



# A REVIEW OF CHONDRICHTYAN DIVERSITY IN THE SOUTHWEST INDIAN OCEAN



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## ABSTRACT

Chondrichthyan (sharks, rays and chimaeras) are subject to exploitation and bycatch throughout the western Indian Ocean. However, very little is known on their diversity, distribution and general ecology in this region. This study aims to review the biodiversity of sharks and rays in the tropical waters of the southwest Indian Ocean, covering the east coast of Africa (southern Mozambique to Somalia) and the islands of the region including Madagascar, the Mascarenes, the Seychelles and the Comoros. This review integrates published and grey literature, as well as unpublished records for each country of the region. A total of 188 species were identified, including 116 sharks and 72 rays, representing 10% of the world chondrichthyan biodiversity. 15 endemic species to the tropical southwest Indian Ocean region were recorded. Shark and ray diversity is linked to a number of factors, including size of the country, diversity and availability of potential habitats, and relative survey effort. Indeed, low diversities were recorded in areas where observation effort is low. Highest diversities were observed along the east coast of Africa (especially in Mozambique and Somalia), Reunion, Mauritius, the Seychelles and Madagascar. This study underlines that chondrichthyan diversity is very important in the tropical southwest Indian Ocean, but need to be assessed in details in some potential key areas, such as around the less surveyed islands of this region.

## Introduction

At the global scale, sharks and rays are overexploited and massively by-caught in several fisheries. Their patrimonial value is important for several reasons: 1- several species are threatened due to direct exploitation and bycatch, 2- they have a high economical value (especially fins) and 3- they constitute bio-indicator of ecosystem health as top predators. However, in the Southwest Indian Ocean (SWIO), the inventory of sharks and rays is incomplete.

In the frame of the Eco-Regional Analysis of WWF (2008), a review on existing information on shark and ray biodiversity in the SWIO region has been made. The area of study includes the waters of the Seychelles, Comoros, Mayotte (Fr), the French Eparses Islands (Juan de Nova, Europa, Glorieuses, Bassas da India), Madagascar, Reunion (Fr) et Mauritius. Information for Kenya, Tanzania and Mozambique has been compiled too.

## Methods

The review is based on existing references and data in countries and territories of the study area. Data sources were: 1- scientific papers; 2- grey literature (unpublished reports) and 3- unpublished data provided by regional collaborators and 4- FishBase (Froese & Pauly, 2009).

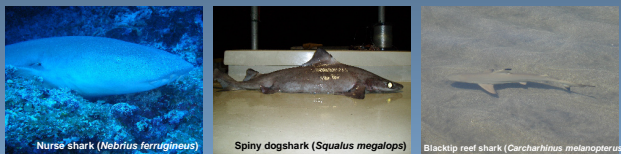
From the studies compiled, data were collected from 1- scientific fishing experiments, 2- underwater visual census and 3- interviews with fishermen/sea users and the collection of dead specimens (especially from longline fishing vessels).

## Results and Discussion

165 Elasmobranch species were identified in the SWIO region: 107 shark and 58 ray species (Figure 1). Among them, 28 species are considered as "Vulnerable" (21), "Endangered" (4) and "Critically Endangered" (3) in the IUCN Red List at the international scale (Table 1). 11 species actually recorded in a single country/territory could be considered as endemic.

Variability of species recorded in each country/territory reflects:

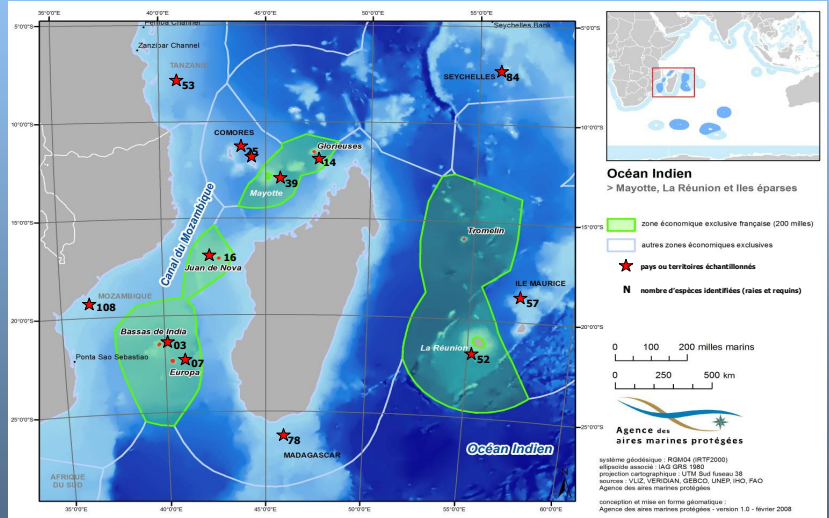
- Coastline length,
- EEZ surface,
- Habitat availability (diversity of habitats is linked to species diversity),
- Sampling effort and methods.



While preliminary, these results show that the diversity of sharks and rays is important in the SWIO (10% of known species). This region has a number of endemic species, but effort to collect data has been very limited. Mozambique, the Seychelles and Madagascar have the highest diversity of species (Table 2). Interestingly, adjacent countries of the study area (not included) also have a high number of species, especially South Africa (180 species). Some areas still have to be explored, such as the French Eparses Islands (Europa, Juan de Nova), where preliminary surveys are promising in these undisturbed areas.

## Conclusions

This is the first review of shark and ray diversity in the SWIO region. While incomplete, this study is a contribution on the ecological and patrimonial value of this region for sharks and rays. It also underlines the high value of opportunistic data provided by sea users, such as divers and fishermen, to complete the inventory. Efforts to complete this diversity assessment are needed. In addition, more comprehensive studies on the status of shark populations are urgently needed in the SWIO region, where a number of species are probably threatened by overfishing and bycatch. Such assessments are of importance, as many coastal communities depend upon these resources.

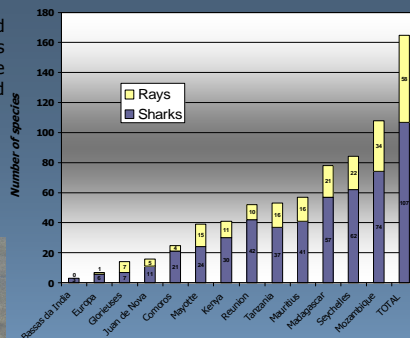


Crocodile shark (*Pseudocarcharias kamoharui*)

Eagle ray (*Aetobatus narinarum*)

White tip reef shark (*Triaenodon obesus*)

Tiger shark (*Galeocerdo cuvier*)



IUCN status	N species	Sharks	Rays
CR	3	3	0
EN	4	1	3
VU	21	14	7
NT	36	29	7
DD	29	21	8
NE	57	27	30
LC	15	12	3
TOTAL	165	107	58

Table 1: IUCN status of sharks and rays recorded in the SWIO region.

Figure 1: Biodiversity of sharks and rays in the SWIO region for each country or territory.



Porcupine ray (*Urogymnus asperrimus*)



Grey reef shark (*Carcharhinus amblyrhynchus*)

Countries	EEZ (km <sup>2</sup> )	Nb sp chondrichthyans			N fish species described	N refs.
		Sharks	Rays	Total		
Mozambique	449418	74	34	108	1556	15
Seychelles	1212276	62	22	84	1195	7
Madagascar	992900	57	21	78	997	24
Mauritius	1267440	41	16	57	1117	7
Tanzania	203867	37	16	53	973	12
Réunion	300211	42	10	52	984	5
Kenya	102851	30	11	41	736	10
Mayotte	68368	24	15	39	750	7
Comoros	152604	21	4	25	523	4
Juan de Nova	65519	11	5	16	325	
Glorieuses	44615	7	7	14	347	
Europa	137008	6	1	7	193	5
Bassas da India	130741	3	0	3	305	
TOTAL	5127819	107	58	165		

Table 2: Number of shark and ray species for each territory/country and related number of fish species recorded, EEZ surface and number of reference used.



Zebra shark (*Stegostoma fasciatum*)

To get the detailed diversity assessment (species level) and related references, please contact MAYSHARK: [mayshark@orange.fr](mailto:mayshark@orange.fr)