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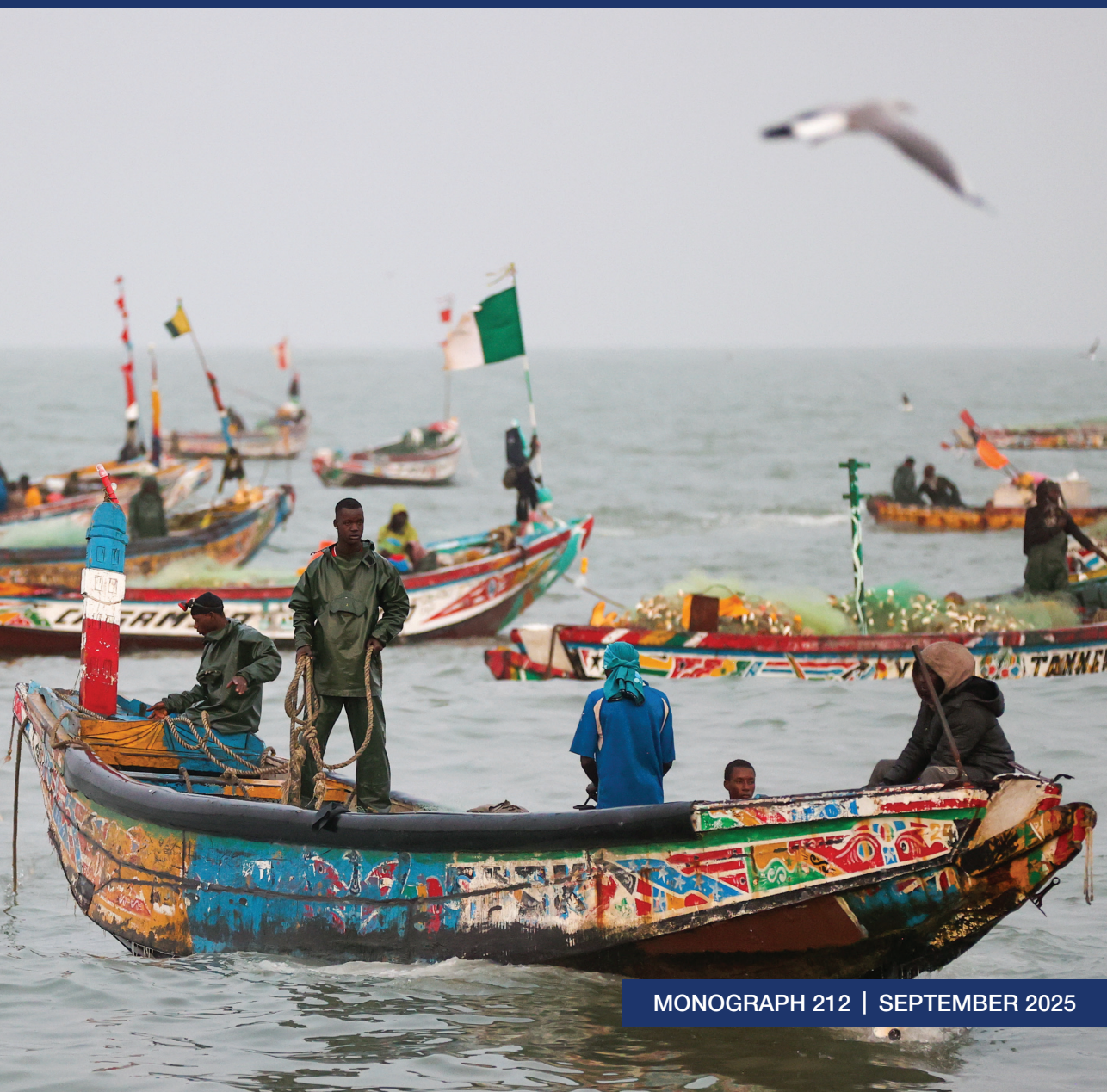
Africa's blue economy and climate change

Status and emerging pathways

Judy Beaumont, Shannon Hampton and David Willima



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Contents

Executive summary

The African Union (AU) defines the blue economy as the sustainable use of ocean and aquatic resources to promote economic growth, improve livelihoods and create jobs while ensuring the preservation of aquatic ecosystems. This framework is integral to Africa's development agenda, Agenda 2063, which aims for inclusive economic growth, environmental resilience and sustainability. The blue economy has the potential to be a major driver of economic transformation across Africa. Blue economic growth needs to be considered within the broader implications of climate change and resilience, inclusivity and sustainable development.

Africa's marine and inland resources are essential for food security and economic stability. However, challenges such as overfishing, pollution and habitat destruction threaten marine biodiversity and economic activities. Climate change exacerbates these challenges through rising sea levels, ocean acidification and shifts in marine ecosystems, impacting fisheries, coastal communities and tourism. The potential for renewable energy, particularly offshore wind and wave energy, could transform Africa's energy landscape, meeting local energy demands and driving economic development. Emerging opportunities exist in blue carbon initiatives and marine biotechnology.

Africa's blue economy presents significant opportunities for economic growth, poverty alleviation and environmental protection

However, governance remains a critical challenge in maximising the benefits of the blue economy. Regional cooperation and international support are essential to strengthen governance and implement effective conservation and economic strategies.

Investment in a sustainable blue economy is necessary to support economic diversification and the security of food and livelihoods to take advantage of opportunities for climate-resilient growth. Africa's blue economy presents significant opportunities for economic growth, poverty alleviation and environmental

protection. However, realising this potential requires integrated strategies, strong governance, investment in sustainable technologies and proactive climate action. By leveraging marine resources responsibly, Africa can achieve its developmental goals while contributing to global efforts to combat climate change.

Key recommendations

- **Regional and international collaboration:** Promote regional cooperation to harmonise policies and manage shared resources, such as fish stocks, through joint enforcement mechanisms and data sharing. Collaborate with global organisations to secure funding and technical assistance for sustainable, climate-resilient blue economy initiatives.
- **Implement ecosystem-based management:** Adopt ecosystem-based approaches for fisheries, tourism and resource exploitation to balance economic activities with sustainable development goals.
- **Promote fairness and equity:** Ensure that blue economy initiatives benefit vulnerable communities, address inequality and incorporate local knowledge into planning and decision making.
- **Diversify economic activities:** Reduce reliance on single industries (e.g. oil or fisheries) by investing in renewable energy, biotechnology, aquaculture and ecotourism. Expand value addition in sectors like fisheries by increasing local processing and reducing post-harvest losses.
- **Strengthen coastal and inland food systems:** Invest in resilient food systems, including sustainable aquaculture and agriculture, to address food insecurity exacerbated by climate change.
- **Build resilient infrastructure:** Invest in climate-resilient infrastructure for ports, coastal cities and renewable energy installations to adapt to sea level rise and extreme weather events. Modernise port facilities to improve efficiency and reduce environmental impacts, incorporating clean energy and waste management technologies.
- **Leverage technology and innovation:** Promote the use of advanced monitoring and surveillance systems to combat illegal, unreported and unregulated fishing and maritime crime. Develop technologies for renewable energy generation, such as offshore wind and wave energy.
- **Enhance capacity and stakeholder participation:** Build the capacity of local communities and stakeholders through education, training and resources to participate in the blue economy. Engage local and indigenous communities in sustainable development planning to ensure social inclusion and equitable resource distribution.

- **Mitigate climate change impacts:** Develop climate risk assessments for key sectors, such as fisheries, port infrastructure, tourism and energy, to guide adaptation planning. Incorporate nature-based solutions like mangrove restoration and blue carbon initiatives to enhance coastal resilience.
- **Transition to renewable energy:** Use revenue from oil and gas exports to invest in renewable energy projects. Promote natural gas as a transitional energy source while developing offshore wind, wave and tidal energy projects.
- **Preserve biodiversity:** Expand marine protected areas and strengthen enforcement to safeguard critical habitats. Promote ecotourism to fund conservation and highlight the economic value of intact ecosystems.
- **Mobilise funding:** Secure and incentivise public and private investments in sustainable blue economy projects, leveraging partnerships with development banks and international agencies. Explore innovative financing mechanisms, such as blue bonds, to support conservation and climate adaptation.
- **Adopt adaptive management:** Plan for uncertainty by designing policies and infrastructure that can adapt to evolving climate and economic conditions.

Acronyms

AfCFTA	African Continental Free Trade Area
AMU	Arab Maghreb Union
AU	African Union
AU-IBAR	African Union-InterAfrican Bureau for Animal Resources
CEN-SAD	Community of Sahel-Saharan States
CHICOP	Chumbe Island Coral Park
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECCAS	Economic Community of Central African States
GDP	gross domestic product
IGAD	Intergovernmental Authority on Development
IMO	International Maritime Organization
IUU	illegal, unreported and unregulated
LNG	liquefied natural gas
NGO	non-governmental organisation
RECs	regional economic communities
SADC	Southern African Development Community
SEYCCAT	Seychelles Conservation and Climate Adaptation Trust
UNCLOS	United Nations Convention on the Law of the Sea
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change

Chapter 1

Introduction

The African Union (AU) has identified the blue economy as the next frontier of Africa's development. It defines the blue economy as the sustainable use of ocean and aquatic resources for economic growth, improved livelihoods and jobs, while preserving the health of ocean and aquatic ecosystems.[1] The AU's Africa Blue Economy Strategy envisions an inclusive and sustainable blue economy that significantly contributes to Africa's transformation and growth. The strategy emphasises the importance of governance and coordination in blue economy development, identifying mechanisms for coordinating various components of the blue economy. It aims to guide the development of a blue economy that becomes a significant contributor to continental transformation and growth, through advancing knowledge on marine and aquatic biotechnology, environmental sustainability, the growth of an Africa-wide shipping industry, the development of sea, river and lake transport, and the management of fishing activities in aquatic spaces.[2]

This is critical in light of high levels of poverty on the continent – in Sub-Saharan Africa about 37% of the population were living in extreme poverty in 2023.[3] The population on the continent is expected to continue to grow. Many people, particularly the youth, are not formally employed. Numerous countries have high levels of debt and there are still some where political instability hampers economic development.[4] Opportunities for economic growth and job creation are therefore crucial.

> The AU-Inter African Bureau for Animal Resources estimates that by 2030 the continent's blue economy will be worth about US$405 billion and 57 million jobs

In Africa, the blue economy contributes substantially to gross domestic product (GDP) and job creation. The AU-Inter African Bureau for Animal Resources (AU-IBAR)[5] estimates that by 2030 the continent's blue economy will be worth about US$405 billion and 57 million jobs. The AU emphasises that the blue economy is not only about economic gains but also about environmental stewardship and social inclusion. By focusing on sustainable practices, the AU

aims to ensure that Africa's vast aquatic resources contribute to food security, poverty alleviation and overall economic transformation, while also protecting the continent's rich marine biodiversity.[6]

The AU's blue economy encompasses five key priority areas: fisheries and aquaculture; tourism, especially coastal and marine tourism; the maritime transport sector; the extraction of oil, gas and minerals; and institutional governance, employment, job creation and poverty reduction.[7] It faces several challenges including climate change, pollution, overfishing and habitat destruction. There are also governance issues such as the need for stronger cross-sectoral regulatory frameworks and better enforcement of existing laws.

The blue economy also presents numerous opportunities – sustainable use of marine resources can drive economic growth, create jobs and improve food security. It can also help address climate change by promoting the use of renewable energy, blue carbon capture and protecting and conserving marine ecosystems.

Dependence on the ocean is particularly significant for island nations where marine resources are crucial for livelihoods, food security and economic activities

Any analysis of Africa needs to be aware that it is a continent of remarkable diversity, encompassing a wide range of cultures, economies, governance structures, conservation policies and degrees of dependence on the ocean. Culturally, Africa is home to over 3 000 ethnic groups, each with its unique languages, traditions and customs, contributing to a rich tapestry of cultural heritage.[8] Economically, the continent varies significantly, with some countries like Nigeria and South Africa having relatively large and diversified economies, while others rely heavily on specific sectors such as agriculture or mineral resources, or depend on artisanal or small-scale agriculture and fisheries.

Governance structures also differ widely, from stable democracies with robust institutions to countries facing political instability and conflict. In terms of conservation policy, nations like Seychelles, Kenya and South Africa have advanced frameworks and dedicated protected areas to conserve their rich biodiversity, while others are still developing their conservation strategies amid various socioeconomic challenges.

Dependence on the ocean is particularly significant for island nations where marine resources are crucial for livelihoods, food security and economic activities like tourism and fisheries. Africa's population is also increasing and predicted to reach 2.4 billion people by 2050.[9] This diversity highlights the complex and

multifaceted nature of the continent, requiring tailored approaches to policymaking and development initiatives and acknowledgement that there is no one-size-fits-all solution to issues.

Sources of additional information

Key sources for learning more about the African blue economy include the AU, which provides strategic frameworks like the Africa Blue Economy Strategy and the United Nations Economic Commission for Africa (UNECA), offering policy handbooks on sustainable ocean use. The World Bank and African Development Bank also play pivotal roles in supporting and financing blue economy projects across Africa, with reports highlighting opportunities in sectors like fisheries and coastal tourism. Additionally, the UN Environment Programme focuses on marine ecosystem protection and blue carbon, and the Nairobi Convention Secretariat has recently published extensive research as background to the Regional Ocean Governance Strategy for the Western Indian Ocean (Nairobi Convention Secretariat 2024). The Western Indian Ocean Marine Science Association conducts research on marine conservation. The Institute for Security Studies addresses maritime security and governance issues relevant to the blue economy. This is not an exhaustive list and does not include many of the organisations that contribute significantly to sectoral knowledge, nor the various initiatives that are happening on a national level throughout the continent.

Climate change implications for Africa's blue economy

The ocean is the world's largest carbon sink, absorbing excess heat and energy released from rising greenhouse gas (GHG) emissions. Almost 90% of the heat generated by rising emissions has been taken up by the ocean, resulting in warming that has cascading effects, including changes in chemistry, circulation, sea level and ice distribution.[10] The ocean has also taken up 30% of human-induced carbon dioxide emissions since the 1980s, significantly increasing the overall ocean acidity, although with regional differences in severity and rate of change.[11, 12]

Africa is disproportionately affected by climate change, with parts of the continent warming at a faster rate than the global average.[13] Climate extremes are becoming more frequent and severe with average annual economic losses of 2%–5% of GDP.[14] As the continent's coastal communities and marine ecosystems increasingly experience rising sea levels, ocean acidification, marine heatwaves and extreme weather events, the economic, social and environmental sustainability of the blue economy is under threat.

Climate change amplifies existing challenges. Loss of biodiversity in Africa is expected to escalate with every 0.5°C of temperature increase. Reductions in

agricultural productivity in Africa are expected to be higher than any other region, with shortened growing seasons, increasing water stress and significant threats to African marine and freshwater fisheries posing severe risks to food security.[15] In coastal areas, increased population growth and urbanisation will drive exposure of people, livelihoods and infrastructure to sea level rise, with between 100 million and 250 million people at risk of displacement, loss of livelihoods and damage to infrastructure between 2030 and 2060.[16, 17]

In Sub-Saharan Africa, adaptation to the impacts of climate change is estimated to cost US$30 billion-US$50 billion per year, or 2%–3% of regional GDP.[18] An assessment of risks to economic growth and development for African countries by African Development Bank (2019) concluded that there were serious economic consequences and development risks for most African countries associated with any level of climate-related warming, with between 10% and 15% reduction in GDP by 2050. Countries facing the most serious economic vulnerability to climate change include Liberia, Sudan, Tanzania, Mauritania and Morocco – all of which are coastal countries.

These potential economic consequences prompted a resolution at the UN Sustainable Development Goals Summit in 2019, encouraging member states to not only adopt economic policies, but also climate change policies within blue economy development strategies, to find a balance between economic and climate change concerns.[19]

Coastal cities are at the frontline of blue economic development and coastal change risk. They are often central to the growth of blue economies and sites of blue economy activity. They are gateways of trade and transport. They provide municipal services that can support or undermine blue economy sectors. Coastal cities are also key to the coastal and marine tourism sector. The potential for multiple and cascading impacts on Africa's coastal cities should be considered as a risk to the continent's blue economy aspirations.

Estimates of potential damage due to sea level rise and coastal extreme events in 12 major African cities[20] show an aggregate of expected damage to these cities in 2050 of between US$65 billion and US$137.5 billion, and up to US$397 billion for low-probability, high-damage events.[21] This can lead to social and economic disruptions, as well as potential conflicts over land and resources.

For example, in Lagos, Nigeria, it is estimated that over two million people are at risk of displacement due to sea level rise and coastal flooding by 2050.[22] In Dar es Salaam, Tanzania, around 70% of the city's population live in informal settlements along the coast, putting them at risk of displacement and loss of livelihoods due to coastal flooding and erosion.[23] Extreme weather events and climate-associated uncertainty will impact blue economic development and societal stability.

Chapter 2

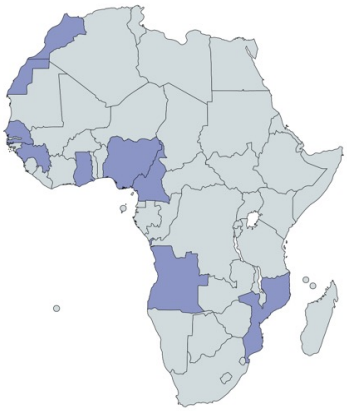
Africa's blue economy and climate change: key sectors

Exploitation of living marine resources in the face of climate change

Fisheries in Africa need to be seen in the broader context of food security for the continent. Climate change has the potential to affect food security at multiple levels: loss of rural livelihoods and income; loss of marine and coastal ecosystems and livelihoods; loss of inland water ecosystems and livelihoods; and reduction of terrestrial food production capacity.[24] Taken together, this creates severe risk of breakdown of food systems and resulting food insecurity. In 2023, the prevalence of moderate or severe food insecurity in Africa (58%) was nearly double the global average.[25]

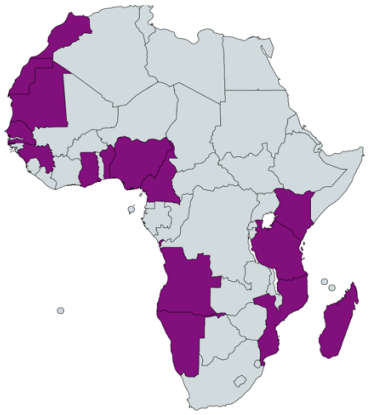
The impact of climate change on African fisheries is likely to be serious under all climate scenarios (Chart 1a and Chart1b). Fisheries are impacted by ocean acidification, water temperature increase, de-oxygenation, changes in ocean

Chart 1a: Global warming 1.6°C



Countries with high overlap of dependence and future threat to fisheries from climate change[26]

Chart 1b: Global warming >4°C



Countries with high overlap of dependence and future threat to fisheries from climate change[27]

currents, as well as sea level rise. Existing pressures of overfishing and ecosystem degradation are exacerbated by climate change impacts, reducing the likelihood of depleted stocks recovering after over-exploitation. Africa is particularly vulnerable, in view of coastal communities' socio-economic reliance on the sector for food, jobs and livelihoods. These communities will be disproportionately affected by reduced catches and shifts in fish stock distribution patterns. This could mean increased migration of fishers seeking livelihood and food security opportunities and, potentially, conflict for resources.[28]

Although global fish production is on the rise, this growth is primarily driven by Asia. Africa contributes only 7% to global production, constrained by a lack of modern fishing fleets, cold chain systems and processing facilities, and with fish stocks impacted by overfishing as well as illegal, unreported and unregulated (IUU) fishing. Most fish production in Africa comes from marine, wild capture fisheries, mostly exported without processing, to Asia or Europe – contributing about 1.26% of GDP to the continent, or US$21 billion annually.[29]

Africa contributes only 7% to global fish production, constrained by a lack of modern fishing fleets, cold chain systems and processing facilities

Significant catch potential declines have been projected for most African fishing nations, under both current conditions and increased GHG emission scenarios.[30] By 2050, a decrease of 30% or more is projected in many tropical West and Central African countries, including the Democratic Republic of the Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Liberia, Sierra Leone and São Tomé and Príncipe.[31, 32] By 2100, catch could decline by 40% or more in tropical West and Central African countries, including Ghana, São Tomé and Príncipe, Liberia and Côte d'Ivoire.

In North Africa, a rise in sea surface temperature is likely to impact migratory patterns of large pelagic species. In Southern Africa, shifting distributions of anchovy, sardine, hake and rock lobster have been partly attributed to climate change.[33, 34] Inland fisheries are also likely to be severely affected by climate change, with almost 70% of commercially harvested fish species vulnerable to extinction by 2100, under 2.5°C global warming.[35]

East Africa includes potentially the most vulnerable countries. The Western Indian Ocean supports large tuna fisheries, which are important for several East African countries and have also been exploited by various foreign fleets, including European (mainly Spanish and French) and East Asian fishing fleets.[36] Africa supports commercial fisheries of tuna and the region is a significant source of fish for both local consumption and export, particularly in countries like Nigeria, Ghana

and Angola.[37] The Gulf of Guinea has significant small pelagic fisheries, targeting species like sardinella, anchovies and mackerel. Sardines and anchovies are also critical along the Mediterranean coasts of Morocco, Algeria and Tunisia.

IUU fishing in African waters, including catches landed elsewhere, is estimated to total 3.1 million tonnes a year,[38] with illegal fishing causing annual losses of between US$10 billion and US$23 billion.[39] In addition, illegal fishing practices, such as using small mesh-size nets, poisons and fish aggregating devices, often target juvenile fish, disrupting ecosystem functions and increasing population vulnerability. Enhanced governance and restoring overfished stocks to maximum sustainable yield could boost the commercial value of marine fisheries by 53%.[40]

Small-scale fisheries are critical to food security and livelihoods across Africa, with almost nine million people employed in the sector and another five million in subsistence fisheries.[41] They are often underrepresented in official statistics. There is limited data on catch volumes, species diversity and economic contributions of small-scale fisheries, particularly in artisanal and coastal communities.[42] Small-scale fishing is one of the largest sources of employment and livelihood in the coastal economies of West Africa.[43] The Western Indian Ocean region supports significant artisanal fisheries, particularly for species like octopus, prawns and small pelagics.[44] Madagascar's fisheries contributed about 7% of GDP in 2018, with the shrimp fishery representing 3.4% of the total value of exports from Madagascar.[45] In the Red Sea, fisheries are relatively small but vital for the livelihoods of coastal communities in countries such as Egypt, Sudan and Eritrea. These artisanal fisheries primarily target reef fish, shrimp and lobster, but they are vulnerable due to limited management and monitoring.[46]

Given that most commercial fisheries are fully or over-exploited, the continued growth in fish production in Africa is largely driven by increased aquaculture, being the farming of fish, shellfish, seaweed and other marine or freshwater species. Aquaculture growth is seen as a key component of the blue economy, offering employment and livelihood opportunities, and promoting sustainable development by integrating it with other sectors like tourism and renewable energy. This is particularly so in Egypt, which accounts for about 70–75% of Africa's total aquaculture production, focusing mainly on tilapia and catfish. Egypt's leadership in aquaculture is attributed to significant investments in sustainable practices, improved feed technologies and efficient water use.[47]

There is a growing interest in marine biotechnology and emerging uses for other living marine resources, such as marine collagen.[48] Marine biotechnology involves harnessing marine resources, such as micro-organisms, algae and marine animals, to develop products like pharmaceuticals, biofuels, enzymes and materials for environmental conservation, bioremediation and aquaculture advancements. This field plays a critical role in innovation within the blue economy by promoting

sustainable use of ocean resources, but must be undertaken within an ecosystem-based management approach and with precautionary principles if the cumulative and ecosystem impacts of harvesting are not fully understood.

Opportunities for action

Access to healthy and adequate food requires resilience across the various components of the food system, particularly in the context of climate change, rapid population growth and urbanisation on the continent. Africa's fisheries management approaches must evolve rapidly to respond to change and to ensure continued productivity in the future and a growing contribution to Africa's blue economy.

Coastal and small-scale fisheries require the most urgent action. The risk of marginalisation of the sector, as a result of emphasis on industrial fisheries, is high.[49] In 2024, the AU-IBAR Africa Small Scale Fisheries Summit sought to raise the sector's prominence and develop African recommendations to the Food and Agriculture Organization, addressing issues such as food security and poverty eradication, climate change, social development and customary rights.[50]

At the regional level, the Jeddah Convention supports sustainable fisheries and marine protected areas in the Gulf of Aden and Red Sea,[51] while the Nairobi Convention has prioritised strengthening regional governance to support fisheries sustainability, working with the South West Indian Ocean Fisheries Commission.[52] This work focuses on building sustainable small-scale and coastal fisheries through regional support for national actions. At the national level, many countries, including Kenya, Liberia, Madagascar, Mozambique, Sierra Leone and South Africa, have prioritised small-scale fisheries in their National Adaptation Plans, providing an indication of national focus and action.

Building alternative livelihoods is a key part of the solution for sustainable small-scale fisheries. Aquaculture expansion can increase employment opportunities in fish farming, processing and related industries, providing livelihoods for community members. To realise this potential, there must be greater investment in infrastructure, technology and education.

Seaweeds could play a critical role in the blue economy of Africa by providing sustainable solutions for economic growth, environmental protection and food security. Many seaweeds are rich in minerals, vitamins and fibres. They are used, among others, in food products, animal fodder, pharmaceuticals, cosmetics and fertilisers. Seaweed farming offers coastal communities alternative livelihoods that contribute to poverty reduction and women's empowerment. The majority (92%) of seaweed farming in Africa is currently in Tanzania, but South Africa and Madagascar also produce seaweed.[53] Seaweed cultivation supports climate resilience by absorbing carbon dioxide and helping mitigate ocean acidification, thereby contributing to climate change adaptation strategies.

For industrial fisheries, the sustainable practices promoted by the AU through the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa[54] emphasises ecosystem-based approaches to fisheries management, responsible aquaculture practice and integration of environmental sustainability into sectoral policies. These documents explicitly recognise climate change as a major threat to fisheries and aquaculture in Africa and call for adaptive management strategies, improved resilience of coastal and aquatic systems, and integration of climate risks into fisheries and aquaculture policies. Regional economic communities (RECs) should support these reforms with funding, but often do not prioritise fisheries.[55]

Some momentum was initiated in 2022 and 2023 when the Food and Agriculture Organization convened two regional consultations to support and develop a framework for regional coordination and cooperation among regional fishery bodies towards more sustainable fisheries governance, including responding to climate change.[56] In 2022, the Indian Ocean Tuna Commission, a regional fisheries management organisation (RFMO), adopted a climate change resolution through a process that was reported as an example of cooperation between the international ocean and climate regimes.[57] These initiatives have signalled the kind of work that needs to be done to build climate response planning into the management of Africa's fish stocks.

Collective bargaining power can lead to higher fees, stricter enforcement of fishing quotas and more favourable conditions for local economies

The AU's Africa Blue Economy Strategy and various RFMOs are critical for coordinating efforts to manage shared resources, enforce regulations and promote sustainable practices.[58] Regional collaboration, in particular for high-value species, through RFMOs, is key to fisheries management. In addition, by forming regional alliances, African countries can collectively negotiate better terms for fishing licences with foreign fleets. This collective bargaining power can lead to higher fees, stricter enforcement of fishing quotas and more favourable conditions for local economies. These frameworks can help harmonise policies across countries, making it easier to address cross-border challenges like IUU fishing and climate change impacts.[59]

By agreeing on shared management and revenue-sharing schemes, countries can ensure that all parties benefit from the exploitation of shared resources, reducing the incentive for overexploitation by any single country. This can lead to a reduction in IUU fishing. Regional collaboration also facilitates capacity building and the sharing of technical expertise.

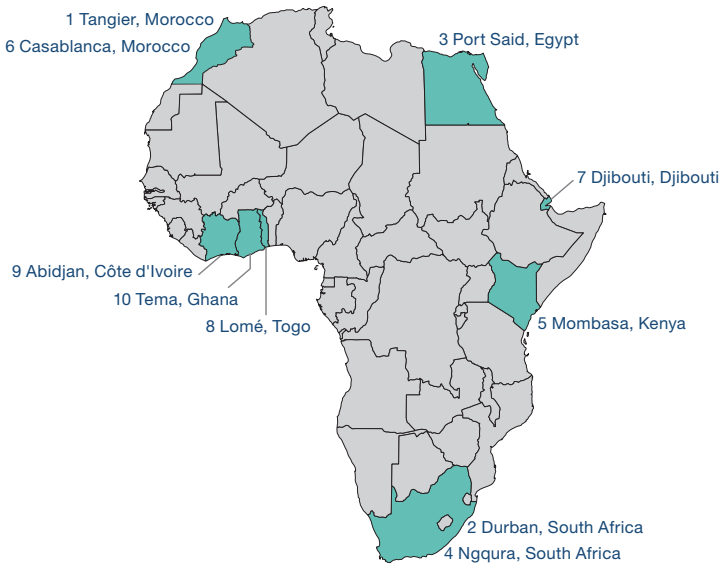
Africa's maritime transport sector in the face of climate change

Climate change presents both a direct threat and a long-term planning challenge for Africa's maritime sector. Sea level rise, extreme weather events and shifting global emissions regulations are already impacting shipping infrastructure and future trade competitiveness. Ports are exposed to natural hazards, due to their location along open coasts or in low-lying estuaries and deltas, and are therefore affected by rising sea levels, storm surge, waves and winds and river flooding.[60] Climate-resilience planning for ports on the continent is therefore of both strategic and socioeconomic importance.[61]

Shipping and maritime transportation play a critical role in Africa's blue economy – over 90% of Africa's trade is conducted via maritime routes along the continent's coastline, with millions of tonnes of goods handled annually through about 100 ports. It is estimated that the output of these ports will continue to increase, possibly reaching as much as two billion tonnes by 2040.[62]

These ports are strategically located along Africa's vast coastline and facilitate the movement of goods to and from key global markets in Europe, Asia, the Americas and other regions. They support a global maritime industry worth about US$1 trillion a year with substantial scope for growth as populations continue to increase.[63] Nigeria, for example, relies on maritime transport to export oil and trades about 180 million tonnes of cargo a year.[64] Many countries rely on importing refined oil and gas by sea (see Chart 2 for the top 10 ports in Africa by volume). The contribution of the maritime sector to Africa's blue economy faces challenges, including an evolving global trade landscape, regional conflicts, piracy and climate change.

Chart 2: The top 10 ports in Africa by volume in twenty-foot equivalent units[65]



Investing in modern, efficient ports and expanding capacity are essential for accommodating the growing volume of maritime trade. Improved port infrastructure not only enhances the efficiency of maritime transportation, but also attracts foreign investment, boosting African countries' overall economic competitiveness.

The maritime transport sector generates substantial employment opportunities, not only in direct shipping activities but also in associated industries such as shipbuilding, port operations, logistics and marine services. Ports are focal points for economic activities, creating jobs, supporting the livelihoods of millions of people in coastal cities and contributing to the blue economy. With the rise of global e-commerce, ports are evolving into logistics hubs, integrating warehousing, distribution and transportation services to cater to growing consumer demand. Public-private partnerships are often used to fund these infrastructure projects, providing a means to leverage private sector expertise and resources. Ports that embrace automation and digitisation technology are likely to become more competitive in global trade networks.

Ports are focal points for economic activities, creating jobs, supporting the livelihoods of millions of people in coastal cities and contributing to the blue economy

Efficient ports and associated transport networks reduce the costs of intra-African trade and support the goals of initiatives like the African Continental Free Trade Area (AfCFTA). The AfCFTA is in its operational phase with many countries still in the process of putting in place measures to implement the AfCFTA guidelines.[66] African ports do not, however, perform well in global rankings on port efficiency and there are high costs associated with the transport of goods, particularly for island and inland states. For example, 20% of the value of a product is spent on transport to Comoros and as much as 75% to some inland countries.[67]

Ports and shipping need to adapt to sea level rise, increases in storm surges, dangerous winds, flooding and erosion. Current growth estimates in maritime transport fail to consider the impacts of extreme weather events and climate change impacts.[68] The sea-land connections will also need to be resilient to change as railway and road infrastructure are also at risk of being disrupted by extreme weather. Increased shipping and unpredictable, extreme weather can increase the risk of oil spills and other pollution events. When bulk carrier MV Wakashio ran aground on a coral reef off the coast of Mauritius in 2020, the ship was carrying about 4 000 tonnes of fuel oil. This began leaking into the ocean, causing a catastrophic environmental disaster with devastating socioeconomic impacts,

particularly for fishing communities, as fishing had to be suspended due to concerns about contamination from the oil.[69]

Climate hazards can affect port infrastructure and operations directly, resulting in damage to assets, operational delays and health and safety risks. These have potential secondary economic and social consequences, including temporary closure of facilities with associated financial, employment and trade implications.[70] Globally, annual port-specific risk is estimated at US$7.5 billion. An additional US$63.1 billion of trade is at risk every year, with the highest impact being experienced by Small Island Developing States.[71] These economic impacts can have ripple effects throughout the region, affecting trade, employment and economic development. Adaptation measures such as improving port infrastructure, implementing climate-resilient technologies and developing climate change adaptation strategies are therefore urgent for mitigating these impacts and building resilience in African ports.

In addition to long-term planning for climate change impacts, Africa's maritime sector must align with evolving global emissions targets, requiring investments in cleaner fuels, fleet modernisation and the transition to low-carbon port operations. The maritime industry accounts for 3% of global GHG emissions and has seen a 20% increase in emissions over the past decade.[72] Sustainable shipping practices, such as adopting cleaner fuels, improving energy efficiency and reducing emissions, are critical for minimising the sector's environmental footprint.[73]

In April 2025, the IMO approved a carbon levy on ships, introducing a carbon price and a GHG emissions fuel standard for the shipping sector

The International Maritime Organization's (IMO) 2023 IMO Strategy on Reduction of GHG Emissions from Ships,[74] or 2023 IMO GHG Strategy, aims to reduce emissions by up to 30% by 2030 and 80% by 2040 to reach net zero by 2050. In April 2025, the IMO approved a carbon levy on ships, introducing a carbon price and a GHG emissions fuel standard for the shipping sector. While the IMO's carbon levy represents a significant step towards reducing global shipping emissions, the full impact on African states remains uncertain. To mitigate these effects, the revenue generated from the levy must be allocated in a manner that supports the transition to cleaner shipping technologies in developing nations, including investing in green fuel production, enhancing port infrastructure and building capacity within the maritime sector.[75]

The route that many vessels take around South Africa due to instability in the Red Sea adds an additional 4 000 nautical miles to the route through the Suez Canal.

The climate-related reduction in sea ice in the Arctic is also expected to influence global shipping routes. The shrinking of ice on the Northern Sea Route will open new possibilities for shipping companies, reducing fuel costs and sea days.[76] This will need to be considered in Africa's strategic planning for growing port operations.

Opportunities for action

The strategic vision and principles for the contribution of Africa's maritime sector to the continent's blue economy were first articulated in the 2050 Africa's Integrated Maritime Strategy (2050 AIM Strategy).[77] It sets the overarching vision to foster increased wealth creation from Africa's oceans by developing a sustainable thriving blue economy in a secure and environmentally sustainable manner. It recognises maritime spatial planning as an important tool for the AU, RECs and member states to determine how maritime zones are sustainably used and protected – and balance frequently competing sector-based interests. The Revised African Maritime Transport Charter advances the principle of safe, secure and efficient shipping; a clean ocean; and sustainable port policies and implementation strategies.[78] These strategic policy documents, while visionary at the time, are now dated and lack the necessary strategic direction for current realities.

In December 2024, at the 7th Association of African Maritime Administrators Conference held in Dar es Salaam, Tanzania, agreement was reached on concrete actions to help shape the region's maritime future, in line with global trends in technology, innovation and sustainability.[79] Priority areas included maritime decarbonisation, financing sustainable maritime transport and governance and maritime trade facilitation. Urgency was conveyed on implementing the AIM Strategy and the need for a new continental maritime governance framework. These outcomes seem to demonstrate political and policy inertia in a sector that is key to Africa's blue economy and that must pivot towards digital transformation, new technologies, artificial intelligence, decarbonisation, environmental sustainability and climate resilience.

From a trade perspective, the AfCFTA is expected to increase demand for maritime freight by 62%.[80] This requires the continent's ports to be efficient, effective, fit for purpose and climate-resilient. There are numerous port expansion projects planned in Africa's maritime sector (e.g., Lamu in Kenya, Lomé in Togo, Tema in Ghana, Lekki in Nigeria and Abidjan in Côte d'Ivoire) attracting both private and public funding. Much of this growth is likely to be funded by increasing levels of debt, and the profitability of these projects will therefore be key to their feasibility.[81]

Specific climate change response planning associated with these port expansion projects is not well documented. Africa's two major investors are the United Arab Emirates (establishing a network of ports connecting the Gulf with Africa) and China (with an estimated 78 ports across 32 African countries as builders, financiers, or operators). At the 2024 Summit of the Forum on China-Africa Cooperation,

green development and industrialisation emerged as a priority, with investments envisaged in green railways and ports.[82]

While the IMO regulations will advance decarbonisation in Africa's shipping sector, it is not clear what policy prescripts are driving efforts towards port resilience at national level, factoring in medium- and long-term climate scenarios and planning for long-term risk. National maritime strategies broadly prioritise sustainability and environmental protection at a strategic level, but are thin on details. Most National Adaptation Plans do not address adaptation measures for ports and shipping. National marine spatial planning processes are starting to integrate climate scenarios in spatial planning, but will have minimal influence on port design.

Africa's ports must transition towards the green port approach, implementing environmentally sustainable practices and technologies to minimise their impact on the environment and adopt a range of measures to reduce carbon emissions, climate-proof infrastructure and operations, manage waste more effectively, conserve energy and water, and mitigate other negative environmental effects associated with port operations. There are some examples on the continent that are leading the way. For example, Mauritius is working towards a greener port by implementing sustainability initiatives such as energy efficiency and the reduction of carbon emissions through modern port infrastructure and renewable energy integration.[83]

Coastal and maritime tourism in the face of climate change

Tourism was estimated to contribute 7% of GDP in Africa and 20 million jobs in 2019. While tourism is growing faster in Africa than elsewhere, it is worth only 5% of the value of global tourism.[84] The High Level Panel for a Sustainable Ocean Economy emphasises the potential of ocean and coastal tourism to contribute to the blue economy.[85] It aims for sustainable and resilient tourism that addresses climate change, reduces pollution, supports biodiversity conservation and invests in local jobs and communities.

Unplanned and unmanaged tourism growth can lead to increased waste generation, including plastic pollution, sewage discharge and other contaminants that can degrade marine environments. Tourism is also an emissions-intensive sector – especially from transport – and vulnerable to climate-related risks such as sea level rise and extreme weather. To secure the sector's long-term benefits for Africa's blue economy, marine and coastal tourism must integrate rigorous environmental safeguards, plan for emissions reductions and embed multi-scale climate adaptation strategies in the planning process.

Marine and coastal tourism is a major source of income for many African countries. For instance, in countries like Seychelles and Mauritius, tourism contributes a significant portion of GDP.

It is estimated that tourism can account for about 20% of GDP in Small Island Developing States.[86] Coastal tourism attracts international visitors, bringing in crucial foreign exchange that helps balance trade deficits and supports economic stability. However, foreign ownership of tourism infrastructure can limit revenue flows into the local economy, requiring mechanisms to maximise national economic benefit. For example, about 60% of the hotels in Seychelles are foreign-owned and account for a large portion of tourist income.[87] This is especially important for Small Island Developing States in Africa such as Cabo Verde and Seychelles where tourism is a key source of foreign exchange.

Nigeria's network of coastal lagoons, estuaries and inland rivers offers potential for diverse tourism activities, creating new employment opportunities

The tourism sector is a significant employer. It provides direct jobs in hotels, resorts, restaurants and tour operations, as well as indirect employment in sectors like agriculture, fishing and crafts that support the tourism industry. Coastal tourism can lead to infrastructure development in remote areas, including roads, healthcare facilities and schools, thus improving the quality of life for local communities. In Tanzania, tourism has facilitated the development of infrastructure in areas around Zanzibar and other coastal regions. In Mozambique, the growth of coastal tourism has provided opportunities for local entrepreneurs and small businesses.[88]

The country with the largest population in Africa, Nigeria, is looking towards its marine and inland waters for potential tourism opportunities to support the blue economy and job creation. The tourism sector in Nigeria contributes 3.6% of GDP[89] and is expected to grow. Although this does not differentiate between coastal tourism and other types, the coast is a drawcard for tourists. Nigeria's network of coastal lagoons, estuaries and inland rivers offers potential for diverse tourism activities, creating new employment opportunities (in guiding, hospitality, transport and handicrafts), and stimulating related sectors such as agriculture and artisanal fisheries.

These opportunities could diversify the economy beyond oil dependence and incentivise the conservation of aquatic habitats and cultural heritage, aligning with broader blue economy objectives.[90] Mauritius Vision 2030 aims to broaden the tourist base and diversify its tourism offerings to strengthen the country's reputation as a premier 'green destination' island. Tourism contributed about 8.1% to the country's GDP in 2019 and generated over US$1 billion in revenue annually from 2014 to 2019.[91]

Many African countries have established marine protected areas to safeguard coral reefs, mangroves and other vital ecosystems, with tourism revenue potentially helping to fund these conservation efforts. Sustainable tourism initiatives, such as ecotourism and community-based tourism, can promote environmentally friendly practices that help preserve biodiversity and reduce the environmental impact of tourism (see below).

An example of tourism and conservation from Zanzibar

Chumbe Island in Zanzibar, Tanzania, was identified as a marine biodiversity hotspot in 1991. In response, the Chumbe Island Coral Park (CHICOP) was created to advocate for its protection. By 1994, Chumbe Island became the world's first privately protected marine area, with a no-take coral reef sanctuary and a fully protected forest reserve. CHICOP fully finances and manages the site, operating a small ecolodge to generate revenue for conservation and education initiatives. The site is environmentally sustainable, using solar energy, rainwater catchment, composting toilets and grey water filtration systems. Since its designation, fish biomass in the no-take reef has increased by 750%, supporting sustainable fisheries, and over 13 000 Tanzanians have benefitted from educational programmes and community initiatives.[92]

The tourism sector contributes to GHG emissions and is also vulnerable to the impacts of climate change. Tourism is an emissions-intensive industry, contributing 8%–11% of global emissions in 2013. Transport-related CO_2 emissions in tourism are the major contributor, requiring the sector to work closely with the transport sector to support its commitment to accelerate decarbonisation.[93] A study on the carbon footprint of Africa's travel and tourism sector by the World Travel & Tourism Council found that between 2010 and 2019, the African travel and tourism sector was making progress in decoupling growth of the sector from its GHG emissions.

The data shows that the tourism sector's total contribution to Africa's GDP grew on average 2.6% annually, while GHG emissions increased by just 1.2% during the same period. The World Travel & Tourism Council research also shows how the sector's emissions intensity is decreasing. In 2010, for every US$1 of the region's travel and tourism GDP, the sector emitted 1.45 kg of GHG emissions. In 2019, this figure dropped to 1.29 kg, suggesting progress was made across Africa to create a more sustainable sector. In the same year the sector was responsible for an average of just 6.6% of total GHG emissions across Africa.[94]

If not sustainably managed, an influx of tourists often leads to increased waste generation, including plastic pollution, sewage discharge and other contaminants

that can degrade marine environments. Coastal developments, such as hotels, resorts and infrastructure, can disrupt natural ecosystems and increase runoff, leading to pollution of coastal waters. This pollution not only harms marine biodiversity, such as coral reefs and fish populations, which are key attractions for tourists, but also threatens the long-term sustainability of the tourism industry itself.

Direct and indirect impacts of climate change are diverse and can amplify environmental challenges. These include extreme weather events, biodiversity loss, increasing insurance costs and safety concerns, water shortages, damage to assets and attractions at destinations, among others. In the African context, natural and cultural resources are often the foundation for the tourism sector's competitiveness. Climate-driven degradation can therefore reduce the attractiveness of destinations and affect economic opportunities for local communities. The concept of impact chains provides a useful way of understanding the risks for coastal and ocean tourism arising from the exposure of natural, social and economic systems to climate-related hazards, and the extent to which these systems are vulnerable to climate shocks. It focuses on the loss of value in tourist experience and therefore loss of attractiveness.[95]

The African coastal and marine tourism sector is already being affected by rising temperatures and ocean acidification, with potential reductions of between 40% and 90% of coral reef tourism value by 2100. Egypt is one of the top five countries in the world with the highest income generation from coral reef-based tourism (US$7 billion per year), and by 2100 risks losing up to 80% of this revenue as a result of coral reef bleaching.[96]

In Marrakech and Casablanca, Morocco, tourist expenditure could decline by 8%–19% by 2035, affecting restaurants and hotels, transport and entertainment

Other coastal tourism sectors are also vulnerable to the impacts of climate change. These include coastal cities that promote tourism and could be affected by flooding, warming and sea level rise; beach tourism that would be affected by coastal erosion; and recreational fishing affected by loss of biodiversity or changes in species ranges. For example, in Marrakech and Casablanca, Morocco, tourist expenditure could decline by 8%–19% by 2035, affecting restaurants and hotels, transport and entertainment.[97]

For the tourism projections to 2050 and beyond to make positive contributions to Africa's blue economy, the potential impacts of climate change need to be actively factored into planning at all levels. As global interest in sustainable and eco-friendly

travel increases and with proper management and investment, this sector could further enhance its contribution to African economies and communities.

Opportunities for action

Policy directives at the regional and national levels exist, but are vague. The African Tourism Strategic Framework[98] recognises the need to increase responsiveness of Africa's tourism sector to climate change. The Common Market for Eastern and Southern Africa's (COMESA) Sustainable Tourism Development Framework flags the need for decarbonisation efforts in the sector but omits any reference to climate resilience.[99] The Western Indian Ocean Regional Ocean Governance Strategy prioritises sustainable tourism and working with UNECA and the World Tourism Organization, and plans to convene stakeholders to review regional lessons, compile scenarios on tourism futures and consider application of global guidelines and codes of conduct for blue tourism.[100]

Kenya's National Adaptation Plan requires climate risk and vulnerability assessment and climate-resilient plans for the sector. The Mombasa County Climate Change Policy (2021) goes into some detail on climate response action for the tourism sector. This includes working with hotel establishments to put in place natural defence measures for protection of the shoreline, and promoting climate proofing of tourism sector establishments and operations within the county.[101]

Sierra Leone lists the tourism sector as requiring climate response planning but provides no further detail. South Africa's Climate Change Act (Act No 22 of 2024) requires the National Department of Tourism to develop a Sector Adaptation Strategy and Plan.[102]

> Effective governance is central to ensuring that Africa's marine and coastal tourism sector is sustainable, inclusive and climate-smart

A well-run tourism sector with clear objectives for managing its carbon footprint, protecting and restoring the natural resource base and stimulating economic opportunities for local communities, will position the sector as a key pillar in the transformation to a sustainable ocean economy.[103] Effective governance is central to ensuring that Africa's marine and coastal tourism sector is sustainable, inclusive and climate-smart, and able to grow its contribution to the continent's GDP and blue economy sector. This requires cross-sectoral coordination to align tourism, environment, fisheries, transport and climate strategies, to avoid conflicting mandates and to promote coherent decision making.[104]

Sustainable tourism principles and climate risk provisions need to be embedded into national legal frameworks, including environmental impact assessment and coastal zone management laws, to provide enforceable sustainability standards and restrict development in areas prone to flooding and coastal erosion.[105] Nationally Determined Contributions should set targets for low-carbon infrastructure and ecosystem-based adaptation. National Adaptation Plans should explicitly identify coastal and marine tourism as vulnerable and mandate climate risk assessments in the planning process, requiring sea level rise, storm surge and extreme-weather vulnerability assessments, with results used to guide siting, design standards and buffer-zone requirements.

Marine spatial planning processes should designate low-impact tourism zones and buffer areas for ecosystem recovery (e.g. for mangroves and coral reefs). Climate-scenario modelling, incorporating sea level rise projections and storm surge maps, can ensure that spatial plans evolve with emerging risks and can inform tourism planning processes. By embedding these governance measures, anchored in integrated planning, inclusive, adaptive and climate-smart management, enforceable standards and continual learning, Africa's marine and coastal tourism sector can continue to grow its contribution to the blue economy.

Energy and mineral resources

Oil and gas

With production of offshore oil and gas identified as a key pillar of Africa's blue economy, there is a growing debate on how this relates to the global clean energy transition. In 2021, the International Energy Agency published a roadmap for the global energy sector towards achieving a GHG emissions reduction target of net zero by mid-century. The production, transport and processing of oil and gas results in close to 15% of global energy-related GHG emissions. To align with the Paris Agreement target of keeping global temperature increase below 1.5°C, these emissions would need to be cut by more than 60% by 2030. The sector would need to peak in oil and gas demand by 2030, with demand in 2050 being 45% below what it is today. In this scenario, there would be a cap on the need for new oil and gas projects. Africa accounts for less than 3% of the world's energy-related CO_2 emissions and has the lowest emissions per capita.[106]

There is considerable controversy surrounding offshore oil and gas exports in African countries, particularly regarding the disconnect between high levels of energy production for export and the lack of domestic energy availability. Resource wealth does not always translate into domestic energy security. This has led to the paradox of being energy-rich but energy-poor, where countries earn significant revenues from exports, yet large portions of their populations lack access to affordable and reliable energy. Africa faces widespread energy poverty,

with 600 million people in Sub-Saharan Africa lacking access to electricity. This despite an investment of over US$5 billion in oil and gas exploration throughout Africa in 2022 – two-thirds of which were foreign investments.[107] Almost 45% of the population lack access to electricity, with the goal of universal access to modern energy sources projected to require US$25 billion a year.[108] For example, Nigeria, Africa's largest oil producer, still experiences frequent power shortages and much of its population relies on inefficient energy sources like biomass and kerosene.[109]

Offshore oil and gas exploration in Africa plays a significant role in the continent's energy landscape, with substantial reserves located off the coasts of countries like Nigeria, Angola, Egypt, Mozambique and Ghana. Nigeria and Angola are two of Africa's largest oil producers, with their offshore fields contributing a major portion of their total production. Nigeria's deepwater oil fields, in particular, have been central to its status as one of the world's top oil exporters. Angola also has vast offshore reserves in the deep and ultra-deep waters, driving its oil output. Key projects are frequently foreign-owned, as a result of the expensive and risky initial investments required; nonetheless, 75%–80% of Nigeria's government budget are from the export of crude oil.[110]

Recent discoveries off the coasts of Mozambique and Tanzania have the potential to transform the Western Indian Ocean region into a key player in global natural gas markets

Ghana's Jubilee and TEN fields have significantly boosted the country's economy and energy independence through offshore oil production.[111] Recent discoveries off the coasts of Mozambique and Tanzania have the potential to transform the Western Indian Ocean region into a key player in global natural gas markets. These countries hold vast offshore gas reserves, particularly in the Rovuma Basin, with Mozambique attracting multibillion-dollar investments to develop its liquefied natural gas (LNG) infrastructure. Road, railway and pipeline infrastructure development and upgrades are likely to be linked to the development of offshore oil and gas.[112]

However, the extraction of LNG in Mozambique faces significant security concerns, particularly in the Cabo Delgado region, where many LNG projects are based.[113] Armed insurgent groups have frequently targeted these facilities, leading to project delays and the withdrawal of major companies such as TotalEnergies in 2021. The Mozambican government has struggled to maintain security in the area, with ongoing attacks threatening both local populations and foreign investments. These security challenges raise questions about the long-term viability of LNG projects in the region, adding to economic uncertainties.

Security, environmental concerns and regulatory uncertainties pose hurdles for both governments and multinational companies developing this industry. Environmental impacts can affect fisheries, tourism and local livelihoods, leading to a sense of injustice, especially when the energy produced is being sent abroad while domestic needs remain unmet. In South Africa, the Constitutional Court is set to hear the case regarding the renewal of Shell's exploration rights along the Wild Coast in 2025. Coastal communities and environmental groups, which have long opposed the oil giant's operations, have vowed to continue their fight, citing concerns over environmental degradation and the impact on local livelihoods.[114]

Countries are increasingly balancing the need for revenue from these resources with commitments to sustainability and environmental protection. In recent years, there has also been a growing focus on transitioning to renewable energy, although oil and gas remain vital to many African economies. The continued development of offshore oil and gas in Africa is driven by both domestic energy needs and the global demand for hydrocarbons.

As countries around the world shift towards renewable energy, many African nations are still heavily dependent on fossil fuel exports. This has raised concerns that African countries could become economically reliant on resources that could diminish in global value over time, without using the revenues to invest in long-term, sustainable domestic energy solutions.

In the context of a global clean energy transition, Africa is at risk of dwindling export revenues from existing oil and gas projects, and increasing challenges associated with finding sources of finance to develop new projects. Large energy sector projects on the continent would generally be financed by development finance institutions and multilateral development banks. However, fossil fuel financing is slowly being constrained, with major international banks and investment funds under pressure to reduce high carbon investments. China is still funding Africa's oil and gas sector, although reluctantly.[115]

The African Energy Outlook 2022 report explored a Sustainable Africa Scenario presenting options for achieving African energy-related development goals.[116] This includes achieving universal access to modern energy services by 2030, significantly growing the use of renewable energy sources (solar, wind, hydropower and geothermal) and improving energy efficiency. Natural gas use could be expanded as a temporary energy solution until alternative sources become more viable.[117] Production of oil and gas would remain important to economic and social development on the continent, with domestic demand drawing much of what the continent would produce.

In response to the European intention to stop Russian gas imports, as well as the new projects to develop LNG terminals in Mauritania, Mozambique and Senegal are creating short-term momentum in the gas sector. However, projects with a long lead

time run the risk of not being able to recover upfront investment costs, as a result of the energy transition and volatile oil prices.

By strategically managing its marine oil and gas resources while investing in renewable energy and positioning itself as a key player in the global energy transition, Africa can achieve a just energy transition. This would enable the continent to reduce energy poverty and build a sustainable and resilient energy future.[118] This could entail:

- using revenues from marine oil and gas projects to fund renewable energy projects, thereby building a diversified energy mix and reducing reliance on fossil fuels over time and ensuring local energy security;
- using natural gas, which has a lower carbon footprint than oil and coal, as a transition fuel;
- plans to repurpose existing oil and gas infrastructure for renewable energy, after decommissioning;
- strictly enforcing environmental regulations for marine oil and gas projects to minimise pollution and habitat destruction;
- including local communities in decision-making processes and ensuring local benefits from energy development through job creation, social programmes and revenue-sharing opportunities.

Renewable energy

Integration of ocean-based renewable energy into Africa's broader blue economy strategy has the potential to make an economic contribution and expand the continent's renewable energy capacity. It would however need to be supported by a targeted regional investment framework as well as partnerships in technology development and best available climate forecasts to de-risk investments in marine renewables.[119] Investment, including public private partnerships, should also support research centres in Africa to advance ocean energy innovation and build local expertise in ocean energy technologies.

There is potential for expansion in marine renewable energy, particularly as it becomes cheaper. In 2022, solar photovoltaic technology and onshore and offshore wind, were cheaper than natural gas.[120] The International Energy Agency has estimated that ocean renewable energy in Africa could produce up to 400% of the current global energy demand. In Morocco and Kenya, wind speeds along coastlines are suitable for large-scale offshore wind farms. South Africa is exploring offshore wind projects to complement its growing renewable energy sector. The Global Wind Energy Council has identified South Africa as having one of the highest offshore wind potentials on the continent, with the possibility of generating substantial electricity through wind power, particularly along its southern coasts.

Morocco, already a leader in renewable energy, is also studying offshore wind potential to diversify its energy portfolio beyond solar and onshore wind.[121]

Wave energy also presents a promising opportunity for Africa, particularly along its western coastlines. Countries like Namibia and South Africa are investigating the possibilities of harnessing wave power, although the technology is still in its early stages. While there are no large-scale commercial projects yet, pilot initiatives and research are underway to assess how to exploit wave energy more effectively. The AU has identified wave energy as an important area for future investment, particularly for coastal and island nations that could benefit from a steady source of renewable power.[122] Ocean thermal energy conversion, a technology that uses the temperature difference between warm surface water and cold deep ocean water to generate electricity, has been identified as a potential source of energy in Nigeria.[123]

The World Bank has been working with several African countries to explore opportunities for tidal energy projects, as part of broader blue economy strategies

Tidal energy potential exists mainly in regions with strong tidal currents, such as the coasts of Tanzania, Kenya and Mozambique. These countries have significant tidal ranges that could be leveraged to generate electricity.[124] While tidal energy infrastructure is capital-intensive and still in the nascent stages in Africa, there is growing interest in using this resource. For instance, the World Bank has been working with several African countries to explore opportunities for tidal energy projects, particularly as part of broader blue economy strategies.

Africa's marine renewable energy sector holds immense potential. While projects are still in the exploratory or pilot phases, these renewable sources could contribute significantly to the continent's energy mix, reducing reliance on fossil fuels and supporting economic development in coastal regions. The development of these resources will depend on technological advancements, investment in infrastructure and supportive regulatory frameworks.

The potential development of Africa's ocean energy resources, such as offshore wind, tidal and wave energy, is closely linked to the global clean energy transition and the urgency to reduce reliance on fossil fuels. As the continent seeks to meet energy needs, renewable energy sources, including ocean energy resources, provide a promising pathway to increase energy access, decarbonise energy systems and position the continent as a leader in green energy. The continent can take advantage of the current growing investment interest in Africa's renewable energy opportunities.

Mineral mining

The World Economic Forum reports that the lack of global cooperation on supply chains of critical minerals for the energy transition risks effective climate action.[125] In this context, deep seabed mining is a matter of growing economic and political interest, as a potential source of minerals for clean energy technologies.[126] Deep seabed mining is also a source of concern over the risks of large-scale and long-term ecosystem disruption. The International Seabed Authority has authority over deep-sea mining activities in areas beyond national jurisdiction, but currently only has non-binding recommendations on environmental impact assessments (EIAs) for exploration, and incomplete EIA regulations for exploitation. A precautionary approach is recommended until the impacts of deep seabed mining can be understood.

While the energy transition requires minerals such as cobalt, nickel and rare earth elements, found in deep-sea deposits, alternative sources and the need for sustainable practices challenge the need for large-scale deep-sea mining. Ongoing research into reducing reliance on critical minerals, including encouraging materials and technology substitution and promoting recycling and recovery from waste streams, could contribute to fulfilling critical mineral needs.[127]

Globally, at least 32 countries have called for a ban, moratorium or precautionary pause on deep-sea mining in international waters

Marine mining poses significant environmental challenges. The extraction of seabed resources can disrupt fragile marine ecosystems and harm biodiversity. African countries that rely on fishing and coastal tourism could face opposition from stakeholders concerned about the environmental and economic consequences of industrial marine mining. Globally, at least 32 countries[128] have called for a ban, moratorium or precautionary pause on deep-sea mining in international waters until the impacts on the ocean, climate and biodiversity are better understood.[129]

Questions have also been raised about whether financing deep seabed mining is consistent with the objective of promoting a sustainable blue economy,[130] with a call to investors to focus on reducing 'the environmental footprint of terrestrial mining' and 'support the transition toward a circular economy' to make current mineral demand 'obsolete.' There is growing investment in next-generation batteries that do not use cobalt, nickel and manganese, potentially reducing the future need for these so-called critical minerals.[131] The UN Environment Programme Finance Initiative does not support investment in deep seabed mining and is joined by numerous

other large financial institutes (including Lloyds Bank and NatWest) and insurance companies that are not willing to insure this type of mining.[132]

Marine mining in Africa is in its infancy compared to terrestrial mining. Nonetheless, Namibia is a global leader in marine diamond mining.[133] Namibia uses advanced dredging and remote-operated vehicles to extract diamonds from the seabed along the coast. This marine mining sector contributes significantly to its economy, with the offshore diamond industry accounting for a large portion of the country's total diamond output.

Other resources of interest for marine mining in Africa include phosphates off the coast of South Africa and Morocco, where deposits could be used for fertilisers. These phosphate deposits in the seabed present a significant opportunity for agriculture-driven economies to meet growing fertiliser demand. However, there are more socioeconomically and environmentally friendly methods for sustainably sourcing supplementary phosphates. These include recovering phosphates from human and animal waste, and optimising the application of phosphate fertilisers to soils.[134]

The potential for new marine mining activities, particularly for deep seabed minerals such as polymetallic nodules and rare earth elements, is attracting attention and controversy. Polymetallic nodules, found on the seabed, contain valuable metals such as copper, nickel, cobalt and manganese, which are essential for modern technologies in batteries and renewable energy systems. Some African coastal nations, particularly around the Western Indian Ocean and South Atlantic, could become hotspots for exploration of these deep-sea minerals as global demand increases.

Mineral mining is yet to take place in the deep sea and African nations are approaching marine mining with caution, balancing the economic benefits against potential environmental costs. Offshore mining costs are higher than terrestrial mining, so the scale at which mining would need to occur to be profitable is much larger.[135] The costs could also be so prohibitive that, with a volatile metals market and innovations in technology, there would be high financial risks in investment in deep-sea mining.

It is highly likely that offshore marine mining in or near African waters would be dominated by foreign companies or countries, which would lead to limited economic benefits for African nations while exposing them to significant environmental risks. Technological and financial constraints in many African countries mean that local companies may lack the resources and expertise needed to engage in complex offshore marine mining operations. Marine mining, particularly in deep waters, requires specialised equipment, advanced technologies like remotely operated vehicles and significant capital investment. Foreign multinational corporations are more likely to have the necessary capabilities

to carry out such operations. As a result, foreign companies often enter into partnerships with African governments or secure licences, leaving host countries with a smaller share of the profits.[136]

However, the environmental impacts of marine mining would be felt most acutely by African countries and local communities. Marine ecosystems are highly sensitive, and activities such as dredging the seafloor, disturbing sediment and damaging habitats like coral reefs could have long-lasting effects on biodiversity. These impacts could undermine local fisheries, coastal tourism and other livelihoods dependent on healthy marine ecosystems.[137]

Coastal communities and marine users – such as small-scale fishermen – would bear the brunt of these environmental costs. Without stringent regulations and oversight, there is a risk that companies will not fully mitigate environmental damage or invest in sustainable practices. Moreover, the impacts of marine mining could extend beyond national borders, affecting neighbouring countries through shared waters, migratory species, or regional ecosystems. The risks of becoming a sponsoring state of deep-sea mining might outweigh the benefits, notably because of high regulatory costs, potential liability for environmental damage, reputational damage, and a weakening of the African Group's strong negotiating position on financial matters.[138]

African governments will need strong regulatory frameworks, transparent agreements and international cooperation to ensure that the benefits of marine resource extraction are shared equitably and that environmental harm is minimised if they participate in seabed mining. Active engagement in international discussions on deep seabed mining, at the International Seabed Authority and other relevant forums, is essential to ensure that the interests of the continent (economic, social and environmental) are met.

Africa's position on deep seabed mining exploration needs to be informed by an assessment of the economic benefits and environmental risks of this type of mining, as well as possible conflicting interests with terrestrial mines in Africa. Exploring opportunities in recycling of scarce minerals could create new economic opportunities for African nations.

Environmental protection and blue carbon

Beyond economic and utilitarian reasons, marine biodiversity has intrinsic value (see box below for examples of innovation in environmental protection). Species and ecosystems have the right to exist and be protected, irrespective of their direct benefits to humans. Preserving the diversity of life in the ocean is part of global conservation ethics. Environmental protection plays a vital role in advancing the blue economy in Africa by preserving critical marine ecosystems and enhancing climate resilience.

Blue carbon ecosystems such as mangroves, seagrasses and salt marshes are highly effective at sequestering carbon dioxide, thus contributing to global efforts to mitigate climate change. These ecosystems not only capture and store large amounts of carbon but also support biodiversity and protect coastal communities from storms and erosion, which are increasing in frequency due to climate change. Restored mangroves and wetlands improve soil health and water quality, which can benefit adjacent agricultural lands. Mangroves, for example, help to filter pollutants.

In some regions, restored coastal ecosystems have been linked to improved agricultural yields by preventing saltwater intrusion and enhancing soil fertility.[139] This can lead to increased food production and income for local farmers.

Examples of innovative conservation legislation

This acknowledgment of the intrinsic right of nature to exist is gaining momentum globally. By granting legal personhood to ecosystems, countries are increasingly acknowledging the importance of protecting natural environments, not just for human benefit but as entities with their own rights to exist and thrive.

- In 2008 Ecuador became the first country in the world to recognise the rights of nature in its national Constitution. The Constitution states that nature has the right to exist, persist, maintain and regenerate its life cycles. This legal framework enables citizens to demand the protection of ecosystems, regardless of direct human harm.[140]
- In 2017, New Zealand passed the Te Awa Tupua Act, which granted the Whanganui River legal personhood. The river is now recognised as a legal entity with rights, with appointed human guardians acting on its behalf. This recognition is based on the Maori worldview that regards rivers as ancestors, deserving of respect and protection.[141]
- In 2016, Colombia's Constitutional Court granted legal rights to the Atrato River. The court recognised the river as a legal entity with rights to protection, conservation, maintenance and restoration. This decision was influenced by concerns over the environmental degradation caused by mining activities in the region.[142]

Recently, blue carbon markets have developed, where entities can offset their carbon emissions by investing in projects that conserve and restore coastal and marine ecosystems like mangroves, seagrass beds and salt marshes.

What is blue carbon?

Blue carbon refers to the carbon captured and stored by coastal and marine ecosystems such as mangroves, seagrasses and salt marshes. These ecosystems act as significant carbon sinks, absorbing carbon dioxide from the atmosphere and storing it in plant biomass and sediments. Blue carbon ecosystems not only help mitigate climate change but also provide critical ecosystem services such as coastal protection, biodiversity support and livelihoods for coastal communities.

Projects that protect or restore blue carbon ecosystems, such as mangrove reforestation, can measure the amount of carbon sequestered, which can then be certified and sold as carbon credits to businesses or governments looking to offset their emissions. These projects create a financial incentive for the preservation of blue carbon ecosystems by linking conservation with carbon markets. Companies or nations buy these credits to meet their emission reduction goals under international agreements like the Paris Agreement.[143]

Coral reefs are estimated to contribute to livelihoods and food security for local communities in the Western Indian Ocean to the value of US$8.4 billion annually,[144] yet they are 'vulnerable to collapse at regional level.'[145] In Tanzania, an estimated 150 000 people rely on mangrove ecosystems for their livelihoods – crab, molluscs, finfish and industrial shrimp trawling are closely associated with the habitat. Mozambique's Inhaca Island hosts the highest biomass of seagrasses in the Western Indian Ocean,[146] and the seagrass habitat in Mozambique's Bazaruto Archipelago hosts the last viable dugong population in the region.[147]

Twenty-two percent of the world's mangroves are in Africa, but many of these are under threat from various anthropogenic activities and few are formally protected.[148] Despite over 130 Ecologically or Biologically Significant Marine Areas having been scientifically identified in Africa, there are remarkably few formal marine protected areas, although this has been increasing since 2015 at a faster rate than other regions in the world.[149]

By investing in the conservation and restoration of these ecosystems, African nations can strengthen their blue economy, as healthy marine environments are essential for sustaining key industries such as fisheries and tourism. Moreover, blue carbon projects can generate financial benefits through mechanisms like carbon credits, providing an additional revenue stream for coastal and island nations.

Blue carbon projects often involve community-based management and restoration efforts, creating jobs and fostering skills development in sectors such as

conservation, research and tourism. These projects empower local communities by engaging them in sustainable management practices that enhance their long-term economic prospects. Overall, integrating environmental protection and blue carbon into the blue economy ensures that economic growth in Africa is both sustainable and resilient.

Seychelles launched the world's first sovereign blue bond to finance marine conservation and blue economy projects, including implementing marine spatial planning and the protection of blue carbon ecosystems. The Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) was established as an independent trust, developed as a result of an innovative agreement to swap $30 million of existing national debt for a fund to conserve ocean spaces against overfishing and climate change. In 2016, SeyCCAT received US$21.6 million from The Nature Conservancy that was partly a grant (US$5 million) and partly loan capital (US$15.2 million), which SeyCCAT lent to the government to buy US$21.6 million in sovereign debt at a discounted value of US$1.4 million.[150]

There is significant potential for new blue carbon projects and initiatives across various regions in Africa, particularly in areas with extensive coastal ecosystems like mangroves, seagrasses and salt marshes (see box below for examples). Mangrove ecosystems have the greatest carbon storage per unit area, followed by salt marshes and seagrasses.[151] The United Nations Framework Convention on Climate Change (UNFCCC) mechanisms prioritise mangrove ecosystems for blue carbon initiatives.

There are some noteworthy examples of successful initiatives, highlighted in the box below, but there is scope for these to be expanded, replicated or adapted to new areas to suit local contexts. The potential for direct economic benefits from blue carbon projects is increasingly being realised, particularly after the success of the Seychelles blue bond initiative.

Examples of blue carbon initiatives in Africa

Vanga Blue Forest Project (Kenya)

The Vanga Blue Forest Project, located near the Kenyan-Tanzanian border, is a community-driven blue carbon initiative that focuses on the protection and sustainable management of mangroves. This project, launched by the Kenya Marine and Fisheries Research Institute and supported by the World Wide Fund for Nature, is generating carbon credits to fund local development projects while helping to mitigate climate change. It has provided jobs related to mangrove reforestation, monitoring and tourism, leading to both environmental benefits and economic upliftment for the local population. www.planvivo.org/vanga

Mozambique Mangrove Restoration Project (Blue Forest Project)
As part of the broader UN Development Programme Blue Forests Project, Mozambique's mangrove restoration initiatives are working to rehabilitate degraded mangrove ecosystems along the country's coastline. These efforts contribute to both carbon sequestration and the restoration of biodiversity, enhancing the resilience of coastal communities to climate impacts such as storm surges and flooding. https://blueforest.co/about/

Casamance and Sine-Saloum Mangrove Restoration Project (Senegal)
Senegal's mangrove ecosystems, particularly in the Casamance and Sine-Saloum regions, have been the subject of restoration efforts aimed at combatting deforestation and enhancing carbon sequestration. The project website calls it 'the largest mangrove restoration project in the world.' Non-governmental organisations (NGOs) work with local communities, focusing on replanting mangroves and protecting existing forests to generate carbon credits. In addition to direct financial benefits for those involved in the restoration, the project reports improvements in fish catches and oyster yields for the local community; improvements in rice fields as salt water intrusion is reduced; and community pride in the restored mangroves.

The Gambia Mangrove Restoration and Conservation Project
The Gambia has initiated blue carbon projects focusing on the restoration of mangroves along its coastline and riverine areas. The project involves replanting mangroves and monitoring their role in carbon storage, while also promoting sustainable livelihoods for local communities dependent on fisheries. It is implemented by the Gambian Department of Parks and Wildlife Management, the Sahel Wetlands Concern, Kombo Foni Forestry Association, and West African Birds Study Association NGOs, and the Danish green energy company Ørsted, and works with over 50 communities. www.gambiamangrove.com/

Chapter 3

Strategic responses and building climate resilience in Africa's blue economy

Policy and governance

Effective policy and governance implementation are critical to fostering climate-resilient blue economies across Africa's diverse coastal nations. Africa is not a single entity and its coastal countries face distinct challenges and opportunities shaped by their geographical, socioeconomic and political contexts. This diversity demands localised approaches to policy development that can address specific issues such as overfishing, coastal erosion and marine pollution while aligning with broader global goals like sustainable development and climate adaptation.

Policy actions for the blue economy in Africa focus on sustainable development, the management of ocean resources and the protection of marine ecosystems. Policy actions for climate change in Africa focus on mitigation, adaptation and building resilience to its impacts while promoting sustainable development, but do not always account for blue economic development. Key policy actions and how they overlap in terms of the blue economy and climate change are indicated in Appendix A.

The implementation of blue economy policies must be accompanied by robust, holistically minded institutional frameworks, ensuring that legislation is effectively enforced, adequately resourced and continuously monitored for impact. Marine spatial planning and integrated coastal zone management are key tools for cross-sectoral, area-based management of marine and coastal environments. They provide structured frameworks for coordinating the use of ocean and coastal resources among diverse stakeholders, including fisheries, tourism, energy, conservation and local communities.

To be effective and sustainable, marine spatial planning and integrated coastal zone management must be forward-looking, incorporating climate change projections, emerging uses and long-term environmental shifts. They should aim to balance

ecological integrity, social wellbeing and economic development, ensuring that current decisions support resilient ecosystems and equitable benefits for present and future generations.

Many countries will have developed national strategies for climate change and/or the blue economy (see Appendix B). All but one country in Africa, Libya, have submitted Nationally Determined Contributions under the Paris Agreement. Countries are at different stages of developing blue economy strategies. Some countries have been criticised for blue economy strategies that focus more on economic development than socioecological sustainability and inclusivity in the context of changing climate.[152]

African nations can develop integrated solutions that build resilience to climate change while unlocking the economic potential of their blue economies

Strengthening regional cooperation and governance frameworks is another essential component for advancing climate-resilient blue economies. Since marine ecosystems and climate impacts do not limit themselves to national boundaries, Africa's coastal nations must work together to manage shared marine resources and address transboundary challenges like IUU fishing, marine pollution and habitat degradation.

Regional initiatives, such as the AU's Africa Blue Economy Strategy, provide a platform for collaboration, enabling countries to pool resources, share best practices and harmonise policies that support the sustainable management of marine ecosystems. By promoting intergovernmental partnerships and fostering regional agreements, African nations can develop integrated solutions that build resilience to climate change while unlocking the economic potential of their blue economies. The groundbreaking work done in the Western Indian Ocean to develop a Regional Ocean Governance Strategy that is holistic and forward-thinking needs to be followed up by collaborative national implementation. Hopefully, in the coming years, it can be used as a proof of concept for replication or adaptation in other regions.

Despite the growing recognition of the triple planetary crisis – where climate change, pollution and biodiversity loss are interconnected – policy and institutional frameworks have been slow to adapt to this understanding.[153] The ocean governance institutional landscape is often characterised as complex, fragmented and overlapping due to the wide array of international treaties, regional agreements and national regulations that govern different aspects of marine environments.[154]

These layers of governance create a patchwork of responsibilities and jurisdictions, with organisations like the IMO, RFMOs and International Seabed Authority often working in silos. The addition of climate change governance further complicates this landscape, as climate issues like ocean acidification, sea level rise and shifting marine ecosystems require integrated responses that transcend traditional marine governance boundaries.

However, these two realms – ocean governance and climate governance – are frequently treated as separate issues, despite their deep interconnectedness. For example, while the UN Convention on the Law of the Sea (UNCLOS) guides maritime activities, the UNFCCC addresses emissions and has only recently started to consider the direct impacts of climate change on marine ecosystems.[155]

The lack of integration between these frameworks makes it difficult to create cohesive policies, resulting in fragmented responses that are inadequate to address the challenges posed by climate change in marine environments. A sustainable blue economy needs a robust and holistic ocean governance and climate change policy landscape to reach its potential. In addition to the policies listed in Appendix A, there are a number of regional collaborative efforts with a focus on cross-sectoral or sectoral issues, some of which are shown in Appendix A to provide an overview of the complexity of the governance landscape in Africa without going into detail. The main cross-sectoral and sectoral organisations involved in ocean governance in Africa are listed in Appendix C.

Economic diversification and food security in Africa's coastal countries

Predictions about the impact of climate change on society have become increasingly alarming and highlight food shortages, social upheaval, violence, disease and mass migrations.[156] Society, at all levels, needs to respond accordingly and cannot rely on 'business as usual' approaches. African governments and private sectors have to embrace the opportunity to proactively and strategically plan pragmatically for unprecedented change.

Economic diversification and food security are central to building climate-resilient blue economies in Africa's coastal countries. As many of these nations rely heavily on sectors such as fisheries and tourism, they are highly vulnerable to the impacts of climate change, including rising sea levels, ocean acidification and declining fish stocks.[157] Diversifying the economic activities within the blue economy offers a critical opportunity to reduce these vulnerabilities while unlocking new sources of revenue and employment.[158] In-country processing and value addition can help increase the income derived from natural resources, develop skills locally and support the development of infrastructure.[159, 160] Nevertheless, the value of traditional agricultural systems and informal enterprise in African countries should not be overlooked.

Ultimately, the path to economic diversification and food security in Africa's coastal countries hinges on the alignment of policies, investment and innovation with the principles of sustainability and resilience.[161] By fostering an inclusive blue economy that promotes alternative livelihoods and invests in forward-thinking projects, African nations can reduce their dependence on climate-sensitive industries and build economies that are better equipped to adapt to the challenges of climate change. This approach not only safeguards food security and livelihoods for millions of people, but also helps to conserve the continent's rich marine resources for future generations. This needs to be done in the context of Africa's diverse capacity, needs, priorities and resource availability.

Infrastructure and technology

Novel and innovative infrastructure and technology are pivotal to the future planning and development of climate-resilient blue economies in Africa. As the impacts of climate change intensify – ranging from rising sea levels and ocean acidification to more frequent extreme weather events – Africa's coastal regions require adaptive solutions that can both mitigate these effects and capitalise on the economic opportunities within the blue economy.

Innovative infrastructure, such as climate-resilient coastal defences, floating structures and renewable energy facilities, can protect vulnerable coastal communities and industries from environmental threats. For example, using nature-based solutions such as restoring mangroves and coral reefs not only provides natural protection against storm surges and erosion, but also enhances biodiversity and supports fisheries.[162] These hybrid approaches blend traditional infrastructure with ecosystem services, building more sustainable and resilient coastlines.

Advanced technologies are also crucial for the effective management and sustainability of Africa's marine resources.[163] Satellite monitoring, drones and AI-driven data analysis are transforming the way marine ecosystems and fisheries are managed, allowing real-time tracking of environmental changes, illegal fishing activities and ecosystem health. These technologies enable decision makers to respond more swiftly and accurately to emerging threats while optimising resource use.

McKinsey (2025) highlights that Africa has the potential to lead the way in AI technologies, with certain sectors (e.g. banks) already ahead of the curve.[164] For instance, the application of remote sensing technology helps track coastal erosion and rising sea levels, providing critical data for infrastructure planning. In addition, innovations in offshore renewable energy – such as wind, tidal and wave energy – present opportunities to reduce reliance on fossil fuels and provide sustainable energy sources for coastal communities, creating green jobs and contributing to both economic diversification and climate resilience.[165]

By investing in such innovative infrastructure and technology, African coastal nations can future-proof their economies while addressing the dual challenges of environmental degradation and economic vulnerability. These advancements will be instrumental in driving sustainable development, reducing climate risks and fostering economic growth through new blue economy sectors. Moreover, integrating cutting-edge solutions with traditional knowledge and local expertise will ensure that technology is not only effective but also equitable, benefitting communities that are most affected by climate change. This approach is essential for building a future where Africa's blue economies are resilient, inclusive and capable of thriving in the face of a changing climate.

Community and stakeholder engagement and capacity enhancement

Community and stakeholder engagement are fundamental to developing climate-resilient blue economies in Africa, particularly in the context of the continent's diverse coastal nations. Raising awareness and educating communities about the impacts of climate change are critical for fostering resilience. Many coastal communities in Africa are directly dependent on marine resources for their livelihoods, making them especially vulnerable to climate-related threats such as sea level rise, declining fish stocks and extreme weather events.

Educating and learning from these communities on the causes and consequences of climate change helps build understanding of how human activities intersect with broader environmental processes. More importantly, it empowers communities to take part in conservation efforts, adopt sustainable practices and guide and support policies that prioritise resilience (see box below for the Great Blue Wall initiative as an example of this). Public awareness campaigns, school programmes and local workshops are effective tools for disseminating knowledge and fostering a collective sense of responsibility towards protecting marine ecosystems.[166, 167]

Great Blue Wall initiative

The Great Blue Wall initiative is an ambitious, Africa-driven effort to combat climate change, biodiversity loss and economic challenges in the Western Indian Ocean region. It aims to create a network of regenerative seascapes – critical ecosystems like mangroves, seagrasses and coral reefs – to act as a natural barrier against climate change impacts while supporting a regenerative blue economy.

The initiative seeks to conserve at least 30% of the Western Indian Ocean by 2030 to sequester 100 million tonnes of CO_2 and generate sustainable livelihoods for 70 million coastal residents. The Great Blue Wall promotes

ocean conservation while accelerating climate adaptation and unlocking financial opportunities for local communities through nature-based enterprises. Its success depends on a multi-stakeholder approach, including governments, private sector investors and local communities, to transform ocean resources into a driver of environmental and socioeconomic resilience.

Empowering local communities and stakeholders is also crucial for ensuring that climate-resilience strategies are effective and sustainable in the long term.[168] When local stakeholders are actively involved in decision-making processes, they are more likely to support and sustain the outcomes of those decisions.[169]

This approach requires creating governance structures that enable community participation at all levels, from local councils to national marine planning. For example, involving fishers in discussions about sustainable fishing practices can lead to more successful and locally adapted regulations. Similarly, empowering coastal women (who often bear the brunt of economic and environmental challenges) can lead to innovative livelihood diversification, such as in Zanzibar's seaweed farming initiative, where women have become leaders in sustainable marine resource use.[170]

Bringing the voice of Africa's youth into science, negotiations and planning is another key component of building climate-resilient blue economies.[171] As the demographic backbone of the continent, Africa's youth have a significant stake in shaping the future of the blue economy. Involving young people in policy discussions, research and decision making not only leverages their energy, creativity and technological skills, but also ensures that long-term planning reflects the aspirations of the next generation (see box below).

Examples of youth-led initiatives

Several successful youth-led initiatives in Africa exemplify how young people are contributing to the development of climate-resilient blue economies. These initiatives show the energy, innovation and commitment of Africa's youth in addressing environmental challenges and building sustainable futures for their communities. Here are a few notable examples:

OceanHub Africa (https://www.oceanhub.africa/)
OceanHub Africa is a youth-led accelerator based in Cape Town, South Africa, focused on nurturing ocean-minded startups across the continent. Founded by young African entrepreneurs, the initiative supports innovative solutions that promote ocean conservation, sustainable fisheries and

marine biodiversity. OceanHub Africa identifies and mentors startups that leverage cutting-edge technologies, such as marine robotics, aquaculture innovations and ocean data monitoring, to solve pressing challenges in Africa's blue economy.

Kenya's Flipflopi Project (www.theflipflopi.com/)
The Flipflopi Project, led by a team of young environmentalists from Kenya, is a pioneering initiative aimed at combatting plastic pollution in the Indian Ocean. The project gained international recognition when the group built the world's first traditional dhow boat entirely from recycled plastic collected along Kenya's coastline. The team has raised awareness of the devastating impacts of plastic waste on marine ecosystems, while advocating for circular economies and plastic waste management solutions.

Youth for Marine Protected Areas in Seychelles
(https://youth4mpas.com/resources-ays/)
In the Seychelles, young environmental advocates have been leading efforts to expand and manage marine protected areas to preserve biodiversity and enhance climate resilience. Youth for Marine Protected Areas works closely with the Seychelles government, NGOs and local communities to promote sustainable marine management. It engages in educational campaigns, research and hands-on conservation projects, such as coral restoration and habitat monitoring.

Towards resilience and sustainability

Planning for resilience and sustainability in Africa's climate-resilient blue economies requires a multi-tiered approach that addresses short-, medium- and long-term challenges. In the short term, immediate actions must focus on mitigating the most pressing climate risks, such as coastal erosion, declining fish stocks and extreme weather events. This can be achieved through investments in nature-based solutions, like mangrove restoration, and building adaptive infrastructure that protects vulnerable communities and economies.[172]

Governments can also prioritise the creation of social safety nets and alternative livelihoods, such as sustainable aquaculture and ecotourism, which can reduce dependency on climate-sensitive sectors. To navigate economic and political uncertainties, governments must foster regional cooperation and partnerships with international organisations, leveraging technical assistance and financial support for adaptation initiatives. By engaging local communities and stakeholders from the outset, these short-term measures can be more inclusive and adaptable to local contexts.

Decisions about new activities in the ocean and coastal zones must account for likely future conditions and carefully balance economic, ecological and social considerations. Ocean accounts provide a structured framework to integrate these dimensions, enabling evidence-based planning that supports both sustainable development and climate resilience. Ocean accounts should be used in decision making within a forward-thinking marine spatial plan.

In the medium term, the focus should shift towards economic diversification and building governance systems that can withstand political instability and the impacts of a rapidly growing population. As countries with high levels of debt and poverty face significant constraints, attracting investment in sustainable blue economy projects – such as renewable energy and marine biotechnology – can help unlock new revenue streams and reduce reliance on external debt.

Building regional governance frameworks that promote shared management of marine resources can enhance cooperation, reduce costs and create opportunities for collective economic growth. Moreover, integrating climate resilience into national development plans and ensuring that policies are flexible enough to adapt to evolving climate, economic and political conditions are essential to fostering long-term sustainability.

Given the inherent uncertainties of climate change and economic conditions, adaptive governance systems that allow for flexibility and innovation will be critical

In the long term, Africa's coastal nations must plan for the uncertainties of a changing climate, fluctuating economic conditions and political shifts. This requires forward-looking strategies that focus on education, capacity enhancement and innovation. Empowering the next generation of African scientists, entrepreneurs and policymakers through education and training will be crucial in developing the technical expertise needed to manage marine resources sustainably.

Investing in research and innovation, particularly in areas like ocean-based carbon sequestration and advanced aquaculture technologies, will provide the tools for long-term resilience. Given the inherent uncertainties of climate change and economic conditions, adaptive governance systems that allow for flexibility and innovation will be critical. By planning across these timeframes and integrating resilience into every level of decision making, Africa's blue economies can thrive, even in the face of climate and economic uncertainty.

Many sectors, industries and communities are deeply entrenched in traditional ways of operating, especially in coastal regions where livelihoods have been tied

to practices like artisanal fishing, tourism and extractive industries for generations. Adapting to a changing climate requires a multifaceted strategy that acknowledges the economic and social dependencies on current systems while creating pathways to transition towards sustainability.

By emphasising the benefits of alternative, sustainable practices – such as stable incomes from renewable energy, resilient coastal protection from ecosystem restoration and enhanced food security through sustainable aquaculture – communities can begin to see the value in shifting away from unsustainable practices.[173] Importantly, this messaging should highlight not only environmental gains but also the economic and social benefits of a more sustainable blue economy, making the case that shifting practices is not just a sacrifice but an investment in future prosperity.

Sustainable finance

Sustainable (including blue and climate) finance can play a critical role in advancing the blue economy and addressing climate change. Blue finance, including instruments like blue bonds, debt-for-nature swaps and impact investment funds, is key to bridging the gap between financial needs and sustainable ocean governance. Climate change adaptation and mitigation, particularly through nature-based solutions like blue carbon initiatives, are also central to this effort.[174]

Ultimately, fostering public-private partnerships, improving access to finance for local communities, and developing innovative funding mechanisms are crucial steps in ensuring that the blue economy supports both environmental resilience and inclusive economic growth. Political support for responsible finance mechanisms (e.g. UN Environment Programme Finance Initiative Sustainable Blue Economy Finance Principles) can encourage private sector buy-in for sustainable activities and vice versa.

By broadening the focus of sustainable finance beyond climate finance, policymakers and financial institutions can catalyse transformative change, fostering inclusive growth and safeguarding critical ecosystems. Insurance companies can also play a critical role in promoting a sustainable blue economy by incentivising risk-reducing practices, supporting climate-resilient infrastructure and investing in nature-based solutions that protect marine ecosystems and coastal communities. This holistic perspective is essential for addressing the challenges of sustainable development in Africa and beyond.

Investment in sustainable blue economy projects is key to realising its potential. To attract both domestic and international capital, African countries must create conducive environments for investment, offering clear regulatory frameworks, financial incentives and public-private partnerships. Innovation plays a crucial role here, as novel technologies and approaches can drive the development of profitable yet sustainable blue economy ventures.

For instance, the expansion of offshore renewable energy – such as wind, wave and tidal power – offers a way to reduce reliance on fossil fuels while creating jobs and driving economic growth and improving energy security. Similarly, investment in marine-based biotechnology, which includes the development of pharmaceuticals from marine organisms, could create high-value industries that tap into Africa's vast marine resources. These sectors not only contribute to economic diversification but also promote the long-term sustainability of marine ecosystems.

Governments and international organisations must provide financial support, technical assistance and incentives that make the transition to sustainable practices feasible

Another key approach is to address the economic and structural barriers that make it difficult for communities and industries to change. Many people resist shifting away from the status quo because they fear losing their livelihoods or cannot afford the upfront costs associated with adopting new technologies or sustainable practices. Governments and international organisations must therefore provide financial support, technical assistance and incentives that make the transition feasible.[175] This could include subsidies for sustainable practices, access to affordable financing for renewable energy projects, or compensation schemes for those whose livelihoods are impacted by stricter environmental regulations.

Fostering public-private partnerships can encourage industries to innovate and embrace more sustainable models, reducing resistance by showing that profitability and sustainability are not mutually exclusive. Collaborative governance can help ensure that the transition to climate resilience considers the needs and priorities of all stakeholders, reducing resistance by fostering a sense of ownership and agency in the process. By combining education, economic incentives and inclusive decision making, society can be guided towards embracing more sustainable approaches, even in the face of initial reluctance.[176]

Chapter 4

Conclusion

Climate change is reshaping marine ecosystems across the globe and its effects are compounded by myriad anthropogenic pressures. Sea level rise and coastal erosion put additional stress on social and economic infrastructure. Environmental degradation is an inevitable outcome of the rapid growth in shipping, offshore mining, oil and gas extraction and rapid coastal urbanisation. A complex feedback cycle emerges in which economic decline, environmental stress and weak governance increase the number of vulnerable people susceptible to exploitation by criminal networks.[177]

To address these threats, it is crucial to adopt a holistic, systems-based approach that acknowledges the interdependencies between climate stressors and human activities. The conventional approach to risk management, often narrowly focused on linear cause-and-effect scenarios, underestimates the full scope of these threats, particularly as they interact and amplify one another.

As marine ecosystems degrade, economies reliant on them experience cascading effects. These can manifest through economic instability, shifts in employment and disruptions to food security. Furthermore, economic behaviours evolve in response to perceived risks. For example, changes in savings and investments can influence the availability of capital for blue economy projects, while shifts in insurance and credit markets may restrict funding for vulnerable coastal developments.

If there are no significant improvements in policy and business to account for climate change, the consequences for Africa's blue economies – and the broader socioeconomic landscape – could be devastating.[178] Without proactive climate action, Africa's coastal regions will face escalating environmental degradation, which will ripple across economies, ecosystems and societies.[179]

Investing in nature-based solutions, such as mangrove restoration or sustainable fisheries management, can enhance ecosystem resilience while providing economic opportunities. Similarly, policies that support carbon sequestration through ocean-based methods, along with stricter regulation and a future-oriented approach to coastal development, can mitigate the compounding effects of climate change and human activity.

One immediate impact of inaction would be the accelerated collapse of marine ecosystems, which serve as the backbone of Africa's blue economies. Overfishing, pollution and habitat destruction, coupled with climate change, would severely deplete fish stocks, leaving local communities without their primary source of protein and income. Coastal areas would become increasingly vulnerable to flooding and erosion, leading to the displacement of populations, destruction of infrastructure and the loss of arable land. These changes would exacerbate poverty, increase food insecurity and place additional strain on already overburdened governments that are grappling with high levels of debt, unemployment and social instability.

Climate-induced migration, conflict over diminishing resources and worsening public health crises caused by deteriorating living conditions could further destabilise vulnerable regions. Moreover, the lack of climate-resilient infrastructure and technologies would leave countries ill-prepared to recover from extreme weather events, locking them into a cycle of repeated disasters and recovery costs.

Without transformative policies and business practices, African coastal nations could face significant setbacks in their development, leaving them even more exposed to the socioeconomic impacts of climate change. The cost of inaction is far greater than the challenges of transitioning to a climate-resilient blue economy. The failure to adapt would also entrench poverty, inequality and social unrest, making it harder for future generations to thrive.[180]

Climate change is seen as an amplifier of other challenges society faces, including maritime security, exacerbating issues around forced migration, competition for resources, food security and increasing vulnerability of coastal communities, which can lead to civil disruption.[181]

Maritime security is not just about preventing criminal activities at sea; it is essential to unlocking Africa's maritime economic potential, fostering sustainable development and ensuring that the benefits of the blue economy are realised across the continent. Maritime security operations and agencies also contribute directly to the blue economy through employment, infrastructure development and international cooperation.[182]

Embracing technology and innovation offers transformative possibilities for developing profitable, climate-smart and future-proof blue economic activities in Africa.

By leveraging advancements in areas such as marine biotechnology, sustainable aquaculture and ocean-based renewable energy, African coastal nations can diversify their economies while protecting marine ecosystems.[183] Technologies like satellite monitoring, artificial intelligence and data-driven management systems enable more precise monitoring of fish stocks, reducing overfishing and supporting

sustainable fisheries. Innovations in renewable ocean energy, such as offshore wind and wave power, provide clean alternatives to fossil fuels, addressing both energy needs and climate change.

Furthermore, climate-resilient infrastructure and nature-based solutions like mangrove restoration can safeguard coastlines from rising sea levels while enhancing biodiversity. By integrating these innovations into blue economy strategies, African nations can unlock new economic opportunities, create jobs and foster environmental resilience, ensuring long-term prosperity in a rapidly changing climate.

Equally important is the need for inclusive governance frameworks that bring together all stakeholders – scientists, policymakers, local communities and the private sector – to ensure that decisions reflect a diversity of perspectives and priorities and co-design a climate-resilient blue economy strategy. Traditional knowledge systems, particularly from coastal and indigenous communities, offer invaluable insights into how marine ecosystems function and how they can be protected in the face of evolving threats. Decision-making tools such as ocean accounts can inform decisions about the blue economy in the face of climate change by integrating social, ecological and economic data to assess trade-offs, support sustainable resource use, and ensure that development benefits both communities and marine ecosystems.

> Only by addressing the compounded risks of climate change and human activity can we maintain functional marine ecosystems

The link between maritime security, ocean governance and the growing blue economy requires an integrated and continental approach with leadership from the AU to promote inter-regional cooperation and build the necessary capability. In particular this requires: (i) revision of Africa's Integrated Maritime Strategy, to reflect the dynamic nature of maritime security issues and incorporate technological advancements; (ii) strengthened capability to respond to maritime security threats, including the implications of increasing maritime traffic; and (iii) a strategic approach to addressing emerging threats, such as the vulnerability of critical infrastructure to cyberattacks.[184]

In conclusion, developing profitable and sustainable blue economies requires a shift away from narrow, linear models of risk assessment, towards a holistic understanding of the interconnected drivers of marine systems. Only by addressing the compounded risks of climate change and human activity can we maintain

functional marine ecosystems and secure the long-term viability of the industries and communities that depend on them. This integrated approach not only strengthens environmental resilience, but also fosters innovation, adaptive policies, economic growth and social equity in the blue economy.

Appendix A

Regulatory frameworks and policies

A non-exhaustive list of international and regional frameworks and policies that cover either the blue economy and/or climate change. A blue square indicates that the policy or framework incorporates the blue economy (BE) and the green square indicates that climate change (CC) is incorporated into the policy or framework.

International frameworks	BE	CC
1982 UN Convention on the Law of the Sea (UNCLOS): UNCLOS is a foundational international treaty that sets out the legal framework for maritime governance, including the sustainable use of ocean resources and protection of the marine environment, but does not directly talk to climate change or the management of GHG emissions.	■	
1992 UN Framework Convention on Climate Change (UNFCCC): The UNFCCC is the primary international treaty for addressing climate change. It establishes the framework for international cooperation on mitigating climate change, enhancing adaptation and promoting sustainable development. It does not refer to UNCLOS, but it does refer to the importance of the ocean as a carbon sink.		■
2030 Agenda for Sustainable Development (UN SDGs): SDG 14, Life Below Water, promotes the conservation and sustainable use of the oceans, seas and marine resources. It provides global goals for countries, including African nations, to support the blue economy. SDG 13 focuses on climate action, calling for urgent efforts to combat climate change and its impacts. African countries are working within this global framework to integrate climate resilience into their development strategies.	■	■

International frameworks	BE	CC
Paris Agreement (UNFCCC 2015): The Paris Agreement aims to limit global temperature rise to below 2°C and pursue efforts to limit the increase to 1.5°C. It requires countries, including those in Africa, to submit Nationally Determined Contributions outlining their climate actions and goals for mitigation and adaptation. It does mention the ocean, but only in relation to its role as a carbon sink.		
Kyoto Protocol (UNFCCC 1997): The Kyoto Protocol, an earlier international agreement under the UNFCCC, set binding emission reduction targets for developed countries. Though largely replaced by the Paris Agreement, it was a key framework for Africa's climate engagement in the early 21st century.		
Sendai Framework for Disaster Risk Reduction (2015-2030): This international framework emphasises the need to reduce disaster risks, including those exacerbated by climate change. It focuses on reducing vulnerabilities and increasing resilience to climate-related disasters such as floods and droughts, which are prevalent in Africa.		

Regional frameworks	BE	CC
AU Agenda 2063: The Africa We Want: Agenda 2063 highlights the importance of the blue economy for Africa's future, emphasising the sustainable use of marine resources as a pathway to economic growth and environmental sustainability. It works towards sustainable management and conservation, and climate resilience and preparedness (AU 2015).		
AU Africa Blue Economy Strategy (AU-IBAR 2019): This strategy outlines Africa's approach to developing its blue economy, focusing on areas such as fisheries, aquaculture, maritime transport and renewable energy, while promoting environmental sustainability and economic inclusiveness.		

Regional frameworks	BE	CC
2050 Africa's Integrated Maritime Strategy (AIMS): AIMS 2050 is a comprehensive framework developed by the AU to promote maritime security, governance and sustainable use of Africa's vast marine resources. It aims to foster economic development, environmental sustainability and peace across the continent's coastal and marine areas. Climate change is mentioned as a challenge (AU 2012).	■	
AU Climate Change and Resilient Development Strategy and Action Plan (2022): This strategy provides a roadmap for AU member states to address climate change through regional cooperation. It focuses on enhancing the adaptive capacity of African countries, promoting low-carbon development and increasing access to climate finance. It incorporates ocean issues throughout the text. Building a climate-resilient blue economy is incorporated into the text.	■	■
African Continental Free Trade Area (AfCFTA): Although primarily a trade agreement, the AfCFTA facilitates regional economic cooperation, which includes sustainable practices in marine resource development and cross-border collaboration on blue economy activities.	■	
Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean: A regional framework aimed at protecting the marine environment in the Western Indian Ocean, it encourages sustainable blue economy initiatives and regional cooperation among African coastal nations including in the development of climate-resilient, sustainable blue economies.	■	■
Convention for Cooperation in the Protection, Management and Development of the Marine and Coastal Environment of the Atlantic Coast of the West and Central Africa Region (Abidjan Convention): A regional framework to encourage cooperation on issues such as pollution, coastal zone management, marine spatial planning and climate change adaptation. The convention secretariat is in the first stages of developing a blue economy strategy for the region.		■

Regional frameworks	BE	CC
Benguela Current Convention (BCC): A multilateral agreement between Angola, Namibia and South Africa, the BCC promotes the sustainable management of the Benguela Current Large Marine Ecosystem, focusing on transboundary marine resource conservation.		
Barcelona Convention: Also called the Convention for the Protection of the Mediterranean Sea Against Pollution, it comprises 22 contracting parties bordering the Mediterranean Sea, including numerous North African countries. It focuses on pollution and the management of natural resources for current and future generations through biodiversity protection and integrated coastal zone management. It does not specifically mention the blue economy in the protocols.		
Common Market for Eastern and Southern Africa (COMESA) Climate Initiative: COMESA has implemented a climate initiative aimed at integrating climate change into regional agricultural and environmental policies. The initiative promotes sustainable land and water management, disaster risk reduction and climate-smart agriculture to enhance food security in the face of climate change.		
Economic Community of West African States (ECOWAS): The ECOWAS Commission has developed a blue economy plan for a more holistic and inclusive economic growth that incorporates climate change considerations.		
African Development Bank's Climate Change Action Plan (2021–2025): This action plan supports African countries in transitioning to green growth and enhancing resilience to climate impacts. It focuses on mobilising climate finance, promoting renewable energy and supporting adaptation projects across the continent.		

Appendix B

Blue economy and climate change policies

National blue economy plans or strategies are denoted by blue squares. The letter U shows that plans are underway. Squares in green indicate that a country has submitted a Nationally Determined Contribution under the Paris Agreement with the year in which that happened. It is acknowledged that this does not indicate level of implementation. An * denotes a landlocked country and, in both cases, an X indicates that no policy was found.

Country	BE	CC
Algeria		2016
Angola	U	2021
Benin	U	2021
Botswana*		2016
Burkina Faso	U	2021
Burundi*	X	2021
Cabo Verde	U	2021
Cameroon	U	2021
Central African Republic*	X	2022

Country	BE	CC
Chad*	X	2021
Comoros		2021
Democratic Republic of the Congo	X	2021
Republic of the Congo		2021
Djibouti		2016
Egypt	U	2023
Equatorial Guinea		2022
Eritrea	U	2018
Eswatini*	X	2021

Country	BE	CC
Ethiopia*	U	2021
Gabon	U	2022
The Gambia	X	2021
Ghana	U	2021
Guinea	U	2021
Guinea-Bissau		2021
Côte d'Ivoire	U	2022
Kenya		2020
Lesotho*	U	2018
Liberia	U	2021
Libya	U	X
Madagascar		2024
Malawi*	U	2021
Mali*	X	2021
Mauritania	U	2021
Mauritius		2021
Morocco	U	2021
Mozambique		2021

Country	BE	CC
Namibia	U	2024
Niger*	X	2021
Nigeria	U	2021
Rwanda*	U	2020
São Tomé and Príncipe		2021
Senegal	U	2020
Seychelles		2021
Sierra Leone		2021
Somalia		2021
South Africa		2021
South Sudan*	U	2021
Sudan	U	2022
Tanzania		2021
Togo	U	2021
Tunisia	U	2021
Uganda*	U	2022
Zambia*	U	2021
Zimbabwe*	U	2021

Appendix C

Organisations involved in ocean governance in Africa

Cross-sectoral organisations

The Indian Ocean Rim Association (IORA) includes the Western Indian Ocean region, and has priority areas for fisheries management, maritime safety and security, tourism, disaster risk management and the blue economy.

The Indian Ocean Commission (IOC) includes the five island states in the Western Indian Ocean and works collaboratively on conservation and sustainable management of natural resources, maritime security, public health, renewable energy and culture. The IOC was integral in advocating for the blue economy to be separated from the green economy to acknowledge the importance of the oceans and ensure that issues around climate change were adequately addressed (Amuhaya and Degterev, 2022). The Western Indian Ocean Marine Science Association focuses on marine research, including blue economy, ocean governance and climate change research in the region.

Sectoral organisations

Economic communities

The AU recognises eight regional economic communities and the African Economic Community. In addition to COMESA and ECOWAS highlighted above, these include the Arab Maghreb Union (AMU); Community of Sahel-Saharan States (CEN-SAD); East African Community (EAC); Economic Community of Central African States (ECCAS); Intergovernmental Authority on Development (IGAD); and Southern African Development Community (SADC).

Fisheries

The AU has the Policy Framework and Reform Strategy for Fisheries and Aquaculture in Africa as a key fisheries policy instrument. The African Platform for Regional Institutions in Fisheries, Aquaculture and Aquatic Systems was established in 2015 as part of the African Fisheries Reform Mechanism. There are also numerous RFMOs, some dealing with tuna and tuna-like species

(e.g. International Commission for the Conservation of Atlantic Tunas, Indian Ocean Tuna Commission) and some dealing with other species (e.g. South East Atlantic Fisheries Organisation and South Indian Ocean Fisheries Agreement).

Transport

The Revised African Maritime Transport Charter and African Charter on Maritime Security and Safety and Development in Africa (Lomé Charter) are Africa-wide. There are also regional port authorities to encourage cooperation, including the Port Management Association of Eastern and Southern Africa.

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About this monograph

The African Union's Africa Blue Economy Strategy promotes a sustainable blue economy for economic growth, job creation and ecosystem protection. Climate change impacts threaten traditional ocean sectors, through acidification, sea level rise and extreme weather events. A well-managed blue economy should aid climate adaptation through technologies, renewable energy and blue carbon. Success requires sustainable finance, integrated ocean governance and regional cooperation, to position Africa as a proactive, climate-smart economic leader.

About the authors

Judy Beaumont is the Director of the International Ocean Institute – Southern Africa, and has worked in the environmental sector for 30 years, focusing on environmental sustainability, ocean and coastal management, and climate change response.

Shannon Hampton is a Marine Biologist who has worked in ocean governance in Africa for over a decade.

David Willima is a Maritime Researcher with the Climate Risk and Human Security Project at the Institute for Security Studies.

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