bagamoyo districts.

Despite the development of the NAPA there is still little awareness of the climate adaptation process and decisions at the district level. In addition, no guidelines or specific coordination mechanisms have been identified to help with the implementation of the action plan.

BOX 3 THE CONSTRUCTION OF DAR ES SALAAM'S CONCRETE SEAWALL

Through a proposed project titled the Implementation of Concrete Adaptation Measures to Reduce Vulnerability of Livelihood and Economy of Coastal and Lakeshore Communities in Tanzania, the government has built a permanent 2 400m concrete wall to help protect the 5 million people living in Dar es Salaam, a coastal metropolis prone to flooding.

This project was modelled on Tanzania's NAPA, which identified 'the construction of artificial structures' as a priority to offset projected sea-level rise of between 0.45m and 0.9m over the coming century. Without major investments in adaptation, it is predicted that, between 2070 and 2100, an average of 800 000 Tanzanians could be impacted by flooding caused by rising sea levels annually. Sea-level rise is expected to cost about $200 million per year by 2050 in lost land and flood damage, USAID concluded in its most recent climate risk report for Tanzania.

38 Yanda P, 'Coastal and Marine Ecosystems in a Changing Climate: The Case of Tanzania', Climate Change Adaptation Series Document 1, University of Dar es Salaam, Centre for Climate Change & University of Rhode Island, Coastal Resources Center, March 2013, https://www.crc.uri.edu/download/TZ2010CC001_Yanda_508.pdf, accessed 15 March 2019.

With financial support from the Adaptation Fund, the Least Developed Countries Fund and the Government of Tanzania, UN Environment and the UN Office for Project Services have coordinated the seawall construction in seven sites along Tanzania's coast. A grant of $5,008,564 was awarded to the project in 2012 for a period of five years by the Adaptation Fund. An additional $3.34 million came from the Global Environment Facility's Least Developed Countries Fund.[a]

To enhance ecological resistance to flooding, the seawall project is complemented by 1 000ha of mangrove habitat restoration and 2 000m2 of coral reef restoration – both of which act as natural barriers against wave and tidal surges.

The project also aims to conduct a baseline study of coastal vulnerability and an assessment of the economic viability and practical feasibility of adaptation measures; create and operate a climate change observatory for Tanzania; document lessons learned; build district level administration capacity; and produce an Ecosystem-based Integrated Coastal Area Management Plan. In parallel, the UN and other agencies have embarked on a programme to improve storm water management through the construction of new drainage canals to help divert water from low-lying neighbourhoods.

a Allison S, 'Tanzania's climate change confusion', *Daily Maverick*, 10 October 2018, https://www.dailymaverick.co.za/article/2018-10-10-tanzanias-climate-change-confusion/, accessed 19 July 2019.

Tanzania's Climate Change Strategy, 2012

Tanzania published its NCCS in 2012.[39] It is the country's mitigation and adaptation vision going forward. Within this framework, the NCCS sets out eight key adaptation objectives, namely building adaptation capacity to climate impacts; enhancing the resilience of ecosystems to climate change; enabling accessibility and utilisation of the available climate opportunities; enhancing participation in climate mitigation activities that lead to sustainable development; improving public awareness; strengthening information management; enhancing institutional arrangements; and mobilising financial resources to address climate adaptation.

Several sectoral interventions were identified to build on these objectives, such as promoting rainwater harvesting, promoting sustainable coastal land-use planning, supporting alternative livelihood initiatives for forest dependent communities, and strengthening wildlife information database and management systems. Interventions for mitigation were also identified.

39 United Republic of Tanzania, 'Tanzania's National Climate Change Strategy'. Dodoma: Vice President's Office, Division of Environment, 2012, pp. 1–90.

This standalone strategy indicates that climate change is a prominent issue on Tanzania's national agenda, and it recognises that biodiversity conservation and sustainable use are key components of climate change adaptation and mitigation. It also attempts to integrate climate change into other sectoral policies and plans, including agriculture. As mentioned previously, 80% of Tanzanians earn their livelihood through smallholder farming, making it important to mainstream climate change adaptation measures in agricultural development strategies. In 2014 the Ministry of Agriculture, Food Security and Co-operatives published the Agriculture Climate Resilience Plan to outline the risks that climate change poses to agriculture in Tanzania, as well as a strategy for sustainable agricultural development and adaptation. Furthermore, with a close connection between freshwater and marine ecosystems, Tanzania has developed a water governance framework that supports integrated management for water resources in both terrestrial and coastal hydrological systems. The Integrated Water Resource Management framework supports multi-sectoral and multi-disciplinary water resource management and planning that integrates freshwater systems and coastal zones, as well as land and water uses.

Tanzania's Nationally Determined Contribution, 2020–2030

As per the requirements of the Paris Agreement, each country is expected to outline and communicate its post-2020 climate mitigation and adaptation action and plans, known as NDCs. Tanzania's Intended Nationally Determined Contribution (INDC,[40] which includes mainland Tanzania and Zanzibar) was submitted to the UNFCCC in 2015, for implementation by 2030.[41] Tanzania ratified the Paris Agreement on 18 May 2018, making its INDC a confirmed contribution (ie, an NDC).

The NDC is anchored on the National Climate Change Strategy (2012) and the Zanzibar Climate Change Strategy (2014). Its adaptation component aims to reduce the frequency of climate-related disasters (from 70% to 50%), as well as the impact of declining rainfall, droughts and floods on key productive sectors and ecosystems (particularly the agricultural sector). In addition, based on a conservative and a worst-case scenario of 50cm and 1m sea-level rise, the NDC will look at reducing the impact of sea-level rise on coastal communities, infrastructure and ecosystems.

The NDC makes specific mention of Tanzania's intended contributions in key sectors, including coastal, marine environment and fisheries. The following priorities in this area have been highlighted:

- strengthening the management of coastal resources and beach erosion/sea level-rise control systems;

40 United Republic of Tanzania, 'Intended Nationally Determined Contribution (INDC) for Submission to the UNFCCC'. Dodoma: Division of Environment, 2015.

41 In terms of Tanzania's plans to embark on a climate-resilient development pathway, it will reduce its greenhouse gases economy-wide between 10–20% by 2030 relative to the Business as Usual scenario of 138–153 million tonnes of carbon dioxide-equivalent gross emissions, depending on the baseline efficiency improvements.

- promoting livelihood diversification for coastal communities;
- improving monitoring and early warning systems of both sea level-rise impacts and extreme weather events to build adaptive capacity;
- enhancing programmes for the management of saltwater inundation and intrusion;
- implementing mangrove and shoreline restoration programmes; and
- enhancing conservation and fishery resource management.

Tanzania's NDC does not mention ecosystems or nature-based solutions to help achieve its climate adaptation goals, but there is scope to include and strengthen EbA in its approach.

Tanzania has made it clear that effectively implementing these adaptation contributions will require access to adequate and predictable financial resources; technologies; knowledge; and skills, as well as institutional capacity building. It is also clear that Tanzania's adaptation and mitigation actions depend international support. The NDC states that an initial estimate of start-up financing for enhancing adaptive capacity is about $150 million. In addition, about $500 million per year is needed to address climate change adaptation and building resilience up to 2020, increasing to $1 billion per year by 2030.

Integrated Coastal Environment Management Strategy, 2003

Integrated coastal management tools, such as Tanzania's NICEMS, are valuable means in defining the process by which multiple users in the coastal and marine environment are managed so that a wide range of needs are catered for, including biodiversity protection and sustainable use. These tools provide a framework for integrating climate change-related activities into the broader coastal and marine ecosystem development planning. The spatial tools are expected to identify vulnerable or critically important coastal areas of high biodiversity, where specific actions for conservation, restoration and sustainable use can be mapped out (often using zonation). MPAs, and preferably a national MPA network, are therefore essential components of integrated coastal management programmes.

Tanzania's NICEMS was adopted in 2003, for completion in 2025. Soon after its development the government introduced a new institutional structure that included a national steering committee, an integrated coastal management unit, and intersectoral working groups.[42] However, these groups have not been active since their establishment owing to a lack of project funding. In the absence of a fully implemented national integrated coastal management strategy, mechanisms have been developed at a local level that include District Integrated Coastal Management Action Plans. These identify local areas of high biodiversity and specify actions and role players for implementation. Pangani District in northern Tanzania, for example, has developed a district action plan for coastal

42 Akwailapo FD, 'Coastal Management in Tanzania', Paper presented at the UN–NF (Nippon Foundation) Alumni Meeting, Nairobi, 11–15 July 2011.

management that has a collaborative fisheries management plan and coral reef closures, identified and enforced by village representatives close by.

In the context of the country's increasing climate vulnerability, risk mapping that includes sea-level rise, inundation and erosion must become a more significant theme in national spatial analyses for coastal Tanzania. These spatial plans must also be accompanied by guidelines for EIAs in vulnerable areas, ensuring that climate change adaptation and risk measures are incorporated into planning and project design.[43] These plans must not only include the coastal zone but also consider incorporating holistic systems dynamics and a ridge-to-reef approach.

In order to take these concerns and other climate change considerations into account, in 2012 the NEMC established a group to review the NICEMS. The outcome was a revision of Strategy 4 intended to address inadequate intersectoral coordination and adaptation measures. This would be done through a number of actions, including an assessment of coastal vulnerability and an evaluation of adaptive management.[44]

Zanzibar has its own integrated coastal management frameworks, including the Integrated Coastal Zone Management of 2011. The Zanzibar Department of Environment, with support from the World Bank, developed integrated coastal management committees and action plans in 10 districts.[45]

Challenges and opportunities related to coastal and marine EbA in Tanzania

Challenges

Inconsistent and conflicting policy frameworks

The differing governance frameworks overseeing marine and coastal ecosystems often cause confusion, resulting in institutional and policy challenges that hamper the successful management of these ecosystems in mainland Tanzania.[46] For mangroves, situated between the land and the sea, this is particularly obvious. While the principal forest management jurisdiction lies with the TFS, under the MNRT, the issuance of mining permits for salt evaporation pans, for example, is the responsibility of the Ministry of

43 World Bank, DHI, Samaki Consultants & NDF (Nordic Development Fund), *Coastal Profile for Tanzania Mainland 2015: Portfolio of Actions – Investment Prioritisation for Resilient Livelihoods and Ecosystems in Coastal Zones of Tanzania*, Volume V, Final Draft, 2015, https://www.ndf.fi/sites/ndf.fi/files/attach/coastal_profile_volume_v_-_portfolio_of_actions_mainland_tanzania.pdf, accessed 20 July 2019.

44 USAID, 'Workshop Proceedings: Tanzania Coastal Climate Change National Adaptation' Planning Workshop, Bagamoyo, 7–8 March 2013, p. 11.

45 *Ibid*., p. 15.

46 Mangora M *et al*., *op. cit*., p. 42.

Energy and Minerals, while fisheries activities in mangroves (including mariculture) are the jurisdictional responsibility of the Ministry of Livestock and Fisheries Development. Furthermore, the Ministry of Lands and Housing is responsible for issuing permits to land developers in coastal areas. There have also been conflicts between the TFS and the MPRU on the tenure and management rights of mangroves that fall within MPAs. Coastal forests, like mangroves, are also governed by the TFS under the MNRT, which is the custodian of forests and wooded and wildlife-reserved areas. Similar confusion exists with coral reef systems, which are governed by the Ministry of Livestock and Fisheries Development.

This highlights the challenges of managing ecosystems in coastal areas where there are overlapping jurisdictions between forest management authorities and marine and coastal resource management authorities. This lack of clear coordination between conservation agencies and other ministries often results in ineffective ecosystem management. It also plays out in practice. Forestry agents, for example, cannot patrol areas of the high sea, on which illegal mangrove loggers often transport logs and poles. Marine patrol vessels can also not patrol the mainland for perpetrators of dynamite fishing.

Mechanisms to promote inter-sectoral coordination between ministries and departments become even more necessary in the face of climate change. In recognition of the importance of these ecosystems to enhanced climate resilience, climate adaptation needs to be mainstreamed among the various ministries mentioned above. In addition, climate change has the potential to destroy these ecosystems, while they in turn perform a mitigation function. It is thus crucial that discussions about climate change and ecosystem governance are better aligned and that the National Planning Commission plays a more proactive coordinating role.

Inadequate institutional arrangements and capacities

The elevation of environmental issues, including climate change, to the level of the VPO is a positive indication of the importance placed on integrating such considerations into various sectoral development efforts. However, the challenge remains in ensuring that the DoE is an effective coordinating unit, not just at the national level but also at the sub-national level. The environment units that have been established in various ministries will help to mainstream environmental and climate change issues through a wide variety of sectors. Current legislation also calls for environmental officers to be appointed at the regional, district and ward levels, but institutional, financial and human capacity constraints are hindering implementation.

As mentioned previously, the NCCTC, with representation from state and non-state actors across a range of sectors, is a potentially powerful forum for guiding climate change initiatives. However, this opportunity is yet to be fully realised owing to various operational shortcomings.

Although the necessary policy infrastructure is in place, the institutional infrastructure for implementing the policies needed to systematically address climate change is somewhat

lacking. Even established institutional arrangements suffer from governance challenges such as fragmentation, poor coordination and under-resourcing. While Tanzania has good institutional machinery, sufficient funds are needed to enable them to improve enforcement operations.

The VPO coordinates national and international climate policy, but there is only a small climate team that makes up the DoE. Ideally the DoE-VPO will develop into an important network for championing EbA and facilitating the integration of climate adaptation measures into sectoral policies and plans. However, at the moment environmental units in the line ministries oversee multiple environmental issues, including climate change, but none is dedicated solely to climate change-specific issues. This is the case within the ministries of Agriculture, Livestock and Fisheries; Energy; Water and Irrigation; and Natural Resources and Tourism. On the one hand, this has been framed by the government as a conscious decision to not create an 'artificial distinction' between issues. However, on the other, when climate is just one of multiple environmental issues it remains side-lined in planning processes.

The NEMC also has a capacity shortfall. According to a Norwegian report, the failure of exploration companies to adhere to environmental and socio-economic safeguards is in part owing to weak oversight on the part of the NEMC, responsible for approving projects and issuing licences. The lack of capacity at the NEMC to follow up, enforce and resolve development issues is seen as its main weakness, and it would benefit significantly from support, training and expansion in staff, facilities and expertise.

Besides numerous national policy documents relevant to coastal and marine resources and environment management, Tanzania is also a signatory to many other international conventions relevant to the coastal zone. While financial and human resources have constrained the diverse legislative mechanisms from operating at their full capacity, they do complement each other.

Lack of adaptive capacity of communities or marginalised groupings

The adaptive capacity of an average Tanzanian artisanal fisher or farmer is generally low. In many of the poorer areas along the coastline, there are limited 'viable' livelihood alternatives, low human capital and a challenged governance system that limits people's adaptive capabilities in cases of extreme weather. Also, as a result of the low productivity in the small-scale fisheries sector – the result of habitat destruction, stock depletion and climate change – fishers are using illegal and destructive fishing methods in the pursuit of quick returns, such as fishing with dynamite (blast fishing). To prevent this situation from worsening, considerable awareness raising is needed, as well as education on sustainable alternative livelihood development and stronger political will to enforce sustainable resource use and pre-empt climate impacts. Inadequate access and often-limited awareness of non-timber energy and building alternatives are constraining efforts to control the over-exploitation of valuable coastal ecosystems such as mangroves.

Female-headed households in many coastal communities are the poorest and most dependent on near-shore resources for food and income. Within these communities, women are mainly involved in farming, gleaning and collecting shellfish, sea cucumber and octopus, and catching small shrimp or sardines in the near-shore environment using nets or pieces of cloth.[47] Only a few women are engaged in small-scale fishing using small boats or canoes. Women are also involved in the processing and marketing of fish. Female traders tend to engage in long-distance retail trade in dried or fried fish (including sardines). But this is competitive and often restrictive owing to family responsibilities. Seaweed farming in coastal Tanzania and Zanzibar is also an important income-generating activity dominated by women, despite its being labour intensive. These traditional livelihood pursuits are being eroded through the degradation of coastal ecosystems such as mangrove depletion, and the intensification of exploitation in fisheries. The alternatives are often competitive, labour intensive, arduous and worse paid.

Production, synthesis and management of EbA-relevant information

Many challenges are associated with inadequate and inaccurate information about the extent and health of marine and coastal ecosystems in Tanzania. For example, there is little data on the extent and spatial distribution of mangroves and seagrasses, as well as on topography, biodiversity stocks, land ownership, erosion rates and water quality. This information is critical for the effective management of coastal resources.

While a growing number of open source software options, such as Geographic Information Systems (GIS), land-use maps and high-resolution images (Google Earth), can identify land-cover types in the study area, this data has been individually collected by and used in the specific activities of donors or individual organisations. There has been a call for a shared and structured directory for accessing geographical information in both Zanzibar and Tanzania. As such, GIS for the marine environment is now expanding and there are national plans to harmonise institutions in the collection and sharing of data.

Balancing trade-offs between economic development and the environment

Development choices can have a direct impact on the health and integrity of marine and coastal ecosystems. This includes infrastructural expansion for the construction of new hydroelectric dams, river water abstraction for agriculture, and coastal dune mining and illegal extraction of sand, water and vegetation. For example, the north-east coast of Tanzania, south of Bagamoyo, is a critical area for biodiversity (home to the CITES-listed coelacanth, as well as endangered sea turtles and migratory water birds). Despite its being declared the Tanga Coelacanth Marine Park and the Tanga Marine Reserve, there is currently a proposed port project, which will include an oil pipeline from Uganda, a storage facility and a jetty to offload oil. Consultation with local communities has been minimal,

47 World Bank Group, NDF, Samaki Consultants & DHI, *Investment Prioritization for Climate-Resilient Livelihoods and Ecosystems in the Coastal Zones of Tanzania*, January 2016, https://www.ndf.fi/sites/ndf.fi/files/attach/overview_publication_january_2016.pdf, accessed 10 August 2019.

and local NGOs have not been able to access or give input into the EIA. Additionally, a major cement factory is planned for the area. The same is true for the construction of the large-scale hydropower dam planned for the Selous Game Reserve World Heritage Site. Downstream changes to the river flow and loss of sediment could cause the Rufiji Delta, East Africa's largest mangrove forest, to shrink, and the offshore fishery, reputedly Tanzania's richest fishery, to decline. A recent WWF report[48] suggests the downstream impacts would affect 200 000 people's livelihoods, as well as the Rufiji-Mafia-Kilwa Marine Ramsar Site.

Opportunities

Partnerships to strengthen EbA-relevant information and promote awareness-raising

While government research institutes such as the Tanzania Fisheries Research Institute and the Tanzania Forestry Research Institute provide valuable scientific information and advice to policymakers on coastal zone management and climate change adaptation, they need additional support and capacity to translate scientific analysis into policy-relevant information. NGOs and research institutes play a constructive role in supporting decision makers with information generation and analysis. For example, the Tanzania Meteorological Agency is an NGO that collects, processes and distributes weather and climate data nationally to agricultural extension workers, water managers, conservation reserve managers, university staff and students, and other NGOs. The Institute of Marine Science (IMS) at the University of Dar es Salaam is another important contributor to research related to EbA. It is home to the National Oceanographic Data Centre and offers postgraduate and undergraduate training and consultancy services in all aspects of marine sciences. The IMS also conducts field activities such as community-based coral reef monitoring and restoration, although a lack of funds has hindered its undertakings. In addition, the Centre for Climate Change Studies at the university is a fast-growing training and research centre that carries out climate change-related research projects funded by international donors.

Other entities like the Western Indian Ocean Marine Science Association (WIOMSA), registered in Zanzibar, also help to promote the educational, scientific and technological development of all aspects of marine sciences in the region. WIOMSA's inter-disciplinary membership consists of marine scientists, coastal practitioners and institutions, providing valuable technical resources to advance marine science research and development in the region.

There are also other projects that require field data collection by communities or local stewards of the environment. For example, WWF-Germany, with support from the US Forest Service (USFS) and USAID, has developed a free, easy-to-use smartphone app called 'East Africa Mangrove Field Data Form' that enables local Tanzanians to collect vital data on

48 WWF (World Wide Fund for Nature), 'The True Cost of Power: The Facts and Risks of Building Stiegler's Gorge Hydropower Dam in the Selous Game Reserve, Tanzania', Report. Gland: WWF, 2017, p. 36.

mangrove extent, condition and species.[49] Launched in early 2018, this app, translated into Swahili, sends data collected in the field to a centralised and accessible database where users can view it in a map or use it for their own research. It can be opened in a computer browser or on a mobile device, which allows offline data collection. The database can be accessed via the WWF's GLOBI Online interactive map platform, and there is currently an interactive map in development, which contains mangrove mapping data from NASA's Carbon Monitoring System, and field data collected by the USFS and the University of Dar es Salaam.

Many active national and international NGOs and donor organisations are working on water management, conservation and community development issues in Tanzania. The Mwambao Coastal Community Network, for example, a Tanzanian NGO established in 2010, works alongside communities in Zanzibar to build the capacity of fisheries committees to collect, store, analyse and present data – not only to their communities, but also to the government's district fisheries department. In previous years, information gathered by local fisheries communities enabled Mwambao to develop the first continuous data set for octopus fisheries in Zanzibar. Mwambao has also expanded its reach and impact to the mainland by piloting a project that developed a network of blast fishing data recorders responsible for collecting and sharing information using a mobile phone application. Following this, Mwambao partnered with the WWF and Sea Sense to cover 24 locations along the coast. Data gathered by communities about blast fishing 'hot spots' helped the government to pinpoint the areas that need monitoring and protection by the government-led Multi-Agency Task Team.

The World Bank is also active in this space. In 2016 it produced a study that focused on investment priorities for climate-resilient livelihoods and ecosystems[50] for 2016–2025. The study identifies current and future challenges to coastal areas and recommends specific actions to be taken to address the most important threats to the coastal livelihoods and ecosystems of mainland Tanzania. The report suggests 63 actions that span a range of interventions. Some include systemic management actions such as integrated coastal zone management and the development of a spatial planning framework, while others consist of more specific actions targeting improvements in fisheries and coastal pollution from sewage and solid waste. For Zanzibar, the study prioritised 30 actions to address the most important threats to coastal livelihoods and ecosystems.

Despite the generation of information and awareness creation, projects that support the implementation of high-level processes (such as the implementation of protected area networks) are also essential.

49 McDaniels M, 'New smartphone app to collect information on east Africa's mangroves', Global Mangrove Alliance, http://www.mangrovealliance.org/new-smartphone-app-to-collect-information-on-east-africas-mangroves/, accessed 20 August 2019.

50 World Bank Group, NDF, Samaki & DHI, January 2016, *op. cit.*

Strengthening partnerships to increase government capacity to implement effective EbA projects

The marine programme of WWF-Tanzania has concentrated its efforts in the Rufiji-Mafia-Kilwa Seascape, a recognised Eastern Africa Marine Ecoregion of global importance. This seascape covers an area of approximately 9 000km^2 on the central Tanzanian coast. It includes the Rufiji Delta and the extensive coral reef areas of Mafia and Songo Songo islands. Programmes ran from 2004–2009 with the aim to improve the socio-economic well-being of coastal communities in Rufiji, Mafia and Kilwa districts, through promoting community-based management systems to regulate fishing efforts and eliminate unsustainable fishing practices. The WWF also introduced new mariculture technologies and micro-lending mechanisms.

Between 2000 and 2009 the International Union for Conservation of Nature was actively engaged in supporting natural resource management programmes in the districts of Rufiji (Netherlands grant), Tanga (Irish Aid) and Mnazi Bay–Ruvuma Estuary Marine Park and the Mafia Island Marine Park (French government support through the Global Environmental Facility). More recently, the Resilient Coasts Initiative in Eastern and Southern Africa addresses the vulnerability of ecosystems and livelihoods using a 'resilience framework' that aims to strengthen coastal socio-ecological systems in the WIO region by building the adaptive capacities of local coastal communities; enhancing the resilience of critical ecosystems and habitats; influencing coastal economic development to be more environmentally sustainable and socially equitable; and improving the effectiveness of local governance in managing these systems. Tanzania is a pilot country for this project.

There are also many NGOs in Tanzania that are key to working with local communities, promoting advocacy and raising awareness of marine ecosystems and coastal biodiversity. Sea Sense, for example, is a local NGO that works closely with coastal communities to conserve and protect endangered marine species. It started as the Tanzania Turtle and Dugong Conservation Programme in 2001 in Mafia Island. The project expanded to the mainland in 2004 and now operates in six coastal districts, covering approximately a third of the Tanzanian coastline. Sea Sense promotes local stewardship through access to information, learning opportunities and direct engagement in conservation initiatives. At a district level it advocates for greater engagement of coastal communities in decision-making processes affecting the use and management of marine resources. At a national level Sea Sense works closely with the government to implement the Indian Ocean–South-East Asian Marine Turtle Memorandum of Understanding and the UN Environment/Convention on Migratory Species Memorandum of Understanding on Dugong Conservation. At a regional level it works with colleagues across the WIO region to promote conservation benefits for shared populations of migratory species, and contributes to regional datasets and policy frameworks.

Sea Sense recognises that limited understanding of the link between climate change and fisheries at both the local and national level hinders the development and practise of EbA in the small-scale fisheries sector. Poor management and weak compliance

within the fisheries sector has resulted in the unsustainable exploitation of marine and coastal resources. The degradation of these fragile ecosystems has in turn exacerbated the livelihood uncertainty of dependent communities, further reducing their resilience to climate change impacts. As such, Sea Sense has been active in capacity building for Beach Management Units (BMUs), as well as supporting systems for women fish workers through existing networks. It also offers technical advice on seagrass conservation and restoration at the community and regional level.

Community-based organisations (CBOs) and networks are essential to promote EbA-related awareness at the grassroots level and to highlight opportunities for community members. For example, the Tanzania Women Fish Workers Association (TAWFA), founded in 2019, is a network of women from 24 regions, all actively involved in marine and freshwater fisheries. The primary goal of TAWFA is to raise awareness among both women and the wider fisheries community on the importance of an inclusive fisheries sector for sustainable economic development and environmental protection. Despite women's making up almost 50% of the workforce in both pre- and post-harvest fisheries, their contribution to the sector is poorly recognised at the local and national level. According to Khadija Malibiche, the secretary of TAWFA, the legislation and policies that govern the fisheries sector fail to recognise gender equality and do not promote an enabling environment for women.[51] The network maps female fish workers along Tanzania's coastal zone, supporting capacity building in business and entrepreneurship and encouraging the increased engagement of women fish workers in policy and legislation planning.

Recognising the vital importance of mangroves, Wetlands International launched a programme called Mangrove Capital Africa in November 2017 in the Rufiji Delta. From 2018–2020 Wetlands International, with support from the DOB Ecology Programme, seeks to launch participatory civil society platforms, adopt a new management plan for the delta, and start an extensive train-the-trainers programme. The project will consist of four building blocks: mangrove management and rehabilitation; sustainable livelihood activities through alternative mangrove economies; improved knowledge of the functions, values and threats to mangroves; and improved understanding of the policies and plans that support conservation, restoration and the wise use of mangroves. Since the implementation of the Mangrove Capital Africa programme, the extent of investment and work still needed in the Rufiji Delta has increased. It therefore invites more organisations to join the effort to conserve the mangroves of this area.[52]

Deepening relations with community actors to participate in EbA project design, implementation and conservation

In order to maintain healthy coastal and marine ecosystems, co-management governance models of governance to improve. Local marine resource governance institutions also need

51 Malibiche K, 'Presentation on Tanzania Women Fish Workers Association at the Tanzania EbA Workshop', Dar es Salaam, 10 July 2019.

52 Japhet E, 'Presentation on Mangrove Capital Africa Project Implementation Status and Learnings at the Tanzania EbA Workshop', Dar es Salaam, 10 July 2019.

to be strengthened, increasing the benefits from sustainable use of marine resources and improving policy and legislation to support community management. For example, *shehia* fishermen committees (SFCs) in Zanzibar and BMUs on Tanzania's mainland could play a useful role in project design and implementation for EbA. However, many CBOs have limited capacity to enforce legislation or to access sustainable financing.

Mainland Tanzania can learn from existing projects that promote collaborative community marine management. For example, Mwambao Coastal Community Network aims to develop an advocacy network to build capacity and resilience for the sustainable management of coastal marine resources, especially coral reefs. Over the years its role has evolved to support the implementation of grassroots-level activities, developing prototypes and strategies for improved community-based marine management. Mwambao's work currently focuses on three distinct geographic areas, namely Pemba Island, Unguja Island and north-east mainland Tanzania. By working with key international partners (such as Fauna and Flora International, Blue Ventures and the Indian Ocean Commission), Mwambao has successfully piloted and expanded new approaches to collaborative community marine management on Pemba and Unguja islands. This has been centred on the use and expansion of temporary closures or permanent no-take zones, using local by-laws and marine management plans to bolster these areas. By working through local institutions, integrating traditional practices and scientific approaches, and learning from international best practices in places like Madagascar, Mwambao is pioneering this collaborative management approach in Zanzibar by focusing on octopus as a quick-growing commercial species suited for catalysing interest in this approach. Today, Mwambao supports eight communities across 1 050ha to manage their octopus fisheries.

Other encouraging prospects also lie in developing enterprise and value-chain opportunities for communities.[53] Mwambao's future work, for example, will focus on increasing the financial benefits from octopus and fisheries catches.[54] In addition, it also supports the establishment of a fisheries 'bank', whereby revenue derived from octopus sales is divided between the SFC village, assigned individual fishers, and a community development fund. To date, revenue from the community development fund has been used to construct a primary school and expand the local health dispensary.

Besides providing both increased subsistence and income for coastal communities, there are other ecological co-benefits to periodic reef closure. For example, according to Science Advances, 'by reducing fishing pressure over periods of time, one increases the number of seaweed-eating fish, in turn decreasing the amount of harmful seaweed, which makes it easier for baby corals to get started and thrive on the reef'.[55] In turn, if corals are producing well, they are more resilient to the impacts of climate change and therefore perform an

53 Mwambao Coastal Community Network, 'Mwambao's 2018–2020 Strategic Plan'. Zanzibar: Mwambao, 2018, p. 24.

54 Sustainable aquaculture in the context of elevated demand for marine products includes exploring new production methods that improve efficiency and cost-effectiveness and new products that can be cultivated and marketed in a way that is not harmful to the marine environment.

55 Steneck R *et al.*, 'Attenuating effects of ecosystem management on coral reefs', *Science Advances*, 4, 5, 2018, p. 4.

adaptation function. Damage to natural habitats causes loss of spawning and nursery grounds, loss of biodiversity and diminished habitat resilience, which takes years, even centuries, to recover.

In terms of on-the-ground EbA project implementation, communities can provide a local workforce to help manage and implement restoration and conservation projects. In 2015 Mwambao (in partnership with Marine Cultures and Reef Ball Foundation) constructed and deployed 87 reef balls near Menai Bay Conservation Area in Zanzibar. Reef balls are artificial reefs in the form of concrete balls that aim to restore ailing coral reefs and create new fishing and tourism sites. Mwambao received permission for this pilot project from the Zanzibar fisheries authority. If successful, it will not only assist in the recovery of coral ecosystems but also serve as an entry point for strengthening co-management of the marine conservation area. The village just south of Jambiani has already requested its own reef ball project.[56]

Communities also form an essential component of marine protection through opportunities around enforcement and on-the-ground surveillance.

BOX 4 NEW FRAMEWORK FOR JOINT FOREST MANAGEMENT: MANGROVES IN THE RUFIJI DELTA

About 100km south of Dar es Salaam is the Rufiji Delta, the largest estuarine mangrove forest in East Africa, with an estimated surface area of 53 000ha. The extensive zone, extending to the Songo-Songo archipelago, comprises mangrove forests, intertidal flats, sandbanks, seagrass beds and extensive coral reefs intersected by deeper marine waters. It supports a wide diversity of flora and fauna, and is a habitat and nesting area for many migratory birds and threatened marine species. The Rufiji Delta is also the most important prawn fishing grounds in Tanzania, from which about 80% of the total commercial prawn catch is obtained.[a]

The delta's mangroves face a range of threats – from changes in flood regimes to saltwater intrusion and the over-exploitation of resources such as timber. Locals are becoming more reliant on mangrove products for their livelihoods. Pollution from agriculture, pulp and paper mills, population growth and, of course, climate change, poses further challenges to mangrove health. Rufiji's population is growing, with approximately 42 000 people living in the delta. These people depend on growing rice, sorghum, millet and cassava, seaweed farming, fishing, fish processing and trade, as well as tourism and handicrafts. Massive flooding in the 1990s changed the river's course, expanding the area suitable for rice farming, while immigration into the delta has simultaneously increased demand for agricultural land.[b]

56 MCCN (Mwambao Coastal Community), 'Reef Ball Project: Coral Reef Recovery Pilot Site Jambiani, Unguja Zanzibar', http://www.mwambao.or.tz/reefball-project-coral-reef-recovery-pilot-site-jambiani-unguja-zanzibar/, accessed 17 June 2019.

The Rufiji Delta is home to Tanzania's (and the region's) most important mangrove area, as well as a large population of extremely vulnerable people

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Tanzanian law currently protects mangroves, given that they are the property of the state (even though the government initially encouraged people to settle in the delta in the early 1970s). The TFS patrols the area despite limited capacity, confiscating illegally cut logs and dhows to discourage further deforestation. However, the system of penalties has had little success and alternative solutions for local management rights and enhanced empowerment are needed.

A new USAID report[c] compares and analyses three different models of community engagement currently being pioneered in the Rufiji Delta. The first is the use of individual farming permits (between the villager and the TFS), whereby farmers apply for renewable one-year licences that allow them to continue farming rice in exchange for facilitating the natural regeneration of mangrove trees on their plots. However, once the trees reach a certain height, their shade makes the rice paddies less productive. This creates an incentive for farmers to intentionally prevent mangrove recovery. Formal, legally binding agreements have also proven unsuccessful, as most people living in the delta are illiterate. Second, the report analyses opportunities and challenges related to the maintenance and rehabilitation of mangroves by community members. With support from the UNDP and UN Environment, groups of 15–30 local men and women are assigned sections of mangrove forest and are paid for each day they spend replanting or weeding. While some community members benefited from the new form of income, others felt excluded. There was no entrenched sense of ownership, with casual labour only active when paid. Last, the report considered a joint management system that is currently being trialled in four villages in the delta as part of the Tanzanian Participatory Forest Management Programme. The TFS has negotiated with individual communities on behalf of the government to draw up plans for sharing the costs and benefits of managing the mangrove forest. Although the state retains

ultimate ownership of the mangroves, this is the only scheme that transfers some decision-making power to local people. It is therefore seemingly the most successful.

a Annual Fisheries statistics for 1996, quoted by Muhando C &CK Rumisha, *Distribution and Status of Coastal Habitats and Resources in Tanzania*. Dar es Salaam: WWF, 2008, p. 115.

b Evans K, 'Protecting Tanzania's mangroves: Why the current conservation scheme is falling short, and alternative approaches to strengthen it', *Forests News*, 1 February 2017, https://forestsnews.cifor.org/48023/protecting-tanzanias-mangroves?fnl=en, accessed 10 May 2019.

c Mshale B, Senga M & E Mwangi, *op. cit.*

Financing coastal and marine EbA in Tanzania

Blue carbon projects

While there are currently no operational blue or coastal/marine carbon projects on the mainland or Zanzibar, the country has a lot to learn from the experiences in neighbouring countries. This includes Mikoko Pamoja, a community-led mangrove conservation and restoration project based in southern Kenya that provides long-term incentives for mangrove protection and restoration through community involvement and benefit.[57] Located in Gazi Bay and operational since 2010, communities protect and restore mangroves and, in turn, sell the carbon credits to international buyers for about $5–6 a tonne. The money goes into financing more forest protection and restoration, and to community-chosen development projects.

The successes of Mikoko Pamoja are currently being replicated on Kenya's south coast at Vanga, and there are many other opportunities for its application in other mangrove-rich WIO countries, including mainland Tanzania's northern marine park near Tanga. Mainland Tanzania has a lot to learn from the factors that have aided the success of Mikoko Pamoja. There are some site-specific factors, such as the close relationship between the project developers and community, and the latter's engagement in the design process. Importantly, community members benefit directly from the revenues generated from selling mangrove carbon credits. In addition, Mikoko Pamoja was developed by a Community Forest Association and includes a zonation map detailing the activities of different stakeholders in the project area. The plan is approved by the Kenya Forest Service – Kenya's state agency in charge of forest management. This agreement is a legal tool for the implementation of the Participatory Forest Management Plan and officially secures community ownership of carbon credits. This inclusive stakeholder process is important for the lifecycle of the project, and includes village-level meetings and group discussions to promote general understanding of the significance of mangrove ecosystems and the use

57 Plan Vivo Foundation, 'Mikoko Pamajo – Kenya', http://www.planvivo.org/project-network/mikoko-pamoja-kenya/, accessed 20 August 2019.

of carbon credits. Also, carbon-offset projects are complex and require a rigorous scientific basis to determine carbon stocks and baselines. In the case of Mikoko Pamoja, the Marine and Fisheries Research Institute assisted the project as the technical partner.

Exploring financial opportunities related to sustainable eco-tourism

Chumbe Island Coral Park Limited (CHICOP) on Chumbe Island, Zanzibar offers a financially sustainable model of private, not-for-profit MPA management through ecotourism.[58] CHICOP reinvests the revenue generated from ecotourism back into MPA management and environmental education programmes, based on community engagement and scientific knowledge to guide and inform better decision-making. The implementation of ecologically sustainable architecture and operations has minimal impact on the sensitive ecology of the island, while promoting social resilience through the employment of 42 local people, access to sponsored education, long-term loans, and the creation of markets for local produce and handicrafts. CHICOP offers environmental education programmes through field excursions to Chumbe (for teachers, community members and government officials), raising awareness of the importance of marine and coastal biodiversity. There is also private sector investment in forest conservation and mangrove restoration. This ecotourism business model follows commercial principles for maximising revenue and promoting cost-effectiveness, making the MPA 100% self-financing.

Escalating Tanzania's commitments to REDD+

Tanzania's Reduced Emissions from Deforestation and Forest Degradation (REDD+) Strategy (2012) addresses the current use of forest resources, proposing strategies to halt forest deforestation and degradation. REDD+ creates a financial value for the carbon stored in forests, including coastal forests and mangroves. When countries better manage and protect forests, and provide sustainable development opportunities for local forest communities, forest loss can be reduced. Carbon dioxide that would have been emitted into the atmosphere if the forests had been cleared remains stored in the standing trees. Once verified through the REDD+ mechanism, countries receive financial payments for these reduced emissions. Mangrove ecosystems store vast amounts of carbon and are already included in REDD+, if only to a limited extent. It is important to advocate this at national level in order to pursue and expand the conservation/restoration of coastal and mangrove forests in Tanzania though REDD+ opportunities.

Expanding Tanzania's Bonn Challenge and AFR100

Tanzania is losing an estimated 469 000ha of forest per year – a 25% increase from three

58 Riedmiller S, 'Establishment of a financially sustainable model of private MPA management through ecotourism', Panorama, 28 January 2016, https://panorama.solutions/en/solutions/financially-sustainable-model-of-private-mpa-management-through-ecotourism, accessed 13 March 2019.

years ago. Its forests are continually under pressure to fulfil both domestic and international demand, which far outstrips supply. Meanwhile, land degradation in Tanzania has increased to 50% today from 42% in the 1980s.[59] A recent assessment report by the VPO estimates that about 13% (125 000km2) of the country is affected by land degradation.

In August 2018 Tanzania announced it would restore 5.2 million ha of degraded land by 2030. The commitment is part of the African Forest Landscape Restoration (AFR100) Initiative under the Bonn Challenge, a global effort to restore 100 million ha in Africa and 350 million ha globally by 2030. WWF-Tanzania has committed to supporting the TFS's efforts towards promoting restoration and tourism in the coastal forests of Pugu, Vikindu and Kazimzumbwi in the Dar es Salaam and Pwani regions. Forest landscape restoration can include mangrove planting, as well as the restoration and rehabilitation of other important marine and coastal ecosystems. There are vast opportunities to extend this commitment to include coastal and marine ecosystem restoration projects.

Conclusion

Given the projected impacts of climate change and the vulnerability of Tanzania's people, particularly women, building resilience to short-term climate variability and long-term climate change is a critical development issue for the country, especially in the context of its vision of economic transition over the coming decades. The current scenarios and predictions of climate change impacts could prevent Tanzania from achieving key economic growth, development and poverty-reduction targets in the near and long term. In order to make these targets, multiple adaptation and planning approaches still need to be prioritised to address climate change impacts. For a country like Tanzania, with a long and vulnerable coastline and home to ample vegetation and biodiversity, marine and coastal ecosystems should be central to climate adaptation. These ecosystems offer a multitude of services to help buffer the coastal zone and its communities, countering the increased risk posed by sea-level rise or waves reaching key assets (eg, homes, infrastructure and business).[60] These ecosystems not only offer climate change protection and buffer sensitive coastlines but also enhance socio-economic development goals through the ecosystem services they provide.

Tanzania, with a long and vulnerable coastline and home to ample vegetation and biodiversity, marine and coastal ecosystems should be central to climate adaptation

59 WWF, 'Tanzania announces historic move to restore 5.2 million hectares of degraded land', 13 August 2018, http://wwf.panda.org/?332953/Tanzania-announces-historic-move-to-restore-52-million-hectares-of-degraded-land, accessed 30 October 2019.

60 UN Environment, 'What is EBA?', http://web.unep.org/coastal-eba/what-is-eba, accessed 15 June 2018.

While the importance of coastal and marine ecosystems is recognised within mainland Tanzania and Zanzibar, EbA as a concept has not really gained widespread traction among all stakeholder groupings and within climate change policy broadly. Tanzania has numerous policy frameworks in place to guide its climate adaptation priorities, yet these still have a way to go with regard to incorporating and mainstreaming marine and coastal ecosystems into climate response strategies. This includes, among others, the incorporation of coastal ecosystems into the next iteration of Tanzania's NDC to the UNFCCC, as well as the lack of explicit references to EbA in its Climate Change Strategy.

There are also still numerous policy and institutional constraints in Tanzania in terms of promoting the sustainable management and use of coastal and marine ecosystems specifically. For example, since the development of the nationwide MMP in 1991 a lot has changed in the context of managing mangroves. It is therefore imperative to revive and update this strategy at the national level and apply it through local plans at the sub-national level. Additionally, new policies and legislation in other related sectors directly affect mangrove forests. A well-implemented national MMP will fill the vacuum resulting from the lack of mangrove-specific policy and legislation and provide coherence to mangrove conservation and management. The same is true for coral reef systems. There is no clear coral reef action plan or strategy to guide national stakeholders.

To date only a few EbA projects are operational in Tanzania, and those that do exist tend to be isolated and limited in scale. While the government of mainland Tanzania recognises that EbA is an important contributor to this process and provides valuable benefits for people and ecosystems, it also believes that other non-ecosystem-based solutions are necessary to address the destructive impacts of sea-level rise. Notably, its NAPA identifies engineering and mechanical activities as the preferred responses to rising sea levels. It is imperative that softer, nature-based engineering responses become a central element of coastal protection, including the rehabilitation and restoration of key coastal ecosystems.

Many of the operational EbA schemes rely solely on donor funding, which compromises their sustainability beyond the lifecycle of the project. There is thus a need to strengthen knowledge and action within the public and private sector around the opportunities for innovative financing and investment to support marine and coastal EbA.

Also, it is crucial to strengthen the capacity of government (for example, the national regulator of development) to ensure that destructive practices in the coastal zone, and in upstream environments, are curtailed as a matter of urgency and that environmental use is regulated and strictly enforced. New and envisaged economic developments in the marine and coastal zone, such as oil and gas, mining, hydropower dam construction and port development, need to undergo thorough ESIAs, which include climate change considerations in their processes. These may be a valuable mechanism for ensuring that vulnerable marine and coastal ecosystems are protected for their future climate adaptation services and functions.

EbA also offers Tanzania the opportunity to fully integrate its climate change concerns into its coastal zone and marine management planning and response strategies. In this regard mainland Tanzania's integrated coastal management strategy urgently needs to be revised and financed in order to support its implementation. This spatial development planning tool is needed to accommodate the increasing multiple uses in coastal areas. At the sub-national level, such as in the Rufiji Delta, spatial plans should be adopted and enforced. This must include a consideration of processes that take place outside of the delta but that impact the health of the mangrove ecosystem. Besides integrated coastal zone management, other similar tools can be used to increase resilience and adapt to climate change, such as integrated land and water use management, and shoreline and waste management planning.

There are significant challenges related to scaling up EbA efforts, as well as incorporating EbA into national, sub-regional and local climate policies and strategies. In addition, Tanzania lacks implementation means such as adequate spatial data, capacity, technology, law enforcement, alternative/improved livelihood planning, and awareness raising and education. Here, a wide variety of national and international stakeholders can help the government to achieve its objectives. Key to its success is the inclusion and participation of communities through co-management models. The government can learn from the experiences of active non-governmental entities and CBOs in strengthening local marine management institutions. These institutions can develop and enforce their own community by-laws to prevent illegal or destructive fishing practices. This in turn will help preserve threatened marine and coastal ecosystems (particularly coral reefs), which will improve resilience to climate change along its coastal areas.

An important part of an inclusive EbA approach is the identification and analysis of sustainable coastal livelihood strategies that support local development and income generation. This includes a range of potential opportunities, such as butterfly farming for export, beekeeping, and mariculture options for shrimp, milkfish, mud crab, oyster and pearl production. Likewise, seaweed farming is another potential opportunity, particularly for women in the coastal zone.

African perspectives.
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