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The use of databases for conservation of sea cucumbers (Echinodermata: Holothuroidea) in the littoral waters of Kenya

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Introduction - At present, almost no species lists exist for the Western Indian Ocean. The Holothuroidea, which are a commercially important group (Conand, 1998), are no exception. The problem is compounded by the fact that sea cucumber fisheries is not regulated and sea cucumbers are severely overfished in many countries (Conand, 1998; Samyn, 2000). Biogeographical databases are urgently needed to direct conservation efforts.

MASDEA - A database was developed at the Regional Dispatch Centre of the RECOSCIX-WIO project. 'Marine Species Database for Eastern Africa' was created to store biogeographical information from the Western Indian Ocean, based on literature sources. Preference is given to peer-refereed papers, but also other publications have been used. The logging efforts are not restricted to a particular group, but obviously, personal interests have caused some taxa to be entered much more complete than others. The geographical scope is the Western Indian Ocean: from the east coast of Africa to 70°E, including the Red Sea (but not the Persian Gulf), and South Africa to Cape Town.

The structure of the database is kept deliberately simple. Distribution records are kept under the taxonomic name used in the publication from which the record was extracted, even if this is no longer the valid name for the taxon. The taxonomy table allows to link these synonyms with valid names. Also misidentifications and other information that was wrong in the original publication is stored, but appropriately flagged. An overview of the different tables and fields is given in figure 1.

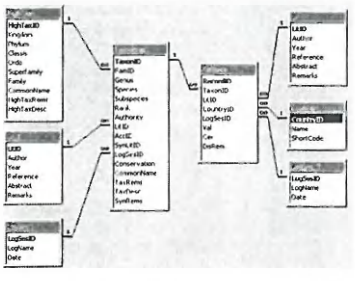

Fig. 1 - Database structure

The number of records in the database in the different tables is listed in table 1. The status of the different taxonomic groups is quite variable. For some groups (eg macroalgae, corals and fish) we were able to draw on the efforts of others (Silva *et al.*, 1996; Sheppard, 1998 and Fishbase, 1997, respectively), and these groups are in a reasonable state. For other groups we have scanned the literature thoroughly. This is the case for xanthoid crabs and Echinodermata. Especially the Holothuroidea within the latter have received a lot of attention, and scanning new literature sources only rarely results in new distribution records, leave alone new taxonomic records.

Table	Number of records
Literature	515
Higher taxonomy	1241
Genus and below	14831
Distribution records	33707

Table 1 - Number of records in the different tables

Compiling check-lists - A first possible application of a biogeographical database is to extract species list for one of the geographical regions defined in the database. As can be noted from such an extract, no single study lists all species: more complete list are based on several studies. Combining names from different studies brings its own set of problems, as explained by Samyn & Vanden Berghe (2000): not every author uses the same name for the same species; a 'species' can be interpreted in different ways, so that a same name can mean different thing for different authors.

Predicting species presence from discontinuous distributions - Gaps in species distributions can provide clues for directed searches for particular species. If a species is reported both from the north and the south of a region, then chances are that the species also occurs in the area of interest (given, of course, suitable habitat). This type of analysis has been done for the Kenyan Holothuroidea. Different combinations of countries/regions defined in the database have been chosen as adjacent regions for the analysis; wider regions result in a higher number of 'missing species' (see fig. 2).

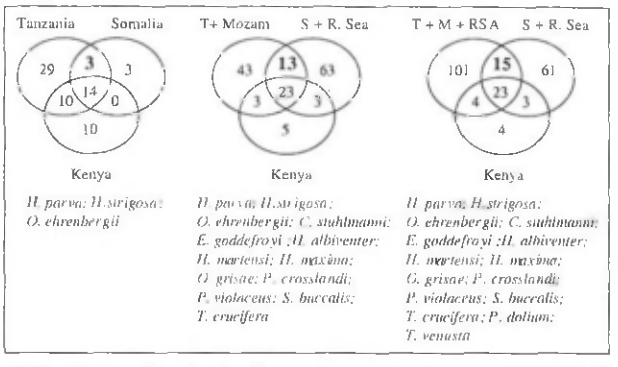

Fig. 2 - Numbers of species shared between Kenya and regions to the north and to the south. Top row: species numbers; bottom row: species occurring to the north and the south, but not in Kenya. Left column: south = Tanzania, north = Somalia; Middle column: south = Tanzania and Mozambique, north = Somalia and Red Sea; right column: south = Tanzania, Mozambique and South Africa (to Cape Town), north = Somalia and Red Sea

Identifying biodiversity hotspots - In principle counting of species per geographical region would allow identifying biodiversity hotspots. This, combined with information about threats to regions, would allow directing conservation efforts.

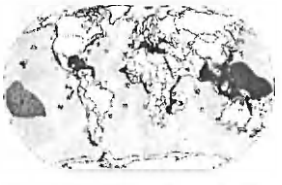

Fig. 3 - Map prepared by C.I. (http://www.conservation.org/marine/map.htm), showing the world's most critical marine areas. Blue marks the most biologically valuable areas, including diversity and functionally importance. Red marks the most threatened areas. Purple, where blue and red come together, highlights the most critical areas for marine conservation.

In practice, this only works for groups that have been well enough studied; possibly, with the exception of birds, this is not the case for any group, definitely not for Holothuroidea in the Western Indian Ocean. In the table below, the species counts as they are known in MASDEA are shown for the various regions. We suspect that, rather than reflecting the real biodiversity, these figures are indicative of the sampling effort. Madagascar scores quite high thanks to the extensive work of Cherbonnier; South Africa has been studied extensively by Clark and co-workers in the 50s and 60s, more recently by Thandar.

Name	Count of species	Name	Count of species
Aldabra	33	Mozambique	51
Chagos	14	Red Sea	96
Comores	19	Seychelles	36
Djibouti	10	Somalia	20
Kenya	35	South Africa	84
Madagascar	122	Tanzania	56
Mauritius	22		

Fig. 4 - MASDEA species counts per region

References

Conand, C., 1998. Overexploitation in the present world sea cucumber fisheries and perspectives in mariculture. Pp 449 in Mooi & Telford (eds) *Echinoderms*. Balkema, Rotterdam.
Fishbase (1997). Fishbase 97 CD ROM. ICLARM, Manila.
Humphreys, W.F., 1981. The echinoderms of Kenya's marine parks and adjacent regions. Zoologische documentatie 19: 1-39. Koninklijk Museum voor Midden Africa, Tervuren, België.
Levin, V.S., 1979. Aspidochirote holothurians of the upper sublittoral zone of Indo-West Pacific: species composition and distribution. Biologia Morja 5: 17-23.
Massin, C., 1999. Reef-dwelling Holothuroidea (Echinodermata) of the Spermonde Archipelago (South-west Sulawesi, Indonesia). Zool. Verhandel. 329: 1-144.
Samyn Y., 2000. Conservation of aspidochirotid holothurians in the littoral waters of Kenya. Reche-de-mer Information Bulletin 13: 12-17.
Samyn Y. & Vanden Berghe E., 2000. Faunistics as an impetus for conservation of sea cucumbers (Echinodermata: Holothuroidea) in the littoral waters of Kenya. Poster presented at ICES 2000, Brugge.
Samyn Y. & E. Vanden Berghe, in press. Annotated checklist of the echinoderms from Kiunga Marine National Reserve, Kenya. Part I: Echinoidea and Holothuroidea. Journal of East African Natural History.
Sheppard, C., 1998. Corals of the Indian Ocean. CD ROM. Western Indian Ocean Marine Science Association, Zanzibar.
Silva, P.C., Basson P. & Moe R., 1996. Catalogue of the benthic Marine Algae of the Indian Ocean. University Herbarium, UC Berkley.