Habitat segregation and population structure of demersal fish within- and between-Aldabra and Mahe Plateau

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SEYCHELLES ISLANDS FOUNDATION RESEARCH & CONSERVATION SYMPOSIUM
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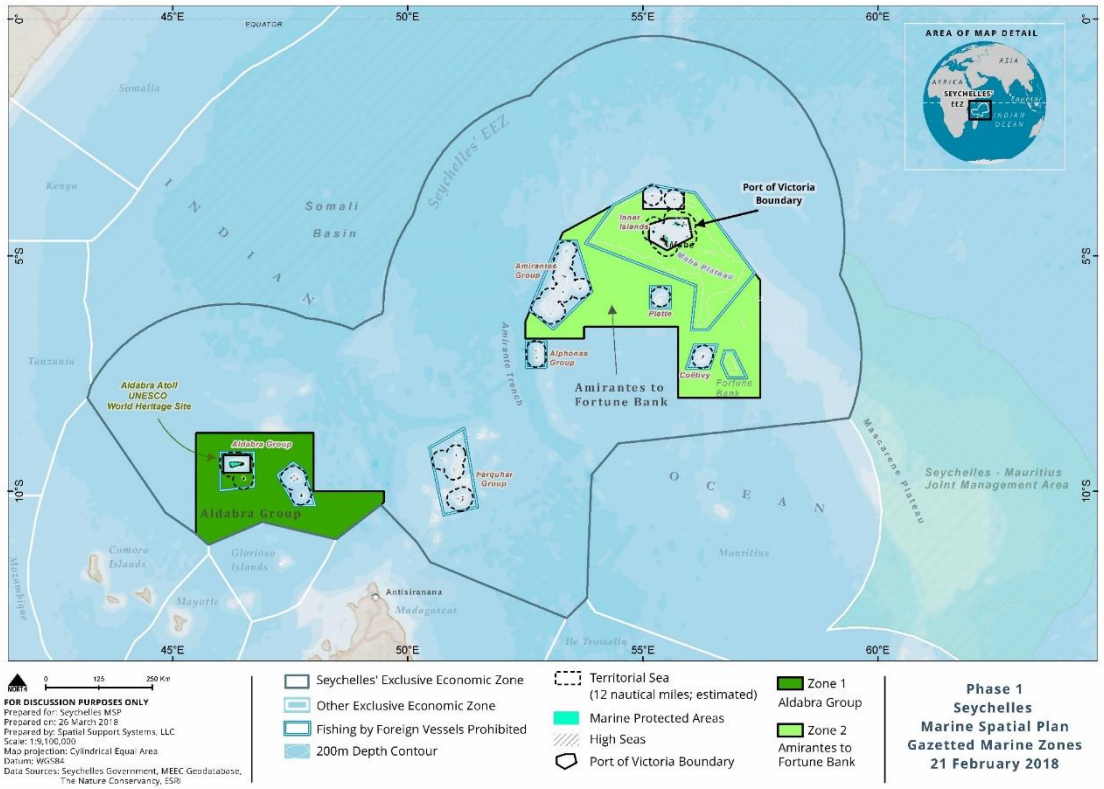
Seychelles Marine Spatial Plan

To ensure representative species and habitats have long-term protection, to improve resiliency of coastal ecosystems with a changing climate, and to ensure economic opportunities

SMSP
SEYCHELLES MARINE SPATIAL PLAN

- 15 % Medium Biodiversity Protection and Sustainable-Uses
  Amirantes group to Mahe Plateau and Fortune Bank

- 15% High Biodiversity Protection
  Aldabra group



Demersal Fisheries Management Plan

To deliver best possible ecological and socio-economic benefits through effective, transparent and participatory management of the demersal fisheries of the Mahe Plateau

>110 species incl. groupers (Epinephelidae), snappers (Lutjanidae) and emperors (Lethrinidae)

Challenges:

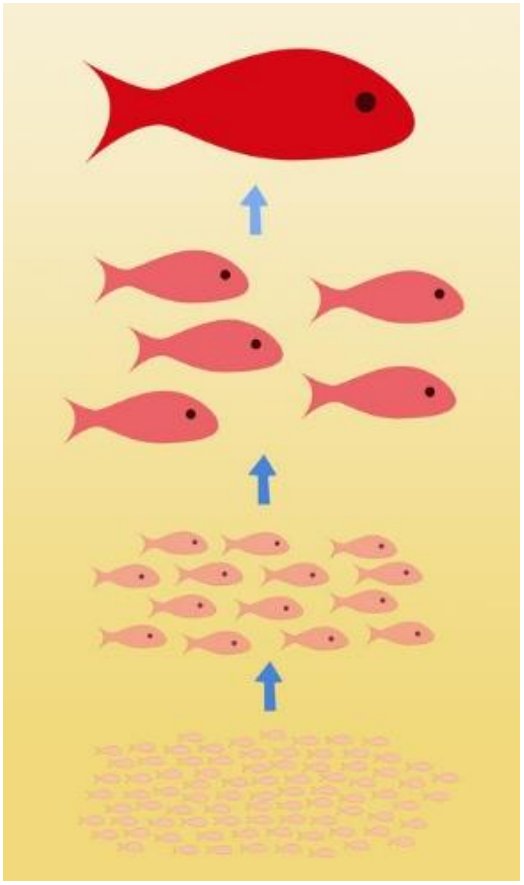
- Few information available for demersal fish
- Complexity of multi-gear and multi-species small-scale fisheries

Main objectives of the "demersal structure project":

- Study population structure between Mahe Plateau and outer islands through genetic analysis for stock assessment (2019-2021)
- Study habitat segregation and food web dynamics within- and between- islands through multi-tracer analysis for an ecosystem approach to fisheries (2017-2020)

Micro-nutrients, isotopes, contaminants

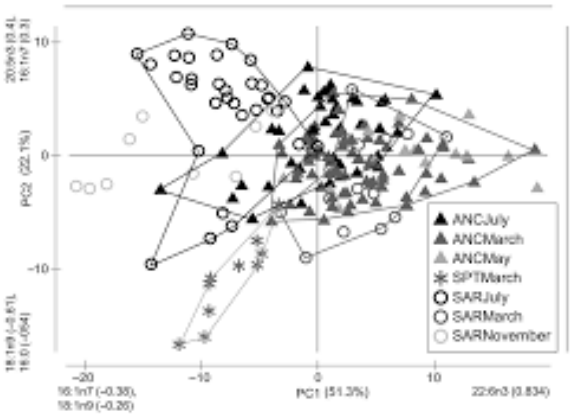
You are what you eat, and you are what they ate !



BIOMAGNIFICATION: When an organism cannot breakdown a substance, it is not excreted – it is stored in the organism

- Stable isotopes of Nitrogen ($\delta^{15}N$) and Carbon ($\delta^{13}C$)
- Essential micro-nutrients:
  - Polyunsaturated fatty acids (omega-3, -6)
  - Trace minerals (iron, zinc, copper, selenium etc)
- Contaminants (Mercury, Cadmium, Persistent Organic Pollutant)

Multi-tracer profiling based on multivariate statistical models



Methodology

Bioindicator species selected: 2 groupers, 1 snapper, 1 emperor

So far, 127 fish from Aldabra waters and 175 fish from Mahe Plateau

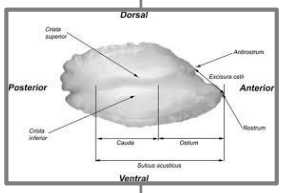
Scientific name	Common English name	FAO code	ALDABRA N Length	MAHE N Length
Aprion virescens	Green jobfish Zob gri	AVR	21 63±9 cm	64 65±10 cm
Lutjanus bohar	Two-spot red snapper Vara vara	LJB	84 55±10 cm	95 48±13 cm
Lethrinus nebulosus	Spangled emperor Kaptenn rouz	LHN	6 54±7 cm	6 48±16 cm
Epinephelus multinotatus	White-blotched grouper Vyey plat	EWU	16 63±9 cm	10 65±10 cm

Methodology

Sampling
Analyses
Purpose

Fish species identification
Fish lengths / Fish & tissue weights
Sex & sexual maturity

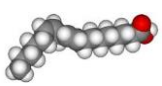
Otolith (dry)



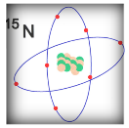
Growth increments
Morphometric shape

Ageing & population structure

Muscle / liver (deep-frozen)



Omega-PUFA



34 Se Selenium

80 Hg Mercury

Micro-nutrients
Contaminants, Isotopes

Habitat segregation
Trophic ecology
Nutritional composition

Finclip / muscle (ethanol)

Genetic

Population structure & abundance

Demersal structure project

Green jobfish

MAHE

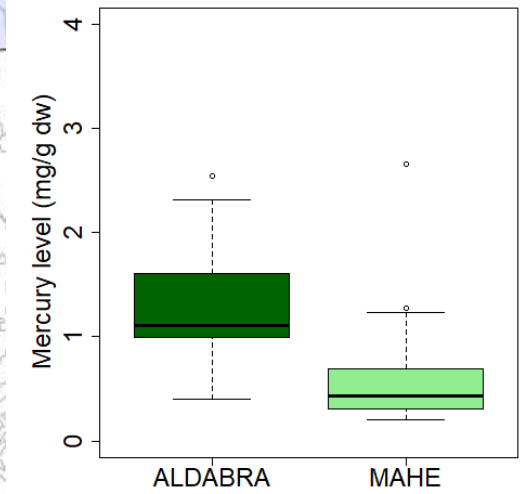
N=64; length = 64±10 cm

- Higher trophic position
- Lower levels in minerals (copper, iron, selenium)
- Lower levels in contaminants (mercury, cadmium)

ALDABRA

N=21; length = 65±11 cm

- Lower trophic position
- Higher level in Cu, Fe, Se
- Higher level in Hg, Cd



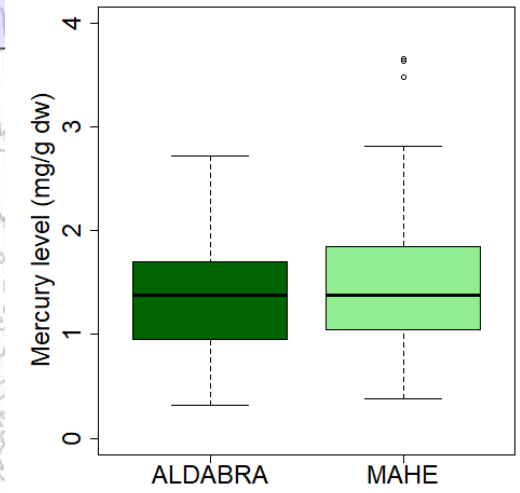
Demersal structure project

Two-spot red snapper

MAHE PLATEAU

NO DIFFERENCE OF TRACERS' LEVELS BETWEEN-AREAS

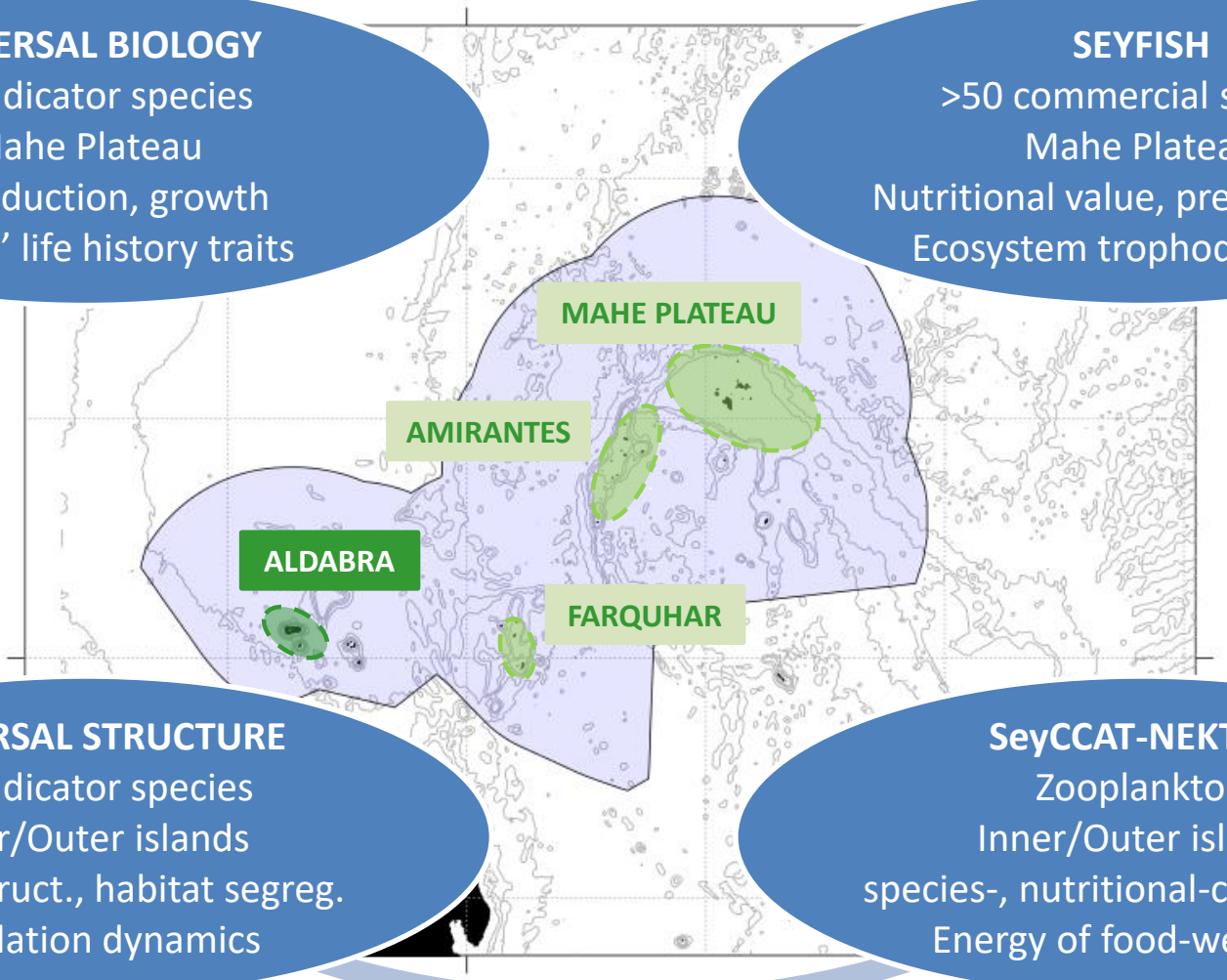
ALDABRA



Towards sustainable fisheries management

DEMERSAL BIOLOGY
Bioindicator species
Mahe Plateau
Reproduction, growth
Species' life history traits

SEYFISH
>50 commercial species
Mahe Plateau
Nutritional value, prey-predator
Ecosystem trophodynamics



DEMERSAL STRUCTURE
Bioindicator species
Inner/Outer islands
Genetic struct., habitat segreg.
Population dynamics

SeyCCAT-NEKTON
Zooplankton
Inner/Outer islands
species-, nutritional-composition
Energy of food-web base

Acknowledgments

SFA Research Team

Aldabra Research Team