SOLSTICE
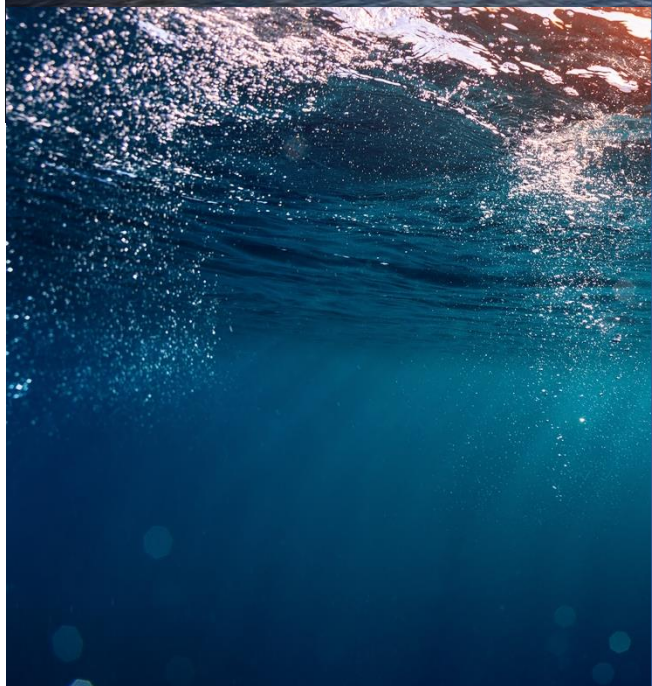
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Data management for ocean governance

Marine information sharing for improved ocean governance and national policy development

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Key Messages:

The management of marine resources relies heavily upon the availability and suitability of oceanographic data.

In data limited regions it is imperative that existing data be accessible and available in a timely manner to support management and governance decision making.

Historic marine data on Tanzania's EEZ is fragmented across the scientific literature, is inadequately archived, may be held privately preventing reuse, or already lost.

Investment in Tanzania's designated data centre for all EEZ oceanographic information would greatly aid local research capacity and also improve use of marine data in national policy.

Efforts must be made to ensure that all future data collected during oceanographic and fisheries studies is supplied to the data centre for long-term curation and reuse.

The need to use oceanographic data in the management of marine resources and ocean governance is very clear. Tanzania's marine environment is data limited and policy development and management decisions are hindered by difficulties in accessing historic observations. Existing data are fragmented across the scientific literature, held by international research institutions or data repositories, or by private companies. Enhancement of the designated oceanographic data centre in Tanzania would benefit local researchers, regional stakeholders and international collaborative efforts as well as aid national policy development.

Marine data and Ocean Governance

The United Nations Decade of Ocean Science (2021-2030) provides a framework supporting actions to increase use of ocean science in the sustainable management of the oceans. Such efforts link basic research, policy development and societal concerns leading to greater benefits for ocean ecosystems and society. In particular capacity development, increased ocean literacy and wider societal engagement are key attributes of the Decade of Ocean Science. Such outcomes however rely upon timely access to data, information sharing and communication. Ocean Governance which underlies the concept of a sustainable ocean economy and is linked to UN Sustainable Development Goal 14, considers both marine resources and the social and economic consequences of management actions. Successful Ocean Governance also requires access to, and timely use of, appropriate marine data.

Why is a national marine data centre necessary?

East African coastal waters have a reputation for being data poor. In reality, much relevant data and information are available but dispersed throughout scientific publications, institutional and other grey literature reports, or held by public and private organizations. This makes access to such data difficult and increases the risk of data loss. Marine information is expensive to collect but retains value long after its

original purpose. Data can come from many different sources including fisheries and oceanographic surveys, seabed or coastal habitat mapping activities, oil and gas surveys and from environmental impact assessments.

What are the benefits?

A national marine data centre would provide a clear source of high-quality data, allowing researchers and stakeholders to identify knowledge gaps and provide policy makers with accurate up-to-date information about the marine environment. The centralized collation of marine observations would improve research led assessment of the marine environment and avoid expensive duplication of collection effort.

Representation of role of the data centre in policy and management development

Knowledge of the marine environment is built up over many years whilst exploitation of that knowledge is central to issues of Ocean Governance. The assessment of climate change impacts requires suitable datasets to compare against, particularly baseline observations from which the magnitude of change can be determined. The benefits would primarily be at a national level, but a central marine data centre would also allow information to be fed into regional (e.g. the Nairobi Convention Clearing House Mechanism) and global mechanisms and assist Tanzania to comply with international reporting obligations, such as towards the achievement of the UN SDGs and the CBDs Post 2020 Biodiversity Framework targets.

The international project perspective

International research programmes from South Africa, Germany, the UK and elsewhere have successfully collected oceanographic data along the Tanzanian coastline in recent years. Such datasets are not presently accessible from a single source. In the South African example, final data are now held by a Government agency (DAFF) and not publicly available whilst in the German example only partially calibrated data are publicly available via the Pangaea data repository. The UK funded SOLSTICE project meanwhile banked its data with a UK based marine data archive (BODC). Requirements to formally submit final data as part of agreed Diplomatic Clearances lack the specificity necessary to ensure successful archiving of data. From an external perspective therefore, it is unclear whether previous cruise data will have been shared in part or in full with Tanzanian researchers despite their relevance for research and policy needs. Nor is it clear where submitted data could be

Distribution of hydrographic stations in northern Tanzania collected by South African research projects

obtained by future research programs. For example, where are data from the 2004 South African cruise located and who in Tanzania is the designated point of contact? This diverse approach to data management and data sharing inevitably weakens the usefulness of such data and can even result in its loss to science. A central data archive in Tanzania would dramatically improve awareness of, and access to, relevant marine data.
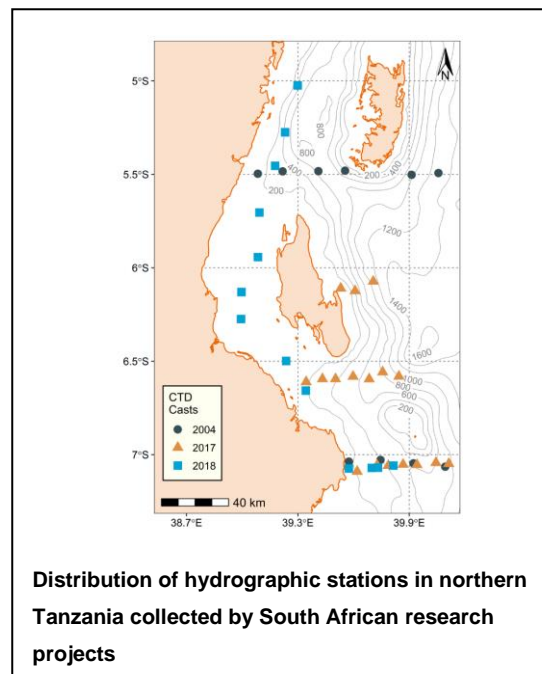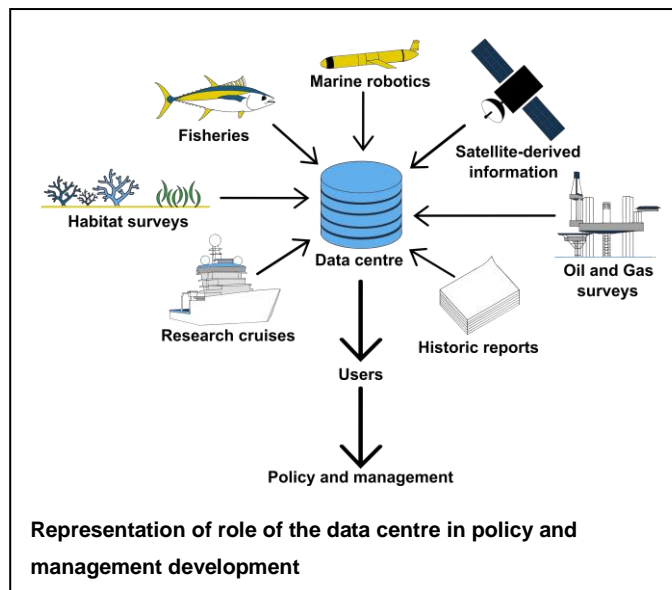
Potential datasets

In recent years the SOLSTICE and SAPPHIRE projects have collected a substantial amount of data which together forms the largest known dataset of the marine and coastal environment in Tanzania. The SOLSTICE project collected over 50 hydrographic profiles, 300 water samples for nutrient, particulate and chlorophyll-*a* concentration measurements, 50 net hauls for both phytoplankton and zooplankton identification, and undertook multiple robotic glider deployments collecting measurements through the water and images of benthic organisms and seabed habitats. Several social surveys were also conducted amongst coastal fishing communities. The SAPPHIRE project collected datasets during a series of South African cruises in 2004, 2017, and 2018 and during a German led cruise in 2008 when hydrographic profiles and ocean currents were measured. SAPPHIRE obtained hydrographic casts and water samples along four transects across the Pemba resulting in with 48 vertical profiles of nutrients and chlorophyll-*a* concentrations.

Recommendations

- Invest in a centralised national data centre to ingest and curate all data related to the marine environment including oceanographic, seabed habitat and fisheries data. Previous efforts have been made to establish such a data centre at the Institute of Marine Sciences (IMS). It is recommended that IMS is supported to further develop the human and infrastructural capacity to carry out this role on behalf of Tanzania.

- Compel data collectors to supply their data to the data centre. Ensure submission of accompanying documentation and metadata.

- Invest in and support local researchers in efforts to exploit collated datasets.

- Ensure that Marine Spatial Planning activities, marine environmental management and monitoring, climate change adaptation and Ocean Governance efforts engage in dialogue with the data centre to ensure timely access to data or to identify data gaps.

The information presented in this Summary for Policy Makers is based on the following open access publications:

B.Sekadende et al., **Spatial variation in the phytoplankton community of the Pemba Channel, Tanzania, during the South-east monsoon.** Ocean Coast Manag., 212 (2021), p. 105799. https://doi.org/10.1016/j.ocecoaman.2021.105799

S. Painter et al., **Evidence of localised upwelling in Pemba Channel (Tanzania) during the southeast monsoon.** Ocean Coast Manag., 200 (2021), p. 105462. https://doi.org/10.1016/j.ocecoaman.2020.105462

A.R. Gates et al., **Ecological considerations for marine spatial management in deep-water Tanzania**. Ocean Coast Manag 210 (2021), p 105703, https://doi: 105710.101016/j.ocecoaman.102021.105703.

M.R. Palmer et al., **Marine robots for coastal ocean research in the Western Indian Ocean**. Ocean Coast Manag., 212 (2021), p.105805. https://doi.org/10.1016/j.ocecoaman.2021.105805