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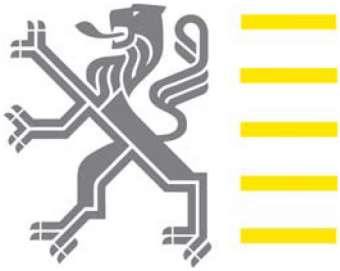

ODINAFRICA:
Marine Biodiversity Data Mobilisation Workshop on Decapoda

Supported by the IOC and the Government of Flanders

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TABLE OF CONTENTS

1. INTRODUCTION

1.1 ODINAFRICA

The Ocean Data and Information Network for Africa (ODINAFRICA) brings together marine institutions from twenty-five Member States of the Intergovernmental Oceanographic Commission of UNESCO from Africa (Algeria, Angola, Benin, Cameroon, Comoros, Congo, Côte d'Ivoire, Egypt, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania, Togo and Tunisia).

The earlier phases of ODINAFRICA enabled the participating Member States to get access to data available in other data centres worldwide, develop skills for manipulation of data and preparation of data and information products, and develop infrastructure for archival, analysis and dissemination of the data and information products.

The goal of the current phase of ODINAFRICA is to improve the management of coastal and marine resources and the environment in participating countries by: enhancing data flows into the national oceanographic data and information centre in the participating countries, strengthening the capacity of these centres to analyze and interpret the data so as to develop products required for integrated management of the coastal areas of Africa, and increase the delivery of services to end users.

The focus is on preparing data and information products to enable the Member States to address the key issues identified in the African Process: (i) coastal erosion, (ii) management of key ecosystems and habitats, (iii) pollution, (iv) sustainable use of living resources, and (v) tourism.

The government of Flanders, Belgium has provided US$2.5 million to support the implementation of ODINAFRICA-III.

The following thematic work packages have been implemented to achieve the objectives of ODINAFRICA-III:

Coastal Ocean Observing System: focuses on upgrading and expanding African network for in-situ measurements and monitoring of ocean variables (e.g. sea-level, temperature, salinity, currents, winds, etc), provision of near real-time observations of ocean variables, and building adequate capacity for collection, analysis and management of sea-state variables. About 15 tide stations will be installed or up-graded and some of them equipped with sensors for other meteorological and oceanographic parameters.

Data and Information Management: focuses on further development and strengthening of National Oceanographic Data Centres (NODC) to manage data streams from the coastal ocean observing network, upgrading infrastructure in the NODC's (including internet access and computer systems), Integrating biogeographic and hydrological data streams into NODC systems, building capacity for data and information managers for new NODC's established as part of this project and rescue historical data (especially sea level data). The sub-Saharan Africa OBIS node (AfrOBIS; http://afrobis.csir.co.za:8000/) will collate marine biodiversity information from many sub-Saharan African countries. It will upload marine biodiversity data to the main OBIS portal, as well as provide a "local" portal for submission and servicing of data requests. Data will be reformatted, loaded onto AfrOBIS and uploaded to the international OBIS portal at Rutgers.

Product Development and end user communication and information delivery focuses on identification of end users of marine/coastal data/information products and their requirements,

identification and development of a set of core products to be prepared by each NODC, development of Regional and National Marine Atlases, improvement of atmospheric and oceanic monitoring databases, promotion and dissemination of outputs of the project to all stakeholders, and assessment of the impacts of products on the end-user.

1.2 Biodiversity

Biodiversity is the variability of all living organisms including animal and plant species of the genes of all these organisms, and of the terrestrial, aquatic and marine ecosystems of which they are part.

It also makes up the structure of the ecosystems and habitats that support essential living resources, including wildlife, fisheries and forests. It helps provide for basic human needs such as food, shelter, and medicine. It composes ecosystems that maintain oxygen in the air, enrich the soil, purify the water, protect against flood and storm damage and regulate climate. Biodiversity also has recreational, cultural, spiritual and aesthetic values. Having a wide diversity of life on Earth is valuable for a variety of reasons. At the ecosystem level, biodiversity provides the conditions and drives the processes that sustain the global economy and our very survival as a species. These can be grouped into the three basic categories listed below.

- Ecological values:
  All living creatures are supported by the interactions among organisms and ecosystems. Loss of biodiversity makes ecosystems less stable, more vulnerable to extreme events, and weakens its natural cycles. The activities of microbial and animal species including bacteria, algae, fungi, mites, millipedes and worms, condition soils, break down organic matter, and release essential nutrients to plants. These processes play a key role in the cycling of such crucial elements as nitrogen, carbon and phosphorous between the living and non-living parts of the biosphere. Wetland ecosystems (swamps, marshes, etc.) absorb and recycle essential nutrients, treat sewage, and cleanse wastes. In estuaries, molluscs remove nutrients from the water, helping to prevent nutrient over-enrichment and its attendant problems, such as eutrophication arising from fertilizer run-off. Trees and forest soils purify water as it flows through forest ecosystems. In preventing soils from being washed away, forests also prevent the harmful siltation of rivers and reservoirs that may arise from erosion and landslides. Plant species purify the air and regulate the composition of the atmosphere, recycling vital oxygen and filtering harmful particles resulting from industrial activities.

  Plant tissues and other organic materials within land and ocean ecosystems act as repositories of carbon, helping to slow the build-up of atmospheric carbon dioxide, and thus contributing to climate stabilization. Ecosystems also exert direct influences on regional and local weather patterns. Moisture released into the atmosphere by rainforests, for example, causes regular rainstorms, limiting water loss from the region and helping to control the surface temperature. In cold climates, meanwhile, forests act as insulators and as windbreaks, helping to mitigate the impacts of freezing temperatures.

- Economic values:
  A biologically diverse natural environment provides humans with the necessities of life and forms the basis for the economy. Everything we buy and sell originates from the natural world. Biodiversity provides the vast majority of our foodstuffs. The annual world fish catch, for example (averaging 100 million metric tons), represents humanity's most important source of wild animal protein, with over 20 per cent of the population in Africa and Asia dependent on fish as their primary source of protein. Terrestrial animals, meanwhile, supply an array of food products: eggs, milk, meat, etc. Wild biodiversity provides a wide variety of important foodstuffs, including fruits, game meats, nuts, mushrooms, honey, spices and flavourings. These wild foods are especially important when agricultural supplies fail. Indeed, wild biodiversity guards against the failure of even the most advanced agricultural systems. For example, the productivity of many of the developed world's agricultural crops is maintained through the regular assimilation of new genes from wild relatives of these crops. These wild genes offer resistance to the pests and diseases that pose an ever-evolving threat to harvests. Many flowering plants rely on the activities of various animal species bees, butterflies, bats, birds, etc… to help them reproduce through the transportation of pollen. More than one third of humanity's food crops depend on this process of natural pollination. Many animal species have evolved to perform an additional function in plant reproduction through the dispersal of seeds.

  Biodiversity is also critical to the 'formal' health sector of the developed world. A recent survey showed that of the top 150 prescription drugs used in the United States, 118 are based on natural sources. Of these, 74 per cent are derived from plants. Microbes and animal species have also contributed a range of medicines, including Penicillin (derived from the fungus *Pencillium notatum*) and several drugs including anaesthetics derived from the skin secretions of tree-frog species. The medicinal importance of biodiversity is particularly impressive considering that only a tiny fraction of earth's species have been thoroughly investigated for medicinal properties. The investigative process is continually turning up new pharmaceuticals of great promise

- Cultural values:
  Most people feel connected to nature, often for reasons that can be hard to explain. Some feel a strong spiritual bond that may be rooted in our common biological ancestry. Others are inspired by its beauty. Human cultures around the world profoundly reflect our visceral attachment to the natural world. Thus cultural diversity is inextricably linked to Earth's biodiversity. It's no mystery why people are prepared to spend so much to get close to nature. Human beings instinctively derive aesthetic and spiritual satisfaction from biodiversity. Recent studies have begun to confirm what has always been known: our emotional wellbeing is enhanced by the proximity of natural beauty. The umbilical bond between humanity and biodiversity is reflected in the art, religions and traditions of diverse human cultures: a spiritual heritage that will be lost for all time if its basis nature itself continues to be destroyed.

1.3 Decapoda

The decapods or Decapoda are an order of crustaceans within the class Malacostraca, including many familiar groups, such as crayfish, crabs, lobsters, prawns and shrimp. Classification within the order Decapoda depends on the structure of the gills and legs, and they way in which the larvae develop, giving rise to two suborders: Dendrobranchiata and Pleocyemata.Prawns (including many species colloquially referred to as "shrimp", such as the Atlantic white shriimp) make up the Dendrobranchiata. The remaining groups including true shrimp, are the Pleocyemata.

The Decapoda is divided into two suborders: the Natantia, containing the prawns and shrimps; and the Reptantia, containing the crayfish, lobsters and crabs. In Natantia the body is generally adapted for swimming, elongated, and tends to be laterally compressed with a well-developed muscular abdomen. The members of Reptantia are adapted for crawling although some have become secondarily specialized for swimming. The body tends to become dorsoventrally flattened to at least some degree. The true crabs are included in section Brachyura, where the abdomen is greatly reduced and flexed beneath the cephalothorax. The Anomurans include highly specialized decapods that occupy a position in between Macrura and Brachyura. The group consists of the hermit crabs and their related forms. Among the decapods the members of the section Penaeidea appear to be very primitive. The Carideans constitute the most important and widely distributed group. Although they are seen at all levels of the seas and oceans, some are inhabitants of freshwater bodies. All colours and combination of colours are found in decapods. Many shrimps can adapt body colouration to the background. Body colouration of many species is specially adapted to harmonize certain habitats.

Decapods live in all seas at all depths. Many are live in freshwater or estuarine water and a few species are largely terrestrial, but they need to return to water for breeding. Commensal crabs such as the pea crab found living inside edible mussels are common, but there do not seem to be any parasitic decapods. On coral reefs small female gall crabs called *Haplocarcinus marsupialis* live on a branch of coral which grows over the crab, enclosing it in a calcareous pouch. Other species are scavengers, herbivores or detritus feeders, and are important in recycling organic matter. They are found in all kinds of habitats, including mud flats, mangrove forests, rocky shores, muddy or sandy beaches, sea grass beds, coral reefs, open water, and sea bottoms, including deep sea geysers known as hydrothermal vents.

Decapods are omnivorous occasionally they scavenge on dead bodies of other marine animals. Some crabs and shrimps are filter feeders. They use their bristly antennae, maxillipeds, or legs to strain out bits of food floating in the water. Other filter feeders stir up sand and mud to strain out food that has settled on the bottom. Many marine and freshwater decapods eat plants, but will sometimes feed on animal flesh when it is available.

The decapods have a huge potential as a source of human food and worldwide shrimps, lobsters and crabs are caught extensively for human consumption. The Irish Aquaculture Status Report 2005 reported net a steady €100 million a year over a period of three years.

For example, *Panulirus cygnus* are seen as one of the best and most desired sea foods in the world and in Australia, Western rock lobsters are the richest commercial fishing industry. Each year, 10,000-11,000 tons of lobsters are caught and more than $300 million is made per year off of this industry. It is considered to be the oldest and the best managed fishery in the world. This fishing is done off the coast of Western Australia between November and June

every year. The fisheries target the *whites,* the lobsters that are freshly molted, as they are leaving the shallow reef areas.

1.4 Importance of databases

In the old days – before the computer and internet era – all information was written down in books and information was sometimes hard to find. Now, since we have access to computers and the World Wide Web, exchanging information has become a lot easier. However, scientists still do not find it easy to exploit this information because of the variety in for example data formats and interfaces. Therefore, it is very important that data is not just made available, but that it is also managed in a proper way, thus becoming easily accessible and understandable for the user. Databases form the ideal tools to structure information on for example the distribution and taxonomy of species. As a database is not limited to one specific aspect of a species, one can make the available information as broad as possible. One can, for example, include information on taxonomy and distribution, but also on ecological aspects such as life history traits (type of larvae, feeding types …).

A single database can capture all this information, without becoming too complex for its users. One can however not forget that a good biodiversity or taxonomic database needs the input of many internationally respected specialists. Although managing and coordinating these networks and related databases and assisting the participating scientists is very time consuming, it is certainly worthwhile to invest in.

A great advantage of databases is that they can be link to the World Wide Web and that an online taxonomic entry tool can be build. This gives taxonomists the opportunity to update and check the available information online.

1.5 Introduction to the represented institutes

Kenya Marine and Fisheries Research Institute - KMFRI

Kenya Marine and Fisheries Research Institute (KMFRI) is a State Corporation in the Ministry of Livestock and Fisheries Development of the Government of Kenya. It is mandated to conduct aquatic research covering all the Kenyan waters and the corresponding riparian areas. The Institute was established by an Act of Parliament (Science and Technology Act, Cap 250 of the Laws of Kenya) in 1979. Its vision is to be a centre of excellence for aquatic research and promotion of wise and sustainable use of marine and freshwater resources in Kenya in order to meet the national challenges for food security, poverty alleviation and economic growth. Its mission is to conduct multidisciplinary research in the aquatic systems in both marine and fresh waters in order to generate information for the sustainable management and optimal exploitation of aquatic resources and thus alleviate poverty and enhance employment creation. It is engaged in six programs, namely: fisheries, environment and ecology, information and data management, aquaculture, socio-economics and natural products.

KMFRI is divided into two main research divisions, namely the Inland Waters Research Division based at Kisumu and Marine and Coastal Waters Research Division based at Mombasa. The research centre at Kisumu coordinates the following research stations: Kegati,

Sangoro, Naivasha, Turkana, Baringo and Nairobi. The research centre at Mombasa coordinates the research substations at Gazi and Lamu.

Contact: Kenya Marine and Fisheries Research Institute
P.O. Box 81651
80100 – Mombasa, Kenya.
Phone: 254 41 475151-4, 475157
Fax: 254 41 475157
Email: kmfri@kmfri.co.ke
Website: http://www.kmfri.co.ke/

L'institut Mauritanien de Recherches Océanographiques et des Pêches - IMROP

The Mauritanian Institute of Oceanographic and Fisheries Research (IMROP) has been founded in 1978. Its main objective is to analyse the pressure, the biological, physical, socio-economical determinants and fishing techniques of the fishing industry. This is done by evaluating the state of the resources, following exploitation systems and studying the applied management techniques. The institute is also responsible for the approval of fishing establishments and fishing boats, controlling the health standards of fishery related products and the conservation of the marine environment by combating pollution.

The Institute manages multiple biological databases. For example databases concerning pelagic and demersal species, juvenile species and data concerning scientific marine observations. It also manages oceanographic databases (cf. Odinafrica metadata) and also a system that allows to statistically monitor the artisanal fisheries of the country, which proves to be of great importance. IMROP focuses on different fields of study, for example stock evaluation, ecology and biology of species, monitoring of the environment …

Contact: L'Institut Mauritanien de Recherches Océanographiques et des Pêches
Mauritanian Institute of Oceanographic and Fisheries Research
BP 22
Nouadhibou – Mauritania
Phone: 222-5 749 035
Fax: 222-5 745 081
Email: secretariat@imrop.mr
Website: http://www.imrop.mr

Mauritius Oceanography Institute - MOI

The Mauritius Oceanography Institute (MOI), was established in January 2000. MOI is responsible for the formulation, implementation and coordination of scientific programmes relating to the protection, exploration and development of marine living and non-living resources in the Maritime Zones of the Republic of Mauritius. MOI is an autonomous research organization involved in scientific research and modelling to characterize coastal and

oceanic processes within the maritime jurisdiction of the Republic of Mauritius and the Indian Ocean.

Contact: Mauritius Oceanography Institute
France Centre, Victoria Avenue
Quatre-Bornes, Mauritius
Tel: (230) 427 4428 31 32 34
Fax: (230) 427 4433
Email: moi@intnet.mu

Website: http://moi.gov.mu/

National Institute of Fisheries Research - INIP

The National Institute of Fisheries Research (INIP) is a public institution of scientific marine research and fisheries technology. It carries out studies on biological aquatic resources and their respective ecosystems (marine, brackish and fresh water ecosystems) and it also involves in quality control of different fisheries products. The National Institute consists of three departments which are Aquatic resources, Aquatic ecosystems and Fisheries technology. Each department possesses a technical laboratory which in total makes three laboratories. There are also two new laboratories dealing with environmental impacts.

The INIP is involved in different regional as well as international programmes such as BENEFIT (Benguela Environment and Fisheries Interaction and Training Programme), BCLME (Benguela Large Marine Currents and Ecosystems), GCLME (Guinea Large Marine Currents and Ecosystems), FAO and ODINAFRICA in biodiversity and ecosystem.

Contact: Instituto Nacional de Investigação Pesqueira
National Institute of Fisheries Research
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Website: http://www.angola-minpescas.com/IIM/index.aspx

National Institute of Marine Sciences and Technologies

The National Institute of Marine Sciences and Technologies (INSTM) is actually a research public institution. The mission of INSTM consists of:

- Conducting contractual research programs related directly or indirectly to the sea and its resources: fishing, agriculture, marine environment, sea technologies, oceanography, etc.
- Participating in different national, regional and international networks related to the sea.
- Contributing to the resolution of problems related to the development of urban and economic activities on the coast as well as in territorial waters.
- Transferring its know-how and the results of its research to decision makers, professionals of the sea and scientists.

- Helping with decision making processes in issues relating to the sustainable management of the sea and its resources.
- Contributing to the diffusion of knowledge and education about marine issues and to raising the public's consciousness for the protection and preservation of the sea and its biodiversity.

The INSTM organization is made up of a board of directors, an academic advisory board (Scientific council), a director-general and a secretary-general. At the scientific level, INSTM consists of four laboratories and seven specialized units.

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2. WORKSHOP OUTLINE

This workshop had a slightly different way of working compared to the previous two. This time, we opted for distribution entries only, so no new taxonomical information was added to the database by the participants. We also chose for an online workshop, meaning that all the input of new distribution records was done through the MASDEA website. This methodology had two major advantages: (1) the participants had a very practical training in entering distributions online, making the "barrier" smaller to continue this work from their homes and (2) the MASDEA context is assigned automatically to the newly added distributions and can thus not be forgotten anymore. This context is important in the light of later analyses on the available data (e.g. distribution of species in Africa compared to other regions …) and in assigning certain information to particular species lists.

When scanning through the literature, new taxon names were listed in an excel file by the participants and then first sent to a taxonomic expert on Decapoda (Dr. Charles Fransen, National Museum of Natural History – Naturalis, The Netherlands) before they were uploaded into the database. As new geo-units can not be added online, they were also listed in an excel file. These geo-units were first checked on spelling and standardised before they were added to the Aphia database. Coordinates were also assigned to these new geo-units, making it possible to plot the distributions on maps. If the coordinates were not available from the literature or not yet present in the VLIMAR Gazetteer (*see also 3.2*), the search was extended to the following sources:

- ✓ the Getty Thesaurus of Geographic Names Online (http://www.getty.edu/research/conducting_research/vocabularies/tgn/)
- ✓ The Times Comprehensive Atlas of the World (*full reference*: Anon. (2001). The Times comprehensive atlas of the world. 10th ed. Times Books: London, UK. ISBN 0-7230-0792-6. 67, 220, 124 plates pp.
- ✓ Earth Search (http://www.earthsearch.net)

- ✓ Google

3. MATERIALS

3.1 Aphia

Reference: www.vliz.be/vmdcdata/aphia

VLIZ is currently doing several projects involving taxonomic names and biogeographical information. To make sure that the taxonomy used in these different projects is consistent, a separate database supporting these different activities was developed. Aphia, the resulting species register, is complemented with extra information like distribution records, vernacular names and photographs.

Detailed sources of taxonomic information are an integral part of the database, and are listed in the web interface with the information on individual taxa. For the classification, a number of standard works have been chosen, and these choices are also documented in the database. It should be noted that the classification used is, by necessity in a database with such wide taxonomic scope, a 'compromise' classification, and that it is very difficult to be completely up-to-date for all taxonomic groups.

The database structure includes fields for the following information:

- ✓ Taxon name, rank and parent (required fields)
- ✓ Source used to create record (required field); can be person (expert), database or a publication
- ✓ Authority of the taxonomic name (optional); including authority for new combination for botany; including any 'non', 'ex', ... clauses as needed
- ✓ Original publication (optional); publication in which the taxonomic description was originally published
- ✓ Type taxon (optional); for families and genera
- ✓ Currently accepted taxon (required field); by default points at the taxon itself
- ✓ Actual (required for taxa placed in synonymy) and primary source (optional) for the synonymy

There is a provision to make annotations - these are dated and attributed to one of the possible information sources (expert, database or publication). Other tables allow storing vernacular names (in several languages), and distribution records. Since Aphia is a single database supporting different projects and web sites, there has to be a mechanism to assign information to these contexts. The database should, in fact, be seen as a collection of overlapping subsets of data, where each piece of information can be selectively shown in one or several contexts. Thus, a sponge species occurring in Europe will be visible to a visitor of the European Register of Marine Species, but the same record will be shown to a visitor of Porifera, a web site with a world-wide list of sponges. The most important projects incorporated in Aphia are

- ✓ European Register of Marine Species (ERMS)
- ✓ World list of Porifera

- ✓ World list of Cumacea
- ✓ Register of Antarctic Marine Species (RAMS)
- ✓ North West Atlantic Register of Marine Species (NWARMS)
- ✓ World list of Pycnogonida
- ✓ Taxonomic information system for the Belgian coastal area (TISBE)

Most importantly, it is used to standardise all taxonomic names of the biogeographical records. The two main collections of biogeographical records are the European node of the Ocean Biogeographical Information System (EurOBIS – now also including the Taxonomic Information System on the Belgian coastal area, TISBE), and the Antarctic node of OBIS, SCAR-MarBIN.

3.2 VLIMAR Gazetteer

Reference: www.vliz.be/vmdcdata/vlimar

The VLIMAR gazetteer is a hierarchical list of geographical place names. As it is a marine gazetteer, it is focused on names of sandbanks, bays, gulfs, seas, islands, seamounts, coastal regions, ridges, bays and standard sampling stations used in marine research. The geographic cover of the gazetteer is global; however the gazetteer is focused on the Belgian North Sea Region, the Scheldt estuary and the Southern Bight of the North Sea. The purpose of the gazetteer is to improve access and clarity of the different geographic, mainly marine names used in marine research. The gazetteer is consultable through a web interface where one can search and browse through the database.

Each geographical place name has a certain place type and can be linked with a certain relation type ('part of', 'adjacent to'…) to one or more other place types. Angola, for example, has a place type 'Nation' and is part of Africa. Bay of Mussulo has a place type 'Bay' and is part of the South Atlantic Ocean. Furthermore, it is linked with Luanda, a region that is part of Angola, with the 'adjacent to'-relation.

Place names can also be linked with geo-units of other databases like Aphia. This link, in combination with the relations between the place names, makes it possible to do some complex biogeographical queries. This way, species that were found in the Bay of Mussulo can be included in the species list of Luanda, the species list of Angola, the species list of Africa, the species list of the South Atlantic Ocean, etc. Place names are also linked with geographical locations. This can be centroïd coordinates of the place name but it can also be polygons or polylines that describe the shape of the place name. This makes it possible to show the exact location of place names on an interactive map.

3.3 MASDEA website (Marine Species database for Eastern Africa)

Reference: http://www.vliz.be/vmdcdata/Masdea/

MASDEA is a biogeographic/taxonomic database of marine species in the Western Indian Ocean/East Africa. The database was originally developed by Dr. Edward Vanden Berghe while working as project manager of the RECOSCIX-WIO project in Mombasa. The database now part of Aphia and is maintained as a collaborative venture between the Kenya Marine and Fisheries Research Institute and VLIZ.

The Marine Species Database for Eastern Africa (MASDEA) was conceived to fill the need for a comprehensive species register for the western Indian Ocean. The database was created to enter all species records from the western Indian Ocean that was published in peer refereed publications. The database thus includes a species register for the region and a road map to the scientific literature relevant to biogeographical studies in the region.

All participants could log in to the database through the Masdea website and were able to add distributions to all Decapoda taxa. In the future, they can search for more distribution information at their own institute and they can then add this to the database through the online editing tool.

3.4 Sources used to enter distributions into MASDEA

Books

From the general books, only the Decapoda part was dealt with, for distributions related to Africa and the Indian Ocean.

Two Oceans: a guide to the Marine Life of Southern Africa

Full reference: Branch, G.M., Griffiths, C.L., Branch M.L. & Beckley, L.E., 2002. Two Oceans. A guide to the marine life of Southern Africa. D. Philip Publishers, Cape Town. Revised 5th Impression, 360 pp. ISBN 0-86486-250-4

This book gives an overview of the data capture for Southern Africa (i.e. South Africa, Mozambique and Namibia). In addition to the geographical range of the occurrence of the species, the book also provides a number of pictures.

CIESM Atlas of exotic species in the Mediterranean

Full reference: Galil, B.S.; Froglia, C.; Noël, P. (2002). CIESM atlas of exotic species in the Mediterranean: 2. Crustaceans: decapods and stomatopods. CIESM Publishers: Monaco. ISBN 92-990003-2-8. 192 pp.

This CIESM Atlas describes the exotic species present in the Mediterranean, their possible origin and their mode of introduction. It is aimed at specialists and non-specialists who are interested in or likely to encounter marine species that are not native to the Mediterranean basin.

A guide to the seashores of Eastern Africa

Full reference: Richmond, M. (Ed.). (1997). A guide to the seashores of Eastern Africa and the Western Indian Ocean islands. Sida/Department for Research Cooperation, SAREC: Stockholm, Sweden. ISBN 91-630-4594-X. 448 pp.

This book gives a general overview of the marine biodiversity in the coastal zone of Eastern Africa and the islands in the western part of the Indian Ocean.

For each species, a description is given of both the habitat and the distribution. This book inspires the reader on the ecology of species in this region and proves to be a good source of information for amateurs.

An illustrated guide to the shrimp of the world

Full reference: Dore, I.; Frimodt, C. (1987). An illustrated guide to shrimp of the world. Osprey Books/Scandinavian Fishing Year Book: Huntington, N.Y. (USA). ISBN 0943738-20-2. 229 pp.

This book is published by Ian Dore who is an expert on knowledge and practical experience in commercial sea foods. The second author, Claus Frimodt, is a specialist in European fisheries and fishing industries. This book describes 70 of the most important commercial species from the 342 shrimp s of the world. This book gives an overview of the major distinctions between the commercial shrimp species. It shows how shrimps are classified into species and how they can be distinguished. It has a shrimp encyclopaedia which also discusses processing procedures. It contains a detailed illustrated guide on how to find a particular shrimp, species and family names, F.AO. names, common and commercial names, sizes, colour pictures, identification drawings, distributions and comments It differentiates them biologically and from the colours they have

Marine lobsters of the world

Full reference: FAO Species Catalogue: Marine lobsters of the world: an annotated and illustrated catalogue of species of interest to fisheries known to date. FAO Fisheries Synopsis n 125, vol. 13 FIR/S125 vol. 13.

The present volume of FAO publication gives a comprehensive treatment of lobsters of interest to fisheries with respect to their identification, taxonomy, distribution, biology and ecology.

Crustacés décapods de l'Atlantique nord oriental, de la Méditerranée et des eaux continental adjacentes au nord de 25°N

Full reference: d'Udekem d'Acoz, C. (1999). Inventaire et distribution des crustacés décapodes de l'Atlantique nord-oriental, de la Méditerranée et des eaux continentales adjacentes au nord de 25°N. *Collection Patrimoines Naturels*, 40. Muséum national d'Histoire naturelle: Paris, France. ISBN 2-86515-114-10. X, 383 pp.

The author has given an overview of the systematics and the distribution of the Decapoda in Europe and bordering regions.

The boundaries of the studied region are limited by three points: the North Pole, 25°N 35°W and 25°N and 60°E. The Red Sea and the Persian Gulf however are excluded, with the exception of the Suez Canal. Introduced and endangered species are given special attention, especially concerning the influencing factors of their regression.

For each species, a geographical and bathymetrical distribution is given, together with some short ecological indications. The original description of each decapod species spotted in the studied region is recorded in the bibliography.

Crustacea – Decapoda – Macrura dans les eaux côtières Afrique

Full reference: Holthuis, L.B. (1952). Crustacés Décapodes, Macrures. Expédition océanographique belge dans les eaux côtières africaines de l'Atlantique Sud (1948-1949): résultats scientifiques, 3(2). Institut royal des Sciences naturelles de Belgique: Bruxelles, Belgium. 87 pp.

The Macrura (Crustacea, Decapoda) reported in this document were collected during the « *Océanographique Belge dans les Eaux Côtières Africaines de l'Atlantique Sud* », in 1948-1949. The studied region is situated along the West African coast, starting from Gabon till Walvis Bay, between the equator and 23 degrees south. All animals were collected between 0 and 500 meters depth.

Other described species originate from the "Mercator" voyages during the following expeditions 1935-1936, 1936-1937 and 1937-1938. These expeditions covered the zone between Rio de Oro (24° N) and Lüderitz Bay (26° S).

The results are presented as schedules describing the morphology of the specimens and tables containing the references to the collected samples. Especially these tables proved to be excellent material to complete the masdea database.

Decapodes from Iberia

Full reference: **Alvarez, R.Z.** (1968). Crustáceos Decápodos ibéricos. [Crustacea Decapoda from the Iberian Peninsula]. *Investigación pesquera*, 32. Consejo Superior de Investigaciones Científicas. Institut de Ciènces del Mar: Barcelona, Spain. 510 pp.

The author describes the morphological characteristics of different species in the order of the Decapods living on the Iberian coasts. Each species description is completed by a general distribution, followed by a more specific distribution for the Iberian peninsula.

Scientific articles

Articles are sorted alphabetically. Although we preferred to work with taxonomical papers, a number of ecological papers were also used to complete the MASDEA database.

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New literature brought by participants

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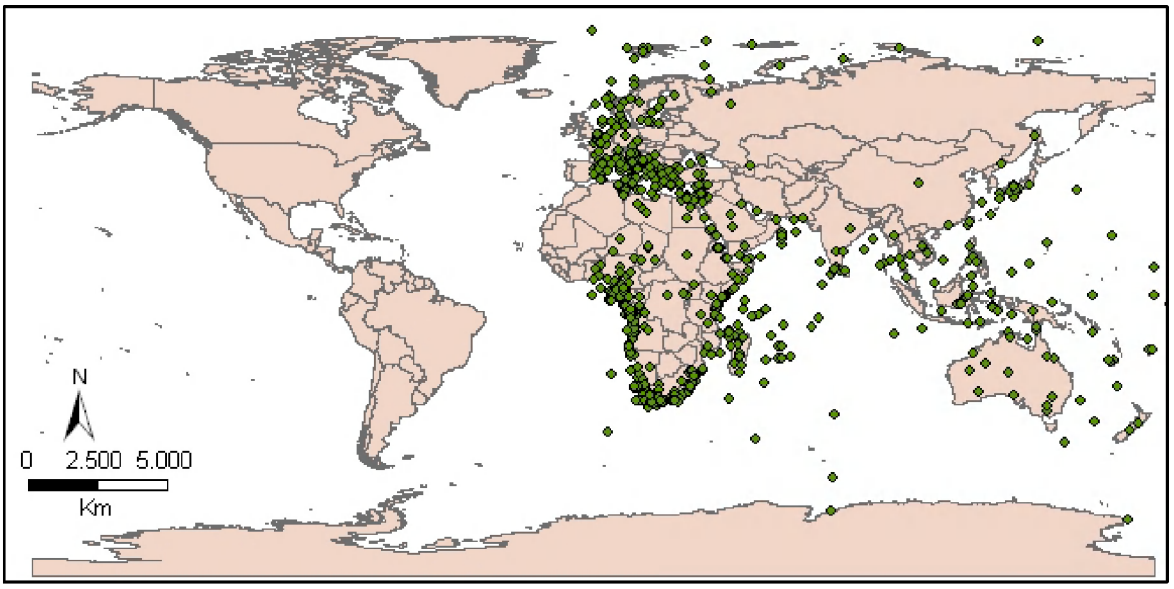
4. RESULTS

4.1 General

At present, 3 877 taxa belonging to the Ordo Decapoda have been entered into the aphia database, with a "masdea" context, representing 2 948 species and subspecies from around the world. 2 752 of these species and subspecies names are valid.

4.2 Geographical

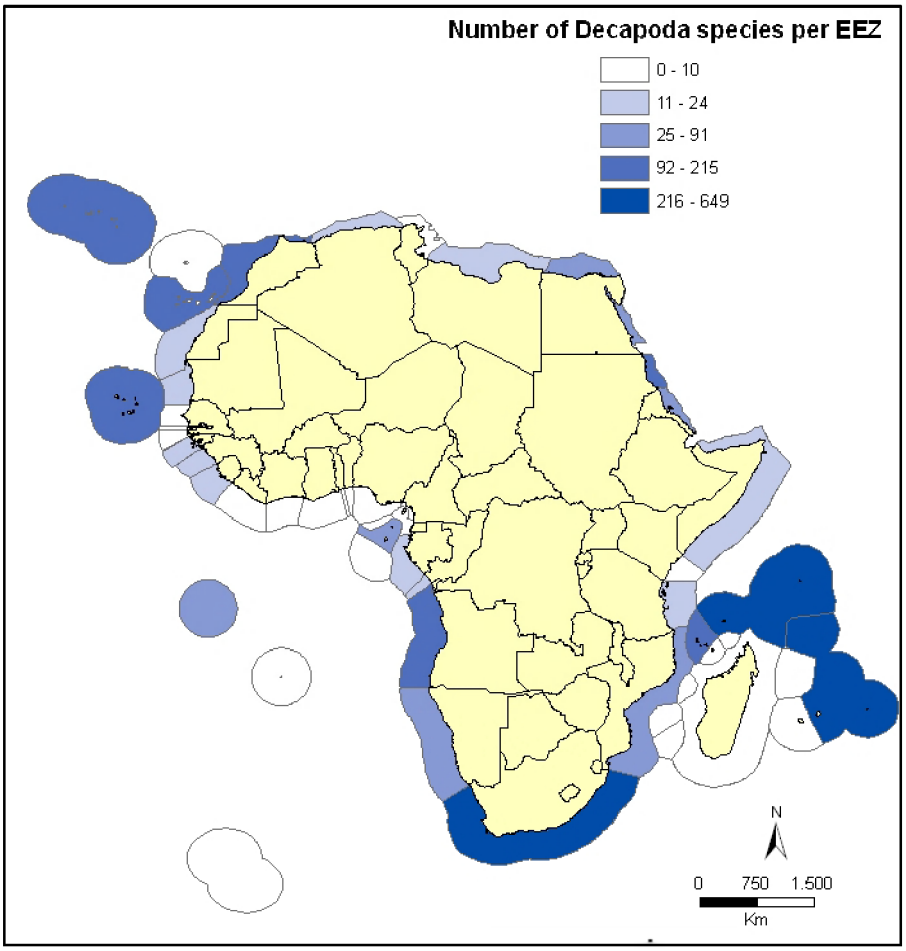
As seen on this general map of the world, the distribution of the species with an African context are not confined to Africa, but are widespread, extending as far as Australia and the Arctic. Inland distributions are species occurring in rivers, lakes or estuaries, or they represent taxa with a broader distribution range. E.g. a marine taxon found in Angola is likely to have a coastal distribution, but – for practical reasons – the coordinates assigned to Angola are the coordinates of the centre of this province.



General map, representing the distribution of all Decapoda species with a Masdea-context (dots on the map).

Within each African EEZ, the number of Decapod taxa varies between 0 and 649. Most of distribution information extracted from literature represents taxa present in the Exclusive Economic Zones of the Seychelles (649), Mauritania (468) and South Africa (458).

As experts informed us on the fact that North Africa and East Africa are heavily undersampled and West Africa is reasonably sampled for Decapoda, we will not make a comparison between the three African regions, as this will not give a good representation of the situation.



Number and distribution of Decapoda taxa in the African EEZ's

5. DISCUSSION

Before we discuss the results, the reader should be aware of the fact that our database shows incompleteness on two levels. First of all, not all data sources concerning African marine Decapoda have been entered into the database. Secondly, publications on marine decapod biodiversity in Africa only represent a limited reproduction of the actual number of marine decapod species present in the region. The first 'incompleteness' can be overruled by actively searching for more publications on African marine Decapoda (also see further) so that the database can become more and more complete. The second problem however is out of our league, although it can be very useful as gap-analysis: it can show researchers which information is still lacking and maybe it can stimulate them to fill these gaps.

The results show that many of the published Decapod species described from Africa have been documented in the database. For many of these species, multiple distribution locations are known, which enables one to compare the percentage of similarity patterns between genera in selected regions or countries (e.g. Europe vs. Africa; East Africa vs. West Africa, …). These comparisons may indicate whether certain locations or regions are undersampled, whether certain areas have a richer diversity pattern than others or whether certain species are endemic or cosmopolitan.

6. GENERAL CONCLUSION

During the workshop, a large number of species have been entered into the database. All species were extracted from (monographic) literature and articles at our disposal. A lot of sources on African marine Decapoda are present at the VLIZ-library ; other sources were introduced by the participants themselves. An overview of the present sources at VLIZ and other literature concerning African Decapods is given in the text.

There is likely still a lot more geographical information on African marine Decapoda available in grey reports, laying on dusty shelves, which are in danger of getting lost. An effort should be made to also rescue these historical data and to integrate them together with the more easily accessible data published in current scientific journals. This way, a complete inventory of what lives and lived along the African coastline can be made. In this workshop, we have made the first steps towards such an African species register of marine Decapoda.

Further completing the database will be necessary to stay up to date with the available literature and existing species.

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