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Baseline Report on Marine Biodiversity Databases with Relevance to Tanzania and Eastern Africa

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Executive Summary

Nowadays, marine biodiversity databases are well-established tools to record species occurrence and distribution. And they are also becoming increasingly important resources for conservation managers and political decision makers. In the past decades a range of online marine biodiversity databases have been developed, ranging from national to global spatial scopes. They also differ widely in terms of the focus on specific taxa (e.g. whales, sharks and rays or algae) towards those which encompass several larger taxonomic groups.

And while especially the larger databases are supported by global supranational institutions the smaller ones were often initiated through individual efforts or short-term projects. Therefore, due to the large differences in scope, funding, data policies and standards the overall accessibility and options to deposit or retrieve data vary considerably among the surveyed databases.

For this report it was our intention to provide an overview of databases which contain marine biodiversity information with relevance to Tanzania and the greater East African region. This includes a general assessment, as well as information about the type of collected data, data format, the geographical scope, the used standards, metadata and the frequency of maintenance as well as potential relationships to other databases.

The report itself was created in the framework of the **“New Digital Technologies for Marine Biodiversity Data Handling in East Africa – Data Linking People (NeDiT)”** project implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The overall objective of NeDiT is to contribute to improved handling of biodiversity data in East Africa, which includes providing and assessing data as well as communicating data. A focus of the project is on integrating data and raising the awareness and capacities for exchange of data building on the existing experiences. Thereby the project will gather stakeholders involved in marine biodiversity data handling to a networking group, compile the most relevant data bases and assess the experience in sustainable data handling and sharing. Furthermore, the project will evaluate how new and innovative digital technologies can contribute to advanced integration of data from different sources and their overarching analysis.



Content

I.	Global Databases	p.4
II.	Databases with special relevance to Tanzania and Kenia	p.11
III.	Conclusions and future steps	p.19



I. GLOBAL DATABASES

1. Global biodiversity information facility (GBIF)

Overall observations: It is an international research infrastructure that provides open access data of all types of life on Earth. Far from complete, the entrances are sometimes not supported with any institution, and can be updated personally, which translates into mistaken entrances.

Type of data: Provides data about where and when species have been recorded. The information derives from many sources, including museum specimens collected in the last centuries to geotagged smartphone photos uploaded by amateur naturalists in recent days.

Distribution format: Online database and maps, and downloadable API, XLS, CSV or tab (tabular)

Datasets: 78 in Tanzania, 105 in Kenya (May 2019)

Geographical scope: Global

Metadata: Easily accessible both online and downloadable

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are repeatedly and frequently updated

Relation with other databases:

Developers and contact: GBIF contact: info@gbif.org

Data policy: All available data are licensed under CC0, CC BY or CC BY-NC. The data are free for all but have to be properly cited.

2. FISHBASE

Overall observations: Most extensively accessed online database on finfish. List of species organised in different categories with many different approaches.

Type of data: Fish species database. Currently accepted name, distribution, characteristics, ecology, etc.

Distribution format: Online dataset

Datasets: 1

Geographical scope: Global

Metadata: Not accessible

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Few times per year

Relation with other databases: Sealife, Tree of Life, PubMed, Otolith Atlas of Taiwan Fishes, Catalog of Fishes, ECOTOX, and many others.

Developers and contact: FishBase Team -> Dr. Rainer Froese (FishBase coordinator) rfroese@geomar.de

Data policy: CC BY-NC 3.0

3. Species +

Overall observations: No marine species for Tanzania or Kenya included in the database.



Type of data: Information about all species that are listed in the Appendices of CITES and CMS, as well as other CMS Family listing and species included in the Annexes to the EU Wildlife Trade Regulations.

Distribution format: Online database, XLS, CSV, TAB

Datasets: n/a

Geographical scope: Global

Metadata:

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Repeatedly and frequently updated.

Relation with other databases:

Developers and contact: UNEP-WCMC

Data policy: Species + Terms of Use: No sub-licensing or redistribution, no commercial use and a proper citation has to be included.

<https://speciesplus.net/terms-of-use>

4. OBIS

Overall observations: Global database with regional nodes (such as AfrOBIS) which are currently included in the main database. The data is accessible and functional.

Type of data: Biodiversity and biogeographic data and information of marine life. It offers more than 56.000.000 occurrences of more than 120.000 species.

Distribution format: Online database and mapper, API, R package

Datasets: more than 2900 (May 2019)

Geographical scope: Global

Metadata: Availability depending on the data providers, who are responsible for the completeness of the data and the metadata profile.

Standards used: Darwin Core, Ecological Metadata Language, Darwin Core including OBIS-ENV-DATA

Frequency of maintenance: Data are updated a few times per year

Relation with other databases: Similar to GBIF

Developers and contact: UNESCO. Regional African contact: Ursula von St Ange: uvstange@csir.co.za

Data policy: CC 0, CC BY or CC BY-NC

5. OCEAN DATA VIEWER

Overall observations: It is a portal that englobes many other databases regarding ocean data, regardless of the scientific discipline.

Type of data: Geospatial information about ocean data: Global distribution of Sea Turtle Feeding, of Dive Centres, of Mangroves, of coral reefs, etc.

Distribution format: GIS vector (vector, .shp), WMS

Datasets: 28

Geographical scope: Global

Metadata: Publicly available to download

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Most of the datasets are regularly maintained and the global dataset too.



Relation with other databases: Ocean+ Data

Developers and contact: UNEP-WCMC. marine@unep-wcmc.org.

Data policy: Depending on the dataset, CC, CC-BY, CC BY 4.0. Free to copy and redistribute the material with proper citation. Sometimes commercial use available with previous request

6. Global Habitat Suitability for Framework-Forming Cold –Water Corals (2011)

Overall observations: Published dataset with 7 different maps containing 7 suborders of cold water octocorals.

Type of data: Modelled distribution for five framework-forming cold-water corals.

Distribution format: Raster (.tif, geotiff)

Datasets: 1

Metadata: Partially available online (publication in PLoS ONE)

Geographical scope: Global

Standards used: UNEP-WCMC specific

Frequency of maintenance: Data are not being updated since 2011

Relation with other databases:

Developers and contact: School of Ocean Sciences, University of Bangor;
andrew.j.davies@bangor.ac.uk

Data policy: Creative Commons Attribution 3.0 Unported

7. MoveBank

Overall observations: Collection of animal tracking datasets published in peer-reviewed journals and added into GIS software.

Type of data: Tracking data, locations describing movements of animals.

Distribution format: Online database, online maps and tabular (.xls, .csv or .tab)

Datasets: 137 data packages and 359 data files. (3.05.2019)

Metadata: Online

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data and metadata are very regularly updated.

Relation with other databases:

Developers and contact: School of Ocean Sciences, University of Bangor;
andrew.j.davies@bangor.ac.uk

Data policy: CC BY 3.0

8. Spatial data for the RedList of Threatened species

Overall observations:

Type of data: Distribution information on species assessed for The IUCN Red List of Threatened Species.

Distribution format: Vector (polygon; .shp)

Datasets: 27000

Metadata: Partially available online

Geographical scope: Global

Standards used: UNEP-WCMC Specific



Frequency of maintenance: Data are updated in intervals that are uneven in duration

Relation with other databases:

Developers and contact: International Union for Conservation of Nature (IUCN)

Data policy: Datasets are freely available for non-commercial use according to published terms constraints: (<http://www.iucnredlist.org/info/terms-of-use>), and under data license for commercial use.

9. Global Database on Protected Areas Management Effectiveness (GD-PAME)

Type of data: Compile evaluation on protected area management effectiveness (PAME) from governments and other authoritative organizations.

Distribution format: Online database, Tabular (.xls, .csv, or .tab)

Datasets: 1

Metadata: Available to download

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated in intervals that are uneven in duration.

Relation with other databases:

Developers and contact: UNEP-WCMC; protectedareas@unep-wcmc.org

Data policy: UNEP-WCMC Data License. Free to use for non-commercial use, otherwise contact business-support@unep-wcmc.org

10. Protected planet

Overall observations: It is basically a list with all the assessments done in the protected areas of each region considered from 1966 until now. When a protected area is selected by the user, a link redirects it to a specific page about the specific protected area, with the result of the assessment. (<https://protectedplanet.net/925> as an example)

Type of data: Global distribution of Key Biodiversity Areas (KBA), Important Bird and Biodiversity Areas (IBA) and Alliance for Zero Extinction (AZE) sites, with a marine component.

Distribution format: Online map, vector (point; .shp), vector (polygon; .shp), CSV list with all the protected areas.

Datasets: 67 regarding Kenya, 329 regarding Tanzania

Metadata: Available to download

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated in intervals uneven in duration

Relation with other databases:

Developers and contact: Birdlife International; birdlife@birdlife.org

Data policy: Not possible to directly download KBA boundaries from the website. For commercial purposes, the dataset is available through the Integrated Biodiversity Assessment Tool (www.ibatforbusiness.org). For non-commercial use, a request has to be filled up.



11. Global Distribution of Ecologically or Biologically Significant Marine Areas (EBSAs)

Overall observations: The webpage presents the different EBSAs per regions and each one redirects the user to the CHM webpage specifically in the page of the EBSA selected.

Type of data: "Geographically or oceanographically discrete areas that provide important services to one or more species/populations of an ecosystem or to the ecosystem as a whole, compared to other surrounding areas or areas of similar ecological characteristics, or otherwise meet the [EBSA] criteria" (Secretariat of the Convention on Biological Diversity, 2008).

Distribution format: Online database

Datasets: 26 in the Western South Pacific

Metadata: None available

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated in intervals that are uneven in duration

Relation with other databases: The Clearing-House Mechanism of the Convention on Biological Diversity (CHM)

Developers and contact: Secretariat of the Convention on Biological Diversity; secretariat@cbd.int

Data policy: The Secretariat grants permission to Users to visit the Site and to download and copy the information, documents and materials (collectively, "Materials") from the Site for the User's personal, non-commercial use, without any right to resell or redistribute them or to compile or create derivative works therefrom.

12. Global Shark Distribution Database (2011)

Type of data: First global database of shark species distributions

Distribution format: Tabular (.xls, .csv or .tab)

Datasets: 1

Metadata: Available through <https://journals.plos.org>

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: It is not maintained nor updated

Relation with other databases:

Developers and contact: Dalhousie University

Data policy: Creative Commons Attribution 3.0 Unported (CC BY 3.0)

13. Coral Ecoregions of the World (2009)

Overall observations: It is a scientific paper that includes the global biodiversity of 798 coral species and divides them into 141 ecoregions. It is not any kind of portal or webpage.



Type of data: Global distribution of 141 coral ecoregions, delineated on the basis of known internal.

Distribution format: vector (polygon,.shp); PDF

Datasets: 1

Metadata:

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: It is not maintained nor updated

Relation with other databases:

Developers and contact: Coral Reef Research; j.veron@coralreefresearch.com

Data policy: Creative Commons Attribution 3.0 Unported (CC BY 3.0)

14.SeagrassNet: Global Seagrass Monitoring Network (2013)

Type of data: Status of seagrass resources and their threats.

Distribution format: Online database (list of species per region) MySQL; PDF

Datasets: 1

Metadata: It is not available to download

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated a few times per year

Relation with other databases:

Developers and contact: Washington State Department of Natural Resources;
Prof Fred Short: fred.short@dnr.wa.gov

Data policy: Contact Prof Fred Short

15.Knowledge Network for Biocomplexity

Overall observations: Library of different datasets from a highly-distributed set of field stations, laboratories, research sites, and individual researchers. Data is properly organized and easily downloadable.

Type of data: Complex ecological data

Distribution format: Online database, .csv, XML, PDF

Datasets: 11 regarding Kenya and 9 regarding Tanzania (3 overlapped)

Metadata: Included when data is downloaded from the portal

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated in intervals that are uneven in duration

Relation with other databases:

Developers and contact: National Centre for Ecological Analysis and Synthesis,
University of California

Data policy: CC-BY 3.0

16.Pangea



Overall observations: It is a publisher and library for georeferenced data from earth system research. Data files are archived with a description (metadata) in a relational database

Type of data: Georeferenced data from earth system research.

Distribution format: Online database and dat-delimited text.

Datasets: 192 datasets found on search for "Kenya" and 26 found for search for "United Republic of Tanzania"

Metadata: Online portal available

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated in intervals that are uneven in duration.

Relation with other databases:

Developers and contact: Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research; <https://www.pangaea.de/contact/>

Data policy: Depending on the dataset.

17. Atlas of Global Conservation

Overall observations: It is a library with GIS files available to download about global spatial data regarding mainly ecoregions

Type of data: 80 global maps describing the state of terrestrial, freshwater, and marine habitats

Distribution format: KML (-kml or .kmz), Tabular (.xls, .csv, or .tab), Vector point; .shp), Vector (polygon; .shp)

Datasets: 80

Metadata: Available per each dataset

Geographical scope: Global

Standards used: UNEP- WCMC Specific

Frequency of maintenance: Data are not being updated

Relation with other databases:

Developers and contact: The Nature Conservancy. Dan Majka; dmajka@tnc.org

Data policy: CC BY-NC 3.0

18. Integrated Biodiversity Assessment Tool (IBAT)

Overall observations: It is a portal that maintains three databases: "IUCN Red List of Threatened Species", "World Database on Protected Areas" and the "World Database of Key Biodiversity Areas".

Type of data: Global and national data layers, such as protected area boundaries, biological information about habitat and species diversity indices, and key areas for biodiversity, which can be useful for research and conservation planning purposes.

Distribution format: Online database, Online maps, Vector (point; .shp), Vector (polygon; .shp)

Datasets: 3

Metadata:

Geographical scope: Global

Standards used: UNEP-WCMC Specific



Frequency of maintenance: Frequently maintained

Relation with other databases: IUCN redlist

Developers and contact: IBAT alliance; ibat@ibat-alliance.org.

Data policy: Information is available to download for internal own use, or after having notified a written undertaking to the Subscriber to use such information only for the purpose of advising the Subscriber (and its Affiliates)

19. Catalogue of Life

Overall observations: It is the most comprehensive and authoritative global index of species currently available. It connects to many other comprehensive databases for each taxon and brings the information together to build a major database.

Type of data: Index of species.

Distribution format: Online database

Datasets:

Metadata:

Geographical scope: Global

Standards used: UNEP-WCMC Specific

Frequency of maintenance: Data are updated in a monthly basis

Relation with other databases: WoRMS

Developers and contact: Species 2000 secretariat, Naturalis Biodiversity Center; support@sp2000.org

Data policy: Use of the content (such as the classification, synonymic species checklist, and scientific names) for publications and databases by individuals and organizations for not-for-profit usage is encouraged, on condition that full and precise credit is given

II. Databases with special relevance to Tanzania and Kenia

1. AFRICAN MARINE ATLAS (omap.africanmarineatlas.org)

Overall observations: The portal is functional, though not 100%. It is supposed to contain the initial continental maps and datasets from the African Coastal and Marine Atlas, maintained by ODINAfrica. It displays the source of information for each dataset and the way to access it directly from the original source (when it has an online version of it). However, the project is still ongoing and there are parts of the portal still under construction (since 2003). It comprises the whole continent and future national subdivisions are expected.

Type of data: Geospatial datasets of environmental themes of Africa (Geosphere, Atmosphere, Biosphere, Hydrosphere, and Anthroposphere),

Distribution format: Map pictures and layers, and text files with georeferenced occurrences.

Datasets: Around 100



Geographical scope: Continental

Metadata: Available per each dataset in the webpage.

Standards used: Depending on the dataset. No common standard.

Limitations: Some of the links to the original source are not updated and do not correspond with the actual source. The local scale remains under construction. When it comes to Biosphere data, it is clearly out of date, the most recent of it belonging to 2007.

Frequency of maintenance: Last update 2007

Relation with other databases: GBIF, FAO fisheries data and information system, ReefBase, AfreMaS, OBIS, AlgaeBase

Developers and contact: ODINAfrica project. No contact provided, but the names of the Editors available.

Data policy: Complete open access

2. AFRICAN OCEAN PORTAL •

Overall observations: The webpage: www.africanoceans.net, which is recommended in some entrances of the African Marine Atlas database, is currently some Asiatic beauty and cosmetic webpage.

3. KENYA MARINE AND FISHERIES RESEARCH INSTITUTE (KMFRI) Online portal for fisheries data

Overall observations: GIS layer with very few information.

Type of data: ArcGIS layer showing the coastal fisheries and its significance

Distribution format: Online

Datasets: 1

Geographical scope: Regional

Limitation: The online portal is often not available

Metadata:

Standards used:

Frequency of maintenance: Created in 2017

Relation with other databases: Similar to WIOfish but less complete

Developers and contact: KMFRI director@kmfri.go.ke

Data policy: Complete open access

4. AFRICAN REGISTER FOR MARINE SPECIES (AfReMaS)

Overall observations: Working and functional.

Type of data: Aims to manage an authoritative list of species occurring along the African marine coasts.

Geographical scope: Regional

Distribution format: Online and downloadable datasets.

Datasets: 24,104 (all in 1 dataset)

Limitations: AfReMaS presents information on marine species in Africa as correctly as possible. However, it undoubtedly contains errors, and the board cannot be held responsible for any errors or misuse of data contained in the register.

Metadata: Available at marinespecies.org

Standards used: LW-TaxBB, CF metadata conventions, Darwin Core, EML, Dublin Core (From marine species).

Frequency of maintenance: Created in 2017



Relation with other databases: WoRMS, ODINA, OBIS

Developers and contact: Flanders Marine Institute. Contact: Mika Odido
m.odido@unesco.org

5. KENYA NATIONAL OCEANOGRAPHIC DATA CENTER (NODC-Kenya)

General overview: Webpage with no available links.

Developers and contact: KMFRI. No email contact available in the webpage. There is another webpage very similar (<http://www.odinafrica.org/>) which does make reference to AfreMaS and to a metadata database (African Marine Atlas Catalog)

6. AFRICAN MARINE ATLAS CATALOGUE (GeoNetwork opensource)

General overview: Datasets not available anymore. "The requested operation could not be performed" is the output of any intended search.

Type of data: "The African Marine Atlas is a collection of data and information on the African marine environment. The purpose of the African Marine Atlas metadata catalogue is to improve access to data and information generated for the Atlas project."

Distribution format:

Datasets:

Geographical scope: Regional

Metadata:

Standards used: ISO-TC211 and the Open Geospatial Consortium (OGC). It supports the most common standards to specifically describe geographic data (ISO19139 and FGDC) and the international standard for general documents (Dublin Core). It uses standards (OGS WMS) also for visualizing maps through the Internet. --> Standards used by the GeoNetwork software.

Frequency of maintenance:

Relation with other databases: African Marine Atlas (omap.africanmarineatlas.org)

Developers and contact: International Oceanographic Commission (IOC) and UNESCO. Contact via online portal not functional (error is shown).

Data policy: Complete open source software

7. THE BIODIVERSITY ATLAS OF KENYA

Overall observations: Database with a user-friendly design that mainly comprises terrestrial biodiversity. It also offers analysis tools like time series analysis of the normalized difference vegetation index, but just for a couple of locations in Kenya. Anyone can upload data in the Atlas, but it will have to be approved by the county administrator.

Type of data: Almost only terrestrial data, generated from Kenya's Natural Capital-Biodiversity Atlas (2015). Occurrences per area in Kenya, from different taxon and considering animals and plants (though many plant species missing).

Distribution format: Online maps, graphs of temporal tendencies available, and lists of organisms downloadable theoretically (the links do not work properly).

Datasets: 47

Geographical scope: Regional

Limitations: Even though the format is user friendly and the maps are interactive and complete, it only comprises data from the Kenya's Natural Capital-Biodiversity atlas of 2015, which only considers terrestrial biodiversity.



Metadata: Kenya's Natural Capital-Biodiversity Atlas metadata (not available in the portal but available to download in researchgate.net)

Standards used: Webpage specific

Frequency of maintenance: Regularly maintained

Relation with other databases: The users of the portal can access data from a variety of databases like IUCN, GBIF, MOL and WWF.

Developers and contact: Through their webpage, no public email available.

Data policy: Complete open access

8. NAIROBI CONVENTION CLEARINGHOUSE MECHANISM (CHM)

Overall observations: It is a database that was very recently revamped, having some of the basic parameters of the portal such as Data Privacy not available. This will probably be solved in the next weeks. Moreover, the portal offers a brief summary of the reports and articles that makes the information accessibility fast and precise.

Type of data: Data and information (documents) for improved management of the coastal and marine environment in the Western Indian Ocean region. This includes articles on the current state of the Coast, Maps, and Reports for the region.

Distribution format: Online maps, text and .pdf

Datasets: 43 (not datasets but 38 reports, 3 maps and 2 articles)

Geographical scope: Regional (Western Indian Ocean)

Limitations: Very new and small database, few information available.

Metadata: Online available

Standards used:

Frequency of maintenance: Very new database (less than 3 months)

Relation with other databases:

Developers and contact: Nairobi Convention Secretariat

Data policy: Not available yet. (03.06.2019)

9. WESTERN INDIAN OCEAN FISHERIES DATABASE (WIOfish)

Overall observations: Simple database that collects the different fisheries of the area, with the information coming from many different sources, including government reports but also local fishers. Provides biological but also social information. However, the fact that the data is not standardized, and that no metadata is available makes it difficult to assess part of the information in it. It would be interesting to add a simple Dublin Core metadata file associated with every dataset.

Type of data: Information about fisheries in the countries of the Western Indian Ocean. Historical, social and biological information regarding the type of fishes, number of catches, but also the year of opening, actual activity, number of boats per fishery, etc.

Distribution format: Online text in table format and CSV or PDF downloadable

Datasets: 36 regarding Kenya fisheries.

Geographical scope: Regional

Limitations: No metadata available, the sources of information are government reports,

publications and/or databases. Because there is little to no formal management of most of the small-scale fisheries of the region, it is difficult to use a standard



for each entry. The data is sometimes consulted with local fishers who are the only ones who know anything about the fisheries.

Metadata: No metadata associated with the database. The data hosted in the database come from government reports, publications and/or databases and are generally cited in the reference section for each fishery (unless there was no citation available).

Standards used: None

Frequency of maintenance: Regularly

Relation with other databases: None

Developers and contact: Oceanographic Research Institute in the Regional Node and KMFRI in the national node. Contact: Bernadine Everett bernadine@ori.org.za

Data policy: Complete open access

10. MARINE SPATIAL ATLAS FOR THE WESTERN INDIAN OCEAN (MASPAWIO)

Overall observations: It is a regional atlas database regularly and meticulously maintained. Many languages display available, including German, Spanish, English and many others. The online software offers the possibility of overlapping maps. Provides access to marine spatial datasets, providing layers useful for marine spatial planning, management, and research, from multiple primary and secondary sources, and contributing compiled the information into other regional and global repositories."

Online maps including geographic but also biological information (coral reefs, fish species, mangroves...)

Type of data: Marine spatial datasets.

Distribution format: Some documents available (txt, xlsx, pdf, GIS layers). Maps can be downloaded: Tiles, KML, GeoJSON, Excel, CSV, GML 3.1.1, GML 2.0, Shapefile Comprimido PNG, PDF, JPEG

Datasets: 97 (17 regarding Kenya)

Geographical scope: Regional

Limitations: Some of the layers are empty.

Metadata: Easily access both online and downloadable

Standards used: Ecological Monitoring Language i.e. EML standard. The metadata is also available for download in ISO, FGDC, ebRIM, Dublin Core, DIF and, Atom.

Frequency of maintenance: Data is uploaded regularly

Relation with other databases: CORDIO East Africa

Developers and contact: CORDIO: info@cordioea.net

Data policy: The data layers uploaded on the portal are shared under open source attribution i.e. Attribution 4.0 International (CC BY 4.0)

11. KENYA GIS DATA

Overall observations: It is an American portal that collects data and maps from different countries, and about different topics. In Kenya case, apart from Agriculture, Land cover, Elevation, Rainfall and some others, it also includes Biodiversity and Wildlife information. It is accessible and the metadata included in each data package.

Type of data: Spatial distribution of terrestrial and marine organisms.

Distribution format: SHP, DBF, PRJ, XML

Datasets: 18 related to Kenya biodiversity, 2 of them related to marine organisms.



Geographical scope: Kenya GIS Data refers to local data, but the World resources institute is global

Metadata: Available to download together with the data

Standards used: USA federal geographic data committee standard. (FGDC Content Standards for Digital Geospatial Metadata)

Frequency of maintenance: Last datasets date from 2007.

Relation with other databases:

Developers and contact: World resources institute; Florence Landsberg
flandsberg@wri.org

Data policy: Creative Commons Attribution 4.0

12. AFRICAN COASTAL AND MARINE ATLAS

Overall observations: Online version is easily accessible. Far for complete, since some countries in Africa are not represented in the atlas (such as Kenya). The offline version (downloadable datasets) is not available at the moment. General information and contact are missing. The general webpage www.odinafrica.org does not offer contact information, and the regional portal for Tanzania is currently not functional.

Type of data: Biogeographical information

Distribution format: Online GIS software and the availability of downloadable data and metadata. However, this option is not currently working.

Datasets: 1 dataset for Tanzania

Geographical scope: Regional (Africa)

Metadata: Available for downloading

Standards used:

Frequency of maintenance:

Relation with other databases: Similar to the African marine atlas.

--> A version focused on Tanzania data is available as **Tanzania Coastal and Marine Digital Atlas**. It is maintained by the Institute of Marine Sciences of the University of Salaam and the data **is not available to download**.

13. TANZANIA BIODIVERSITY INFORMATION MANAGEMENT TOOL •

Overall observations: Portal with an interface to consult an online GIS system and another interface for searching specific data per region, taxa, etc. The webpage is often out of service.

Type of data: Georeferenced occurrences of mainly terrestrial plant species, even though it aims to include all kind of taxa in Tanzania.

Distribution format: Online GIS software and the availability of a downloadable list of georeferenced occurrences in an XLS format.

Datasets: 1 dataset for Tanzania

Geographical scope: Tanzania

Metadata: Publicly not available

Standards used:

Frequency of maintenance: Regularly updated

Relation with other databases:

Developers and contact: JRS Biodiversity Foundation. info@bimt.costech.or.tz

Data policy: Complete open access

14. TANZANIA NATIONAL OCEANOGRAPHIC DATA CENTER •

Overall observations: The Tanzania Oceanographic Data Center is a subsection of the ODINAfrica portal consisting in just one interface with several links, most of them being not functional.

15. TANZANIAN CLEARING HOUSE MECHANISM •

Overall observations: The Tanzanian Clearing House Mechanisms intends to be a platform of information exchange regarding Tanzanian biodiversity. Apart from the GIS database, it contains a forum, photos, and other interfaces that enhance this information exchange. However, the link to the Geo-referenced biodiversity data and maps is not functional, and the webpage is out of date since 2017.

16. AFRICAN MARINE ATLAS (omap.africanmarineatlas.org)

Overall observations: The portal is functional, though not 100%. It is supposed to contain the initial continental maps and datasets from the African Coastal and Marine Atlas, maintained by ODINAfrica. It displays the source of information for each dataset and the way to access it directly from the original source (when it has an online version of it). However, the project is still ongoing and there are parts of the portal still under construction (since 2003). It comprises the whole continent and future national subdivisions are expected.

Type of data: Geospatial datasets of environmental themes of Africa (Geosphere, Atmosphere, Biosphere, Hydrosphere, and Anthroposphere),

Distribution format: Map pictures and layers, and text files with georeferenced occurrences.

Datasets: Around 100

Geographical scope: Regional

Metadata: Available per each dataset in the webpage.

Standards used: Depending on the dataset. No common standard.

Frequency of maintenance: Last update 2007

Relation with other databases: GBIF, FAO fisheries data and information system, ReefBase, AfreMaS, OBIS, AlgaeBase

Developers and contact: ODINAfrica project. No contact provided, but the names of the Editors available.

Data policy: Complete open access

17. AFRICAN OCEAN PORTAL •

Overall observations: The webpage: www.africanoceans.net, which is recommended in some entrances of the African Marine Atlas database, is currently some Asiatic beauty and cosmetic webpage.

18. AFRICAN REGISTER FOR MARINE SPECIES (AReMaS)

Overall observations: Working properly. Simple but fulfills its objective.

Type of data: Aims to manage an authoritative list of species occurring along the African marine coasts.

Geographical scope: Regional

Distribution format: Online and downloadable datasets.

Datasets: In 27.04.2019 -> 24,104 species (all in 1 dataset)

Metadata: marinespecies.org

Standards used: LW-TaxBB, CF metadata conventions, Darwin Core, EML, Dublin Core (From marine species).



Frequency of maintenance: Created in 2017

Relation with other databases: World Register of Marine Species, ODINA

Developers and contact: Flanders Marine Institute. Contact: Mika Odido
m.odido@unesco.org

19. AFRICAN MARINE ATLAS CATALOGUE (GeoNetwork opensource) •

General overview: Datasets not available anymore. "The requested operation could not be performed" is the output of any intended search.

Type of data: "The African Marine Atlas is a collection of data and information on the African marine environment. The purpose of the African Marine Atlas metadata catalog is to improve access to data and information generated for the Atlas project."

Distribution format:

Datasets:

Geographical scope: Regional

Metadata:

Standards used: ISO-TC211 and the Open Geospatial Consortium (OGC). It supports the most common standards to specifically describe geographic data (ISO19139 and FGDC) and the international standard for general documents (Dublin Core). It uses standards (OGS WMS) also for visualizing maps through the Internet → Standards used by the GeoNetwork software.

Frequency of maintenance:

Relation with other databases:

Developers and contact:

Data policy: Complete open source software

20. WESTERN INDIAN OCEAN FISHERIES DATABASE (WIOfish)

Overall observations: Simple database that collects the different fisheries of the area, with the information coming from many different sources, including government reports but also local fishers. Provides biological but also social information. However, the fact that the data is not standardized, and that no metadata is available makes it difficult to assess part of the information in it. It would be interesting to add a simple Dublin Core metadata file associated with every dataset.

Type of data: Information about fisheries in the countries of the Western Indian Ocean. Historical, social and biological information regarding the type of fishes, number of catches, but also the year of opening, actual activity, number of boats per fishery, etc.

Distribution format: Online text in table format and CSV or PDF downloadable

Datasets: 34 regarding Tanzanian fisheries.

Geographical scope: Regional

Metadata: No metadata associated with the database. The data hosted in the database come from government reports, publications and/or databases and are generally cited in the reference section for each fishery (unless there was no citation available).

Standards used: None

Frequency of maintenance: Regularly

Relation with other databases: None



Developers and contact: Institute of Marine Sciences, Zanzibar. Contact: Dr. Narriman Jiddawi, njiddawi@ims.udsm.ac.tz
Data policy: Complete open access

III. Conclusions and future steps

Overall. There is a large variety of databases related to marine biodiversity in the eastern African region or specific countries. The data is either part of larger, global datasets or the databases are solely dedicated to individual nations or taxa groups. A broad spectrum of species is covered in those databases, from commercially important fishes to charismatic ones, such as sharks, rays and turtles, with high value to tourism.

During the survey it also became clear that there is often a separation between long-running databases which are mainly funded / supported by supranational institutions and smaller, local databases which were initiated by individual projects or institutions. The latter were frequently offline or inaccessible and this was often related to the fact that funding and commitment ended when the project was concluded. Therefore, future efforts to establish additional databases should have a clear strategy to ensure the sustainability of the developed databases.

However, the main issue with most, if not all, of the listed databases is the lack of embedded analysis or visualization tools. For conservation practitioners and political decision makers it is virtually impossible to get up to date information on the threat status or condition of selected species for any given area. This renders it almost impossible to start quick and science based conservation efforts. Moreover, none of the databases allow to include other external parameters, such as water quality or temperature, to be included. This often additionally hampers management or conservation efforts, as the link between changing populations and the underlying driving factors remains unknown. Including key environmental parameters would allow to base decisions, e.g. to designate new, also on the suitability of those areas. Furthermore, it would allow to make predictions on how specific taxa will likely change in abundance due to changing habitat conditions.

It would therefore be our recommendation to include such options for data visualization and analysis for databases to increase the value not only for practitioners and managers but also for scientists. Another hurdle that in our view hinders a more widespread use of biodiversity databases in management efforts is the lack of interoperability between the large number of databases. Related information is often scattered among many databases, which all use different standards and interfaces for the data access. If database operators could agree on shared (meta-)data and access standards portals could be developed to synthesize the available information and make it thus more easily accessible.