Session1: CLIMATE CHANGE, POLLUTION AND OTHER ENVIRONMENTAL STRESSORS

Monday, 24 January 2022, 13h00-14h30 (times in UTC)

Scope of the session

- *Pollutants and contaminants and their potential impacts on human health and ocean ecosystems in Africa* (ODC 1)
- *Ocean and Coastal biodiversity (protection, monitoring, management and restoration)* (ODC 2)
- *Climate Change adaptation in Africa's coastal zones (addressing coastal vulnerability, including erosion, storm surges)* (ODC 5)

Summary outcomes of the Regional Gap Analysis

Scope of ODC	**Identified issues**	**Proposed actions/areas for intervention**
Input to Part i	*Input to Part ii*	*Input to Parts ii & iii*
1. Marine litter and microplastics; oil spills/chemicals; eutrophication; multi-stressor hotspots	• Lack of **harmonized methodology** for regional assessments • Different **capabilities** to respond to marine pollution • Lack of **source-to-sink** understanding and assessment of pollutants, including **impacts on human health**	***Actions/interventions particularly relevant to Topic 1.*** • Strengthen capacity development and partnerships related to monitoring and assessment of marine litter; oil spills/chemicals and identification of potential hotpots • Establish a regional monitoring and assessment programme on marine litter, eutrophication (and related impacts, e.g. harmful algal blooms), invasive species (e.g. *Sargassum*) and chemical pollution, including persistent organic pollutants (POPs) and oil pollution • Improve regional assessments, based on harmonized methodologies, including modelling, datasets and indicators, and tested and validated standard methodologies for assessing and reporting on marine litter and microplastics • Review, evaluate and strengthen legislative measures for effective management of marine litter • Promote the clean ocean concept into the curricula of schools in Africa ***Actions/interventions particularly relevant to Topics 1, 2 and 5.*** • Establish and implement management plans for marine litter and conservation plans, including MPA networks for coastal and deep-sea ecosystems that take into account their relationship to natural and anthropogenic changes in the environment while ensuring and promoting ecosystem services • Establish a coordinated networks of research institutes, universities, observatories, associations, and businesses in Africa to define standard protocols for monitoring and protecting species, habitats, and ecosystems, and improve the institutional and human capacity of the networks ***Actions/interventions specifically relevant to all Topics*** • Strengthen ocean governance, including through adaptive approaches
2. Understanding healthy and resilient marine ecosystems;	• Lack of **fundamental knowledge/research** on species diversity and taxonomy	***Actions/interventions particularly relevant to Topic 2.***

biodiversity incl. species diversity and taxonomy; alien and invasive species; structure and functioning of the ocean; linkages between ecosystem services and people	• Lack of understanding of **ecosystem functions and services** supported by different ecosystems at the scale required by relevant management; ecosystems resilience and biogeographic patterns • Lack of **mapping** of marine and coastal ecosystems (e.g. for MPAs) • **Increasing pressures on resources**	• Strengthen fundamental scientific biodiversity knowledge (e.g. taxonomy and systematics research) • Improve environmental management for the conservation of ecosystems, preservation of their services (fisheries, aquaculture, tourism, etc.) and human health • Strengthen integrated knowledge e.g. linkages between biodiversity and social sciences, governance, local knowledge etc. • Identify the origin of invasive or exotic species and pathways of invasion, the environmental conditions conducive to invasion, and their major effects on local habitats, species, and ecosystems • Promote inclusive and participatory MPA planning and management processes ***Actions/interventions relevant to all Topics*** • Identify areas that are potential conflict hotspots that are particularly exposed to the impact of several stressors and propose possible solutions • Develop policies on e.g. prevention and control of alien and invasive species, IUU fishing (link to ODC 3), regional cooperation in terms of maritime surveillance which could be extended from the current cooperation around combating piracy • Provision of adequate waste reception facilities at ports
5. Trends/changes in environmental conditions and long-term monitoring; numerical modelling, forecasting, indicators; impacts on marine ecosystems; climate processes at local and regional scales and for different time scales	• Highly variable **ocean modelling expertise and resources** • Lack of **high-resolution weather and climate information** • Lack of **forecast modelling** of extreme events and their impacts on coastal zone management; and projections of warming in view of MPAs	***Actions/interventions particularly relevant to Topic 3-5.*** • Intra/inter-regional collaboration to advance and harmonize capacities on modelling (meteorological, oceanographic, and climate processes at local and regional scales and for different time scales), including expertise and resources in terms of human capacity, infrastructure and strategies • Downscale global ocean models for African seas and sub-basins to simulate regional scale and shelf processes, assess impacts on marine ecosystems and their resources from regional to local scales • Improve regional and national climate forecasts on different time scales to ensure anticipation of hazards and minimize their impacts • Enhance responses to the potential impacts of climate change on maritime sector by including climate change concerns into risk assessment and development of climate adaptation plans for ports ***Actions/interventions relevant to all Topics*** • Strengthen evidence-based support to policy strategies, including adaptation and mitigation through environmental decision support models • Increase awareness among sectoral decision-makers of the impact of climate variability and changes on marine ecosystems • Conduct environmental change scenarios of the impacts of future socioeconomic development pathways, policy options, and exploitation on biodiversity & nature benefits

Session 2: OCEAN ECONOMY AND FOOD SECURITY

Tuesday, 25 January 2022, 11h00-12h30 (times in UTC)

Scope of the session

- *Fisheries and aquaculture* (ODC 3)
- *Ocean science in support of the development of a sustainable ocean economy (including, Marine and coastal ecosystem services, Fisheries and Aquaculture, Ocean-based renewable energy, Ocean-based transport operations, Coastal and marine tourism, and Offshore oil and gas exploration and exploitation)* (ODC 4)
- *Marine Spatial Planning and Integrated Coastal Zone Management, Ocean science-policy interface, Ocean governance including ABNJ* (Cross-cutting themes)

Summary outcomes of the Regional Gap Analysis

Scope of ODC	**Identified issues**	**Proposed actions/areas for intervention**
Input to Part i	*Input to Part ii*	*Input to Parts ii & iii*
3. Fisheries and aquaculture, including data, assessments, ecosystem-based approach to fisheries management, enforcement and governance	• Key knowledge gaps related to **data on fish catch and fishing effort** • **Irregular assessments** of fish stocks • Lack of **reliable information** on the nature and extent of **IUU** fishing in the EEZ, high seas and ABNJ • Lack of understanding of the effects of **unsustainable exploitation of resources, other anthropogenic factors, climate variability and change on marine ecosystems** • Lack of **enforcement** of national and international laws and regulations; impacts of **ineffective governance** on marine ecosystems	***Actions/interventions particularly relevant to Topics 1 and 2.*** • Address gaps in the understanding of biogeographic patterns, biodiversity, fisheries, and ecosystem functions and services at the scale required for relevant management • Improve understanding of fishing techniques and technologies needed for sustainable exploitation of marine resources, innovative strategies for alternative livelihoods • Upscale gathering and analysis of data and information on the nature and extent of IUU fishing in the EEZ, the high seas and ABNJ • Expand the provision of historic data, real-time data and modelling with evolving partner networks • Promote synchronized efforts by governments, private operators and NGOs for an integrated approach to mariculture
4. Ocean science in support of the development of a sustainable ocean economy, including data and observations, evaluation of environmental change scenarios	• Inadequate recognition of the **role of relevant partnerships**, public-private alliances and university networks as engine of environmental research, understanding and management, and providing the competent work force in a fast-changing environment • Lack of adequate capacity for and development of **entrepreneurship in sustainable ocean economy**	***Actions/interventions particularly relevant to Topics 1 and 2.*** • Map of seabed topography, geomorphology and substrate types, geo-habitats and sensitive habitats, describe the deep sea, with an inventory of their biodiversity, as well as critical fish habitats • Implementation of management plans for sustainable exploitation of coastal and deep-sea biotic and abiotic resources, including gas hydrates, minerals and molecules of industrial interest, conservation and preservation of ecosystem services (fisheries, aquaculture, tourism, etc.). • Efforts to share capacities and develop entrepreneurship in sustainable ocean economy sectors, e.g. designing joint education strategies, mixing art, science and education

		• Develop tailored university programmes and blue skills actions, e.g. internship, institutional exchange programs, oriented to bridge employability, meeting the needs of industry and society • Up-scale and transform capacity building and marine technology transfer, addressing youth, scientists, decision-makers and stakeholders • Focus on the required enablers: functional governance frameworks and more openness to innovation and mobility
Cross-cutting themes: Marine Spatial Planning and Integrated Coastal Zone Management, Ocean science-policy interface, Ocean governance including ABNJ	• Not specifically addressed in the Regional Gap Analysis	***Actions/interventions particularly relevant to Topic 3.*** • Advocate for integrated coastal management for sustainable development • Promote synchronized efforts by governments, private operators and NGOs for an integrated approach to mariculture • Conduct environmental change scenarios to provide insight into the impacts of future socioeconomic development pathways, policy options, and blue growth on biodiversity and nature benefits ***Actions/interventions particularly relevant to Topic 4.*** • Upscale gathering and analysis of data and information on the nature and extent of IUU fishing in the EEZ, the high seas and ABNJ ***Actions/interventions relevant to all Topics.*** • Strengthen the African agenda in ocean science for development e.g. establish an "Africa maritime university" as an alliance of existing institutions and programmes, linked to relevant UN bodies (e.g. UNESCO-IOC, World Maritime University, etc.) and as a platform under the Ocean Decade • Establish a special financing vehicle to financing for the Decade's activities in Africa in order to assure consistency and build a longer continuity from the Decade • Up-scale and transform capacity building and marine technology transfer, addressing youth, scientists, decision-makers and stakeholders • Focus on the required enablers: functional governance frameworks and more openness to innovation and mobility

Session 3: OCEAN OBSERVATIONS AND MONITORING AND ACCESS TO DATA AND INFORMATION

Tuesday, 25 January 2022, 13h00-14h30 (times in UTC)

Scope of the session

- *Early warning systems for ocean related hazards, including storm surges, cyclones and tsunamis* (ODC 6)
- *Ocean Observations and monitoring in Africa/ Modelling and forecasting of ocean processes and ecosystems, including coupled ocean-atmosphere models/ Ocean data and information management/Emerging technologies for ocean observations and monitoring* (ODC 7)
- *Mapping of the ocean floor in Africa* (ODC 8)

Summary outcomes of the Regional Gap Analysis

Scope of ODC	**Identified issues**	**Proposed actions/areas for intervention**
Input to Part i	*Input to Part ii*	*Input to Part iii*
6. Early warning systems for ocean-related hazards and extreme events, including vulnerability to flooding, enhanced frequency and duration of tropical cyclones, storm surges, tsunamis etc.	• Lack of comprehensive **assessments of climate-related risks**, including extreme weather events in a changing climate, sea level rise, temperature increase, flooding, and incidence of invasive species • Lack of **operational platforms and decision support systems** to address tsunamis generated by different sources, e.g., seismic activity, volcanoes, landslides, atmosphere • Need for the **integration of operational platforms** with progressive geological processes such as erosion or burial, and the undersea environment • Need for **assessments of the risk** of climate change on the ecosystem and human environment in the coastal zone and deep sea	***Actions/interventions particularly relevant to Topics 1 & 2.*** • Reduce the data observation gaps between sub-regions e.g. expand the South West Indian Ocean Climate Change Portal for information sharing • Develop climate risk monitoring programs and services (link to ODC 5) ***Actions/interventions particularly relevant to Topic 4.*** • Promote engagement with regional platforms for integrated and standardized methods of assessment and management of ecosystems and associated resources ***Actions/interventions particularly relevant to Topic 2.*** • Develop tools for observation, forecasting, warning and anticipation of climatic hazards • Adopt appropriate sampling strategies; improve assessment of marine geo-hazards, based on paleo records and submarine terrain analysis and description of active faults and other features • Conduct a comprehensive assessment of climate-related risks, including extreme weather events in a changing climate, sea level rise, temperature increase, flooding and extreme weather events, including the risk of climate change on the ecosystem and human environment (socioeconomics) in the coastal zone and deep sea • Promote research on extreme events (extreme cyclones and swells, etc.) by developing coupled sea-atmosphere models • Adopt coordinated methods and approaches to establish a network dedicated to hazard science and policy in Africa • Encourage participation in relevant ongoing global and regional initiative (e.g. "Tsunami Early Warning and Mitigation System in the North-eastern Atlantic, the Mediterranean and connected seas - ICG/NEAMTWS") • Enhance the maritime security unit within the African Union

7. Ocean observations and monitoring; Modelling and forecasting of ocean processes and ecosystems, including coupled ocean-atmosphere models; Ocean data and information management; Emerging technologies for ocean observations and monitoring	• Lack of **common platform for data sharing; incompatible metadata formats; incompatible data** (data existing in printed format/file type) • Key shortcoming related to **access to data** (ownership e.g. lack of access to oil and gas industry data), data quality, lack of standardized observing parameters, and gaps in the types of data collected • Gaps in sustained **in-situ observations for several Essential Ocean Variables (EOVs)** • Lack of **multidisciplinary approaches** to observation, monitoring, and modelling	***Actions/interventions particularly relevant to Topics 1 & 2.*** • Develop a network of ocean observation systems and regional forecasting models of ocean circulation, to provide baseline information on the oceanographic, biogeochemical and ecological state, changes and trends of the large marine ecosystem • Develop operational platforms and a decision matrix to address natural ocean events • Establish an operational system of long-term coastal observations to provide information at key locations • Sustain existing observing system (e.g. in the Mediterranean) to ensure systematic and continuous observations of oceanographic data • Develop autonomous ships and digital shipping (i.e. from sensors to big data analytics) • Ensure that the entire African shelf region is routinely monitored (EOVs and EBVs) and data is near real time and accessible and the bathymetry is mapped at high resolution. This should be complemented by autonomous monitoring (including pH through BGC Argo) being enhanced around Africa • Establish a regional calibration and instrument centre that could also develop local instruments • Track seafloor morphology in key areas characterized by particular natural dynamics (e.g. coastal erosion, deltaic deposits, mass transport sea-floor current activity, etc.) or anthropogenic modification (e.g. infrastructure, dredging, dumping) ***Actions/interventions relevant to all Topics.*** • Develop regional capacity development institutions to provide education, training and capacity building that are adapted to the regional context
8. Digital representation of the ocean, mapping of the ocean floor in Africa including a dynamic ocean map	• Need for **training on data collection, analysis, and interpretation** (including capacity building in programs and software to analyze different environmental datasets) • Lack of **common platform** for data sharing, adaptation of technologies, facilities and infrastructure within Africa • Identified gap in **research programmes on ocean policy agenda** in order to analyze objectives, identify priorities, align teaching/research/outreach activities capable of impacting on policy • Need to better **manage, develop and transfer know-how** within the contributing research community	***Actions/interventions particularly relevant to Topics 3 and 4.*** • Provide training on data collection, analysis, and interpretation, including capacity building on programs and software to analyze different environmental datasets, for seabed mapping /marine ecosystem mapping • Create a platform for data sharing, adaptation of technologies, facilities and infrastructure within Africa • Strengthen capacities e.g. GEBCO envisages the training of executives for updating the bathymetry of the seabed

Session 4: CAPACITY-DEVELOPMENT AND OCEAN LITERACY

Wednesday, 26 January 2022, 11h00-12h30 (times in UTC)

Scope of the session

- *Ocean training and research capacities and opportunities in Africa/Mobilizing transformative partnerships for the Sustainable Development of oceans in SIDS* (ODC 9)
- *Improving humanity's relationship with the oceans through ocean literacy programmes/ Underwater cultural heritage and its potential to contribute to sustainable development in Africa* (ODC 10)

Summary outcomes of the Regional Gap Analysis

Scope of ODC	**Identified issues**	**Proposed actions/areas for intervention**
Input to Part i	*Input to Part ii*	*Input to Part iii*
9. Ocean training, research capacities and opportunities; equitable access to data, information, knowledge and technology; transformative partnerships for the Sustainable Development of oceans	• Challenges in data sharing due to **lack of common platforms**, and incompatible metadata and data formats • Lack of **standardized policies** in relation to access and sharing of data • Lack of **trust between organizations** to share data • Limited technical capacities and resources • Need to empower local/regional scientists with skills and tools to enable them to analyse and interpret the **large amounts of data sets** available in the region,	***Actions/interventions particularly relevant to Topics 1 and 4.*** • Provide standardized training on data collection, storage, dissemination, analysis and interpretation to facilitate data sharing and uptake/ease of use • Establish a coordinated network of research institutes, universities, observatories, associations, and businesses to define standard protocols for monitoring and protecting species, habitats, and ecosystems • Pursue marine open data approach and boost advancement in scientific innovation • Promote transparency and accessibility of research conducted by private companies and institutes in order to make it accessible to end-users – governments, policymakers, and the public. This requires establishment of an institutional framework to bridge science and policy and facilitate uptake of data and models by decision makers • Build network capacity and competency within the region and develop regional platforms and programs that promote knowledge sharing, including sharing of models, publications and research outputs • Establish of state-of-the-art regional research facilities that can be supported by regional and international organizations • Promote societal needs in forecasting and climate to ensure the added value of meteorological products and the return of information to the citizen • Improve communication of reliable data to decision makers and between policy makers, IOC National focal points and scientists
10. Improved ocean literacy and better communication to improve humanity's relationship with the ocean, recognition and better understanding of the multiple values of the ocean for human wellbeing,	• Lack of appropriate tools for the **dissemination of climate information** related to coastal and oceanic areas • Lack of **effective communication** between science and policy; need for improved **ocean literacy** and better communication	***Actions/interventions particularly relevant to Topics 2 and 3.*** • Promote ocean literacy and participatory research; improve connection and collaboration with existing networks that are working on science communication and outreach, and harmonize among the riparian countries • Engage and motivate the youth to appreciate the ocean

culture, and sustainable development	• **Limited funding** available to promote outreach programs to educate the public on issues of sustainability and conservation	• Develop, improve, and provide user-friendly tools for the dissemination of climate and ocean information • Improve the understanding of the future links with economy and societal needs by ensuring the complete openness of scientific knowledge and supporting the formulation of environmental policy and management plans • Develop digital tools to characterize and analyze interactions between all stakeholders and the marine environment