PAEWG-01-14

First Meeting of the Protected Areas and Ecosystems Working Group (PAEWG1)

18-19 March 2019

A proposal of framework to design research and management plans for SIOFA's areas

Relates to agenda item: 6.1 Protected Areas and Ecosystems Working Group

(PAEWG 3.3 Protected area protocols)

Working paper ☒ Info paper ☐

Delegations of France (Territoires) and Australia

Abstract

This document is a draft to be discussed and amended within the PAEWG, and finalized during the PAEWG 2019 physical meeting.

This document is a proposal of framework and toolbox to design management plans and research plans for SIOFA's Areas. Different management measures can be chosen according to the sustainable fisheries management and conservation objectives that are to be applied to each area.

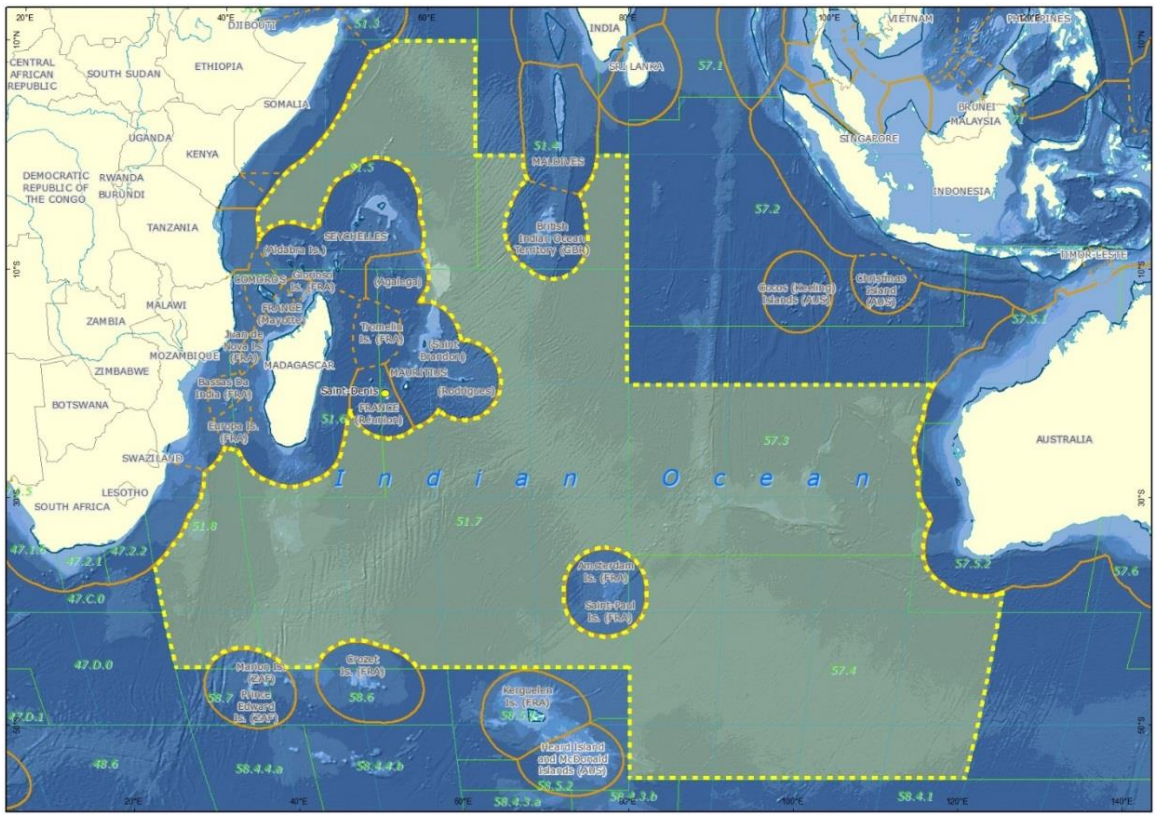
The action sheets, listed in the document, constitute a structured list of operations which can be selected in order to build relevant management plans. Actions can be organized with priorities. Pilots and partners can be identified for each action.

The action sheets include operational objectives according to long-term objectives. The context and global description of actions are provided.

Recommendations *(working papers only)*

This document is to be discussed within the PAEWG-01 and during the PAEWG-01 physical meeting.

A proposal of framework to design research and management plans for SIOFA's Areas



Introduction

This document is a proposal of framework or toolbox to design management plans for SIOFA's Areas. Different management measures can be chosen according to the sustainable fisheries management and conservation objectives that are to be applied to each area. The choice, monitoring and conditions for the application and control of these measures are to be defined by the CP on the recommendation of the SC.

These measures can be:

- Strict closure measures for fishing to all activities using bottom-contacting gear. This measure may be applied over specific periods to be defined by the CP.
- Restrictive measures aimed at acquiring additional knowledge. These measures shall apply by specifying the scientific research or fishing plan to be implemented to acquire the additional data.
- Fisheries management measures and the establishment of an observation system to ensure the sustainability of the stocks exploited.

The action sheets, listed in the tables below, constitute a structured list of operations which can be selected in order to build relevant management plans for each SIOFA Benthic Protected Area. Actions can be organized with priorities. Pilots and partners can be identified for each action.

The action sheets include operational objectives according to long-term objectives. The context and global description of actions are provided. Evaluation of actions can be processed according to the expected results and indicators.Conditions necessary for the realization of the actions are identified. Finally, a schedule is proposed according to a period of ten years.

To be discussed:

- **Interest and balance of the actions**
- Adaptation of the framework for each of the Benthic Protected Areas
- Feasibility criteria (a: logistical means (ships...); b: financial means; c: human means; d: technical and material means; e: political levers / involvement of partners).
- Priorities, pilots and partners of the management plan for each of the Benthic Protected Areas
- The feasibility of the actions (e.g. 1: Feasible with the means available now or in the near future; 2: Feasible by mobilizing new means, already identified; 3: Need to identify and mobilize new means)

All the long-term objectives aim to reduce the impacts of fishing on exploited species and benthic ecosystems and to develop monitoring of the fishing activities. The successful implementation of the management plan to reduce the impacts of fisheries depends on cross-cutting factors, or key success factors, common to all conservation issues.

Long-Term Objective (LTO)	**Influencing factors**	**Operational Objectives(OO)**	**Actions**
Long-term objective of the issue of reducing the impact of fishing identified. 1 LTO/issue	*Potential threats or favorable factors that may influence the conservation status of the issue and on which action must be taken directly or indirectly in the short/medium term*	*OOs allow action to be taken on influencing factors and must be achieved, in whole or in part, during the management plan*	*Management measures to realize over the duration of the management plan to provide answers and achieve operational objectives. They are broken down into associated operations, which specify the different steps of the action, its geographical variation, etc.*

ISSUE. POPULATIONS OF MARINE SPECIES SUSTAINABLY EXPLOITED

Long-term objectives: Ensure the maintenance and/or restoration of populations of exploited marine species and improve the knowledge about the diversity of marine species and ecosystems in order to reduce the impact of fishing activity

Long-Term Objective (LTO)	*Thematic*	Influencing factors	Operational Objectives	Actions	Pilots (to be defined)	Partners (to be defined)
Reducing the impacts of the fishing activity to ensure the maintenance and/or restoration of populations of exploited marine species	Sustainable fisheries management	Level of knowledge on the exploitation of marine resources and its impact	Develop the acquisition of knowledge on exploited marine resources	1.Collect and manage data from commercial fisheries		
				2.Implement surveys to assess the stock of exploited marine resources and experimental and multidisciplinary surveys in the SIOFA area		
				3. Stock assessment of exploited marine resources to define appropriate harvest levels		
		Exploitation of marine resources	Strengthen the fishery management framework	4.Develop the regulatory framework for fisheries in the SIOFA area and ensure its application		
				5.Implement fisheries management plans in SIOFA areas		
			Reduce by-catch and incidental catches	6.Monitor and evaluate the impacts of fisheries on bycatch and incidental catches		
				7.Implement measures to limit by-catch and incidental catches		
			Exchang with fishing industry stakeholders	8.Implement the conditions to ensure good collaboration with fisheries stakeholders in the SIOFA area		

Long-Term Objective (LTO)	*Thematic*	Influencing factors		Operational Objectives	Actions	Pilots (to be defined)	Partners (to be defined)
Improve the knowledge about the diversity of marine species and ecosystems to reduce the impact of fishing activity	Reduction of the impacts of the fishing activity on marine ecosystems	Data from multiple research organisations		Collect existing data on the marine environment	9.Summarize all available knowledge on the marine environment		
		An improvement in the knowledge necessary to define fisheries management actions on:	* bathymetry and environmental factors	Collate good quality bathymetry and environmental data grid	10.Aquire data on bathymetry on protected seamounts		
					11.Acquire complete and good quality environmental data grid		
			* marine habitats	Improve knowledge of marine habitats	12.Establish the inventory and mapping of marine habitats		
					13. Identify benthic taxa and assemblage with heritage value		
					14.Monitor the impact of fishing on benthic marine ecosystems		
			* the essential ecological functionalities of marine environments	Identify and characterize critical functional zones	15.Establish the inventory and mapping of essential functional zones (spawning grounds, nurseries, primary and secondary production areas, etc.)		

			* the sensitivity and vulnerability of marine ecosystems	Identify the sources and rank of pressure on marine ecosystems	16.Identify pressures on the marine environment and assess their impacts		

Summary of action sheets

Introduction 3

1-Collect and manage data from commercial fisheries 8

2- Implement surveys to assess the stock of exploited marine resources and multidisciplinary surveys in the SIOFA area 11

3- Stock assessment of exploited marine resources to define appropriate harvest levels 13

4-Develop the regulatory framework for fisheries in the SIOFA area and ensure its application 15

5-Implement fisheries management plans in SIOFA area 17

6-Monitor and evaluate the impacts of fisheries on bycatch and incidental catches 19

7-Implement measures to limit by-catch and incidental catches 22

8-Implement the conditions to ensure good collaboration between fisheries stakeholders in the SIOFA area 25

9-Summarize all available knowledge on the marine environment 27

10- Acquire data on bathymetry on protected seamounts 29

11-Acquire complete and good quality environmental data grid 31

12-Establish the inventory and mapping of marine habitats 33

13-Identify benthic taxa and assemblage with heritage value 36

14-Monitor the impact of fishing on benthic marine ecosystems 38

15-Establish the inventory and mapping of essential functional zones (spawning grounds, nurseries, primary and secondary production areas, etc.) 40

16-Identify pressures on the marine environment and assess their impacts 42

1-Collect and manage data from commercial fisheries

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Improve knowledge of exploited marine resources

Link with another action in management plan

-Stock assessment of exploited marine resources to define appropriate harvest levels

Geographical area(s) concerned: the SIOFA area

Description of action:

Context / Reasons for the Action

While fishing vessels provide fisheries data that improve knowledge of exploited marine species and their populations, they are also the source of other data and scientific samples, which enrich knowledge of the marine environment more generally. The work of collecting fisheries data and biological samples from fishing vessels is assigned to fisheries observers, also some fishing data are collected by skippers and crew. It is essential to acquire all these data from fishing vessels.

Electronic fishing logbook (software and hardware) including user-friendly tools to facilitate data collection and quality assurance could be set up by as scientific organization to produce high quality data ready to upload to SIOFA secretariat.

Global description of the Action

The management of data and samples, from their collection to their inclusion into databases or collections, requires cooperation between the various parties (Member States, scientists, and inspectors) through the organisation of a program. In the field, this work is made possible by the presence of trained and skilled fishery observers, properly equipped and scientifically and technically monitored at sea to ensure the quality of the data and sample collection. In the program, tissue collection is important for defining "stocks", knowing connectivity and gene flows between populations.

This action aims to develop the data management system

Explanation of the priority level (if necessary)

The implementation of resource assessment protocols and data collection on board fishing vessels are priorities to feed stock assessment models of exploited populations and assess population status. This action also improves knowledge on other compartments of marine ecosystems (benthos, marine mammals, birds, etc.).

Expected results of the action:

- Identification of scientific needs for which fishing vessels could be a source of data;
- Collection and archiving of data and optimized and standardized samples on board fishing vessels;
- Definition of priorities for protocol implementation and data collection;
- Data quality control;
- Availability and accessibility of this data

Action Indicators:

- Quantity and quality of data collected for each of the protocols
- Effectiveness of data collection (agent time / data collected)
- Compliance and completeness of data provided to SIOFA

Operations associated with the action:

Operations	**Deliverables**	**Faisability**	**Pilots**	**Partners**
Maintaining the system of observers on board fishing vessels to implement scientific and environmental protocols on a routine basis	Reports Completed fishing logbooks by observers, sometimes they are made by captains			
Reinforcement of the observation system by a recruitment plan for additional observers agents, to implement the specific protocols (experiments and testing of practices and techniques, additional environmental monitoring protocols)	Annual recruitment plan and management strategy for observers			
Training and monitoring at sea of on-board observer, before and during their boarding, through training sessions, personalized briefings, and the provision of presentations, manuals, protocols and instructions adapted for the proper implementation of tasks on board.	- Tutorials (videos) -Self-training tools (identification, excellent skills) - Performance assessment report on the work of each observer			
Regular review, adaptation and evolution of all scientific protocols and onboard data collection tools: - Update, prioritise and standardize scientific and population assessment protocols to meet the data and sample needs of the entire scientific community; - Development of new complementary on-board monitoring and collection tools (video and automatic collection tools such as electronic measurement tables, scales and other connected equipment).	- Standardized, optimized and prioritized protocols and instructions to meet all data needs - Apparatus on all vessels with specific tutorials for their implementation			
Management of data (within the fisheries information system) **Availability and accessibility of this data.**	Fishing logbooks optimised for the use of captains and observers Database adapted for the provision of data to SIOFA Simplified data access procedure (web access)			

Pilots / Partners (role of each party)

To be define

Conditions necessary for the implementation of the Action:

The implementation of the action requires human and technical resources on board fishing vessels to implement the protocols, raise crew awareness and disseminate good practices. Other human resources are also required for analysis and development of tools and protocols.

Provisional ten years schedule for operations:

Operations	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**	**N9**	**N10**
Maintenance of the system of observers on board fishing vessels										
Reinforcement of the observation system by a plan to recruit additional observers on certain vessels										
Training and follow-up of observers										
Regular review, adaptation and evaluation of all scientific protocols and onboard data collection tools										
Management of data within a fisheries information system. Availability and accessibility of this data										

2- Implement surveys to assess the stock of exploited marine resources and multidisciplinary surveys in the SIOFA area

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the sustainability of exploited marine species populations

Operational objective: Improve knowledge of exploited marine resources

Link with another action in management plan

- Collect and manage data from commercial fisheries
- Ensure the modelling of exploited marine resources

Geographical area(s) concerned: SIOFA area

Description of action:

Context / Reasons for the Action

Surveys to assess demersal fish populations in fishing areas in the SIOFA area could be set up. Bottom trawl surveys could provide robust and complementary data to those from fishing vessels, typically on recruitment and productivity of fish populations. These data will feed assessment models and will be used to estimate the populations of target species in the SIOFA area as well as their dynamics.
However, in areas that are difficult to trawl, such as seamounts. A mark/recapture program could be set up to overcome this difficulty.

Global description of the Action

This action would consist in implementing fish stock assessment surveys with scientific protocols implemented on board fishing vessels. These campaigns must be based on resources adapted to the sea, external researchers, specialists and technicians on board. They must be independent of any commercial profitability objective. In addition to sampling target species in commercial fisheries, these surveys assess the status and dynamics of bycatch species population caught in commercial fisheries.

Fish stock assessment surveys don't provide information on all components of the marine environment. Therefore, multidisciplinary surveys could be carried out to achieve other research simultaneously, such as inventories and sampling of marine species (e. g. macrobenthos), bird and marine mammals observations, experimentation of new techniques and practices (selectivity testing of gear, impact studies on the seabed, etc.)

Explanation of the priority level

These fishing campaigns are a priority to provide accurate, standardize and exploitable data for the assessments of exploited populations. They are therefore essential for the development of a robust model of exploited populations consistent with the state of resources and taking into account other species caught.
This action also improves knowledge of other compartments of marine ecosystems (benthos, marine mammals, birds, etc.).

Expected results of the action:

- Increased knowledge on the marine species exploited and the state of their populations in order to adjust harvest levels;
- Increased knowledge on marine species and habitats potentially impacted by fisheries.

Action Indicators:
- Number of populations of exploited species whose population status and dynamics will be studied

Operations associated with the action:

Operation	**Deliverables**	**Faisability**	**Pilots**	**Partners**
Implementation of fisheries resources assessment campaigns, experimental campaigns and multidisciplinary campaigns.	Fishing reports Population assessment reports			

Pilots / Partners (role of each)
To be define

Conditions necessary for the implementation of the Action:
A number of conditions must be met to ensure the successful implementation of the Action:
- Sufficient financial resources to cover the significant costs of these surveys;
- Vessels adapted to the technical specifications of these surveys;
- Sufficient and appropriate human resources

Provisional ten years schedule for operations:

Operation	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**	**N9**	**N10**
Implementation of fisheries resource assessment surveys. Timetable to be adapted according to the assessment needs of each target species										

3- Stock assessment of exploited marine resources to define appropriate harvest levels

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Improve knowledge of exploited marine resources

Link with another action in management plan

- Collect and manage data from commercial fisheries
- Implement surveys to assess the stock of exploited marine resources and experimental and multidisciplinary surveys in the SIOFA area according to an ecosystemic approach
- Monitor and evaluate the impacts of fisheries on bycatch and incidental catches

Geographical area(s) concerned: the SIOFA area

Description of action:

Context / Reasons for the Action

Fishing in the SIOFA area targets several fish species (orange roughy, lizard, Patagonian toothfish, etc.). The management of these fisheries is based on catch limits for each target species. Modelling the stock assessment of exploited populations is necessary in order to better manage fisheries.

Global description of the Action

The modelling of stock assessment must be carried out in the SIOFA area. The objective is to know precisely the state of the populations, and to estimate their spatio-temporal dynamics in order to adapt the levels of harvesting on these populations and to define appropriate management measures, guaranteeing the sustainability of these resources in the long term.

The need for robust data needed for these models should guide the evolution of assessment campaigns, but also protocols and data/samples collection on board commercial fishing vessels, and laboratory analyses (age reading on otolith, genetic analyses, etc.). Genetic analyses provide critical knowledge on stock identification of exploited species.

Expected results of the action:

-Knowledge of populations of "targeted" species
- Determination of harvest level in accordance with SIOFA fishery decision-rule for each population

Action Indicators:

-Proportion of exploited species modelled
-Number of stocks assessed
-Model uncertainties

Operations associated with the action:

Operations	Deliverables	Faisability	Pilots	Partners
Assessment of stocks and population dynamics of fish targeted by fisheries in the SIOFA zone: continuous review of models, updating of parameters (data from assessment and marking/recapture campaigns, growth data, mortality rates, age readings, biometrics, etc.).	Report on the status and dynamics of target species (management advice)			

Pilots / Partners (role of each party)
To be define

Conditions necessary for the implementation of the Action:
-Sufficient and appropriate human resources (trained stock assessment modellers).
-Robust and available data

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Assessment of the stocks and population dynamics of fish targeted by fisheries in the SIOFA area										

4-Develop the regulatory framework for fisheries in the SIOFA area and ensure its application

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Ensure the sustainability of the fisheries

Link with another action in management plan

-“ Develop the regulatory framework for fisheries in the SIOFA area and ensure its application”; “Collect and manage data from commercial fisheries”

Geographical area(s) concerned: All fisheries in the SIOFA area

Description of action:

Fisheries management in the SIOFA area could be based on a specific framework, which is based in particular on Articles L-958 of the Rural Maritime Fisheries Code (CRPM) and from which:

- regulatory measures to control each of the fisheries in the SIOFA area, through technical requirements specific to each fishery (bottom trawl, pelagic trawl, bottom longline, etc.);
- scientific monitoring organised by a scientific organisation and permanent control, carried out on board each of the fishing vessels by on-board fisheries controllers, as well as control by landing the catches.

This management framework could be strengthened by fisheries management plans, defining management objectives and the means to achieve them.

In this perspective, fisheries control programs may be set up. Indeed, the fisheries controllers on board each of the authorised vessels would have two missions: (1) one scientific, consisting of collecting, under scientific supervision, the data, samples and photo-identifications necessary for fisheries monitoring and improving knowledge of marine species and environments. (2) The other is to raise awareness of good practices and ensure that each ship enforces the regulations. The collection, verification, formatting and analysis of fishing data are therefore necessary for the proper application of the regulations (see the Action "Collect and manage fishing data", Issue 5, for more information).

Expected results of the action:

- Effective regulatory measures for properly managed fisheries;
- Scientific monitoring to collect data in order to monitor fisheries and improve knowledge of marine species and environments.

Action Indicators :

- Indicator of the control pressure exerted (evolution of the controlled fishing effort rate, evolution of the number and frequency of the control points checked...)

Operations associated with the action:

Operations	Deliverables	Faisability	Pilots	Partners
Regular review of important environmental criteria that affect the regulation of fishing, in connection with the actions to improve knowledge (eg VME, heritage taxa)	Study of the relevance and effectiveness of each indicator to achieve the desired objective			
Adaptation of conservation measures, based on the latest knowledge acquired (e.g. target species, VME, heritage taxa, by-catches and by-catches, etc.)	Annual review on the application of technical requirements Annual synthesis on new SIOFA conservation measures An Arrêté "technical requirements" for each fishery			
Identification of control points on board and at landing and implementation of the material and human resources necessary for this control	Equipment, protocols and training adapted to enable fisheries controllers to optimise their control work			

Pilots / Partners (role of each party)

Conditions necessary for the implementation of the Action:
The implementation of the action requires sufficient and appropriate human resources. It also requires the appropriation of the management scheme by the various actors involved in its operation.

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Regular review of important environmental criteria that affect the regulation of fishing										
Adaptation of conservation measures										
Identification of control points on board and at landing and implementation of the material and human resources necessary for this control										

5-Implement fisheries management plans in SIOFA area

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Strengthening the sustainability of fisheries

Link with another action in management plan

- "Develop the regulatory framework for fisheries in the SIOFA area and ensure its application"

Geographical area(s) concerned: All fisheries in the SIOFA area

Description of action:

Context / Reasons for the Action

Like any other management plan, the fisheries management plans in the SIOFA area will make it possible to build long-term strategies and establish the sustainable fisheries management model developed by SIOFA in this part of the territory. They specify the management objectives adapted to each fishery, taking into account all available knowledge, as well as the means necessary to achieve these objectives. These management plans not only guarantee the environmental sustainability of fisheries in the SIOFA area, but also their socio-economic stability, insofar as they enable shipping companies to adapt their long-term strategy. In addition, these management plans are essential tools for the establishment of good fisheries governance, in that they guarantee the transparency of fisheries management methods in the SIOFA area.

The management plan for some seamounts could be put in place, as some seamounts are proposed for fishing closure in SIOFA areas because they meet criteria for evaluating protected area proposals.

Global description of the Action

This Action aims to put in place management plans for fisheries.

Expected results of the action:

- Management plans adapted to each of the fisheries in the SIOFA zone and well adapted to the shipping companies

Action Indicators:

- Proportion of actions in each management plan carried out / monitored

Operations associated with the action:

Operations	Deliverables	Faisability	Pilots	Partners
Development of fisheries management plans	- Drafting of a management plan adapted to each fishery			
Elaboration of a fisheries management plan for selected seamounts	- Management plan			

Pilots / Partners (role of each)

Conditions necessary for the implementation of the Action:

The successful implementation of the action requires sufficient human resources for the definition and drafting of management plans, as well as close collaboration with scientists and industrials (shipowners) in the field to ensure the proper implementation of these management plans. In addition, Member States will have to ensure that these management plans are validate

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Development of fisheries management plans										

6-Monitor and evaluate the impacts of fisheries on bycatch and incidental catches

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Limit by-catch and incidental catches

Link with another action in management plan:
"Collect and manage data from commercial fisheries"; "Stock assessment of exploited marine resources to define appropriate harvest levels"; "Monitor and evaluate the impacts of fisheries on bycatch and incidental catches"; "Establish the inventory and mapping of marine habitats".

Geographical area(s) covered: the SIOFA area

Description of action:

Context / Reasons for the Action

The fishing techniques used (longlines, trawls, traps) and practices implemented often still lead to by-catches (commercially valuable or not) or accidental catches (birds, marine mammals, benthos). These catches may concern protected species, species whose populations are not assessed, or little-known species or species assemblages for which the precautionary principle is necessary. In order to limit interactions with these by-catches and accidental catches, and possibly to release the organisms back into the water, it is necessary, as a first step, to improve knowledge of the impacts of fishing on these species, with regard to the state of their populations and dynamics, but also with regard to their vulnerability and resilience.

Global description of the Action

To limit by-catch and incidental catches in fisheries, it is necessary first to have a good knowledge of the effects of fishing on the populations of the species concerned, and then to guide and prioritize catch reduction operations according to the fisheries and species that represent the most important issues.
As a first step, it is therefore necessary to maintain and strengthen the monitoring of these catches, as well as the characterisation of the interactions of these species with fisheries in the SIOFA zone. To this end, new monitoring and/or protocols will have to be implemented (see sheet "collecting and managing fisheries data Data on the vulnerability and sensitivity of VMEs to fishing and the literature suggest that the recovery of damaged VME areas can take decades or longer. In the absence of additional information and data, the precautionary principle suggests that appropriate management measures may be closure/protection or control of areas.

Expected results of the action:
- Reduction of impacts and mortality of incidental and accidental species;
- Prioritisation of reduction measures according to the issues identified.

Action Indicators:
- Effort to monitor by-catch and incidental catches by species (or taxon) and fishery;
- Dissemination of monitoring data

Operations associated with the action:

Operations	Deliverables	Faisability	Pilots	Partners
Characterization and assessment of impacts on bird bycatch Data analysis and dissemination at SIOFA	Mortality data and characterization of interactions (feeding, choking, etc.) by species and area Assessment report on the impact of these interactions on the populations of each of these species			
Characterisation and assessment of impacts on marine mammal bycatch Data analysis and dissemination at SIOFA	Interaction data by species and area Assessment report on the impact of these interactions on the populations of each of these species			
Characterisation and assessment of impacts on by-catch of teleostals and chondrichthyans Identify pressures on the marine environment and assess their impacts	Catch data by species and area Assessment report on the impact of these catches on the populations of each of these species			
Characterisation of the impacts on marine invertebrate bycatch, by adapting tools for independent monitoring of opportunistic catches on fishing gear (use of underwater cameras, etc.)				
Prioritisation of species/taxa/habitats to be subject to management measures to reduce their interaction with fisheries	Priority lists of species / taxa / habitats Management advice on these species			

Pilots / Partners (role of each party)

Conditions necessary for the implementation of the Action:
The implementation of the Action requires appropriate technical and human resources on fishing vessels to monitor and characterize interactions, as well as in laboratories to define protocols and carry out analyses.

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Characterisation and assessment of impacts on bird bycatch										
Characterisation and assessment of impacts on marine mammal bycatch										
Characterisation and assessment of impacts on incidental and/or by-catch of teleostals, rays and sharks										
Characterisation and assessment of impacts on marine invertebrate bycatch										

7-Implement measures to limit by-catch and incidental catches

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Limit by-catch and incidental catches

Link with another action in management plan

- "Monitor and evaluate the impacts of fisheries on bycatch and incidental catches"; "Develop the regulatory framework for fisheries in the SIOFA area and ensure its application ".

Geographical area(s) concerned: the SIOFA area

Description of action:

Context / Reasons for the Action

The fishing techniques used (longlines, trawls, traps) and practices implemented often still lead to by-catches (commercially valuable or not) or accidental catches (birds, marine mammals, benthos). These catches may concern protected species, species whose stocks are not assessed. In this context, measures to reduce their capture or destruction and to ensure the survival of those that could be returned to the water alive should be implemented rapidly. Beforehand, it is necessary to have a good knowledge of the effects of fishing on the populations of species affected by incidental catches and by-catch, and then to guide and prioritize catch reduction operations according to the fisheries and species that represent the most important issues. This is the purpose of the action sheet "Monitoring and evaluating the impacts of fisheries incidental catches and by-catch".

Global description of the Action

This action aims to implement all measures to limit interactions with by-catch and marine habitats. To this end, it is proposed to continuously strengthen guides to good fishing practice (mapping of by-catch densities, use of more selective and less impactful gear and practices, etc.) and to disseminate them to seafarers' crews by raising their awareness. This approach is thus complementary to the regulatory approach (see fact sheet "Improving the regulatory framework for fisheries in the SIOFA area"), through which more restrictive measures can be taken to reduce interactions (zoning, bans on certain gear or practices, etc.).
To identify them, it may be necessary to experiment with certain practices (spinning/steering techniques, bait type, waste management, etc.) or fishing gear (type of hooks, type of traps, etc.) in order to test their effectiveness and applicability on board fishing vessels.
In addition, the survivability of certain species caught will have to be measured in relation to fishing conditions in order to propose management measures adapted to each species (release or conservation on board conditions, etc.).
With regard to skates and sharks specifically, it is proposed to formalise this work more precisely through the drafting of an action plan detailing the objectives to be achieved and the means to be implemented.

Explanation of the priority level (if necessary)

This action is a priority given the heritage nature of some incidental catches and by-catches, and the limited knowledge that exists about these species.

Expected results of the action:
Reduction of by-catch and mortality of by-catch and incidental catches

Action Indicators:
- Number of each incidental catch and by-catch by fisheries;
- Catch rate, in relation to fishing effort and/or tonnage of target species;
- Survival rates after capture and release, for each species;
- Status of populations of accessory species (if possible assessment)

The number and rate indicators must show a significant decrease throughout the period of the management plan. The success of the Action will be measured by the continued reduction of these numbers and rates over the entire period of the management plan, including a mid-term evaluation. For by-catches, the objective is to reduce their fishing, but for incidental catches of birds and marine mammals, which are already low at present, a long-term objective very close to zero is reasonable.

Operations associated with the action:

Operations	Deliverables	Faisability	Pilots	Partners
Definition and dissemination of technical recommendations and good practices related to knowledge improvement actions - Identification of factors that explain the differences in environmental performance observed between different ships - Extension of the best practice guidelines to by-catches (marine mammals, marine invertebrates) of all fisheries in the SIOFA zone; - Broadcasting of the CBCs to shipowners and fishermen by appropriate	Mapping Atlas of Species: Popularised presentation of factors influencing catches (seasonality, equipment and fishing practices, etc.) Annual reports and presentations of by-catch and incidental catch data.			
Experimentation and implementation of new techniques and practices to improve selectivity and reduce by-catches and by-catches - Field testing of equipment adaptations (exhaust traps on traps, new hooks, etc.) - Experimentation of new practices (bait, setting time, etc.) These experiments may be carried out during commercial fishing campaigns by allocating time and resources dedicated to experimentation, or by sharing them with fishing or multidisciplinary campaigns.	Reports on the effects of each new device on the catchability of target species and incidental and accidental species Reports on the technical and financial implementation conditions of these devices for their widespread use.			
Assessment of the survivability of bycatch and by-catch and identification of possible means of live release - Estimation of the survival of individuals of each accessory or accidental species (including benthos) through experimentation and the implementation of specific protocols (reactivity of individuals to release, oxygen tank housing, marking, etc.) - Definition of procedures (handling, hook removal techniques, unstressing, equipment) to ensure that individuals with a chance of survival are returned to the water in optimal conditions.	Reports on the survival rates of these species and the processes for returning them to the water under conditions optimal for their survival			
Mise en place de plans d'actions spécifiques (raies, requins) Définition de la stratégie de réduction des captures de raies et de requins à travers la rédaction d'un plan d'action spécifique, précisant les objectifs et résultats attendus, et développeront les opérations ci-dessus. Ils seront évalués et révisés à échéances régulières et indépendantes du plan de gestion de la réserve naturelle.	Plans d'actions			

Pilots / Partners (role of each party)

Conditions necessary for the implementation of the Action:
The implementation of the Action requires human resources in laboratories for analyses, the development of CBC-type tools and the organisation of experiments, as well as human and technical resources on board fishing vessels, the implementation of protocols, crew awareness and the dissemination of good practices.

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Definition and dissemination of technical recommendations and good practices										
Experimentation and implementation of new techniques and practices to improve selectivity										
Assessment of the survivability of bycatch and by-catch and identification of adequate means of live release										
Implementation of specific action plans (rays, sharks)										

8-Implement the conditions to ensure good collaboration between fisheries stakeholders in the SIOFA area

Main issue: Sustainable exploitation of marine resources

Long-term objectives: Ensure the maintenance of populations of exploited marine species

Operational objective: Ensure good collaboration between fisheries stakeholders in the SIOFA area to ensure sustainable fisheries management

Link with another action in management plan

- All actions

Geographical area(s) concerned: All fisheries throughout the SIOFA area

Description of action:

Context / Reasons for the Action

Fisheries management in the SIOFA area is based on a relationship between shipwoners, scientists and treaty member states (State Action at Sea, ministries, etc.). Regular dialogue between these parties is essential to ensure that everyone has the same level of information, and that everyone gives their point of view, to ensure long-term management for these fisheries. This is why a working group and a scientific committee of SIOFA take place once a year, in addition to the regular exchanges between each of the parties.

Collaboration with fishing companies in the SIOFA area is a prerequisite for the success of the actions under challenge 5. This action therefore aims to maintain and strengthen this collaborative mechanism.

Global description of the Action

The regular presentation of the results of fisheries research and general knowledge of the marine environment must be ensured to seafarers and shipping companies in order to ensure a good understanding of fisheries management, in full transparency. They can be broken down as follows:

- Presentation of the results of fisheries research and the results of fishing seasons;
- Presentation of environmental, technical and socio-economic performance;
- Presentation of the technical requirements of each fishery, the reasons for taking these measures and provision of technical advice to ensure their application;
- Presentation of management plans and their objectives.

During these presentations, the shipping companies and the crew members themselves share their feedback. They are also often the driving force behind new technical or practical solutions to achieve the objectives set by the management plans and can present their fleet renewal projects.

Finally, this action will also require anticipating future economic developments and defining in advance the regulatory changes that require significant investments from shipowners). States members of the treaty, shipowners and scientists will thus be able to accompany each other on their long-term projects.

Expected results of the action:

- Creation of synergy through regular dialogue between Member States, fishing companies in the SIOFA area, research laboratories and institutional partners;
- Fluidity of information exchanges and therefore good implementation.

Action Indicators:
- Participation of stakeholders in each of the consultation and information meetings for each of the fisheries in the SIOFA zone

Operations associated with the action:

Operations	**Deliverables**	**Faisability**	**Pilots**	**Partners**
Consultation meetings with fisheries stakeholders in the SIOFA area (central administrations, scientists, shipowners, etc.)	Minutes of meetings			
Supporting shipowners upstream in their reflections on the new ship/renovation project (waste and wastewater management, energy production and use, etc.)				

Pilots / Partners (role of each party)

Conditions necessary for the implementation of the Action:
The implementation of the Action requires sufficient human resources and moderate financial resources in order to invite certain stakeholders on an occasional basis

Provisional ten years schedule for operations:

Operation	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**	**N9**	**N10**
Consultation meetings with fisheries stakeholders in the SIOFA area (central administrations, scientists, shipowners, etc.)										
Supporting shipowners upstream in their reflections on the new ship/renovation project (waste and wastewater management, energy production and use, etc.)										

9-Summarize all available knowledge on the marine environment

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: Capitalise on existing data on the marine environment

Geographical area(s) concerned: SIOFA area

Description of the Action:

Context/ Reasons for action:

The SIOFA area has been the subject of some scientific expertise, for example on the Walters Bank in the southwest Indian Ocean, in several fields (biology, ecology, geology, etc.). The actors involved in these projects follow one another according to the scientific projects and available funding, without the data collected having been shared and/or processed. Each scientific observer program or mission follows its own protocols and prepares reports that aren't always published or sent to structures that could benefit from them. Processing and synthesizing all these data is the necessary basis for the implementation of a knowledge acquisition strategy supporting the implementation of informed biodiversity management in the SIOFA area.

Global description of the action

The objective of the action is to identify, capitalise and synthesise a large number of available research works. The completion of this synthesis of available knowledge will make it possible to identify gaps and develop a strategy for acquiring knowledge in consultation with scientific stakeholders.

Expected results of the Action:

A knowledge acquisition strategy necessary for informed the area management based on all the knowledge resulting from scientific research.

Action Indicators:

Number of missions/campaigns identified
Number of collections processed and identified over the duration of the management plan/number of untreated collections identified. For example, to identify whether there are endemic or important species

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Synthesis of existing mission reports and other research *Identification of missions, capitalisation of reports*	Inventory of all existing documents and database entry			
Identification, sorting and analysis of collections that may be existing or future *Identification of existing or future collections and assessment of the level of processing of these collections, organization of identification workshops to accelerate identification processes, database entry and publications.*	Inventory of taxa collected or to be collected and data processing status Database entry Identification workshops			
Development of a strategy to improve the knowledge needed for conservation *Based on the synthesis, identify gaps in knowledge and additional work required. Develop a strategy for improving knowledge in consultation with partners to identify research priorities differentiated by territory.*	A knowledge acquisition strategy identifying the research activities that would be most desirable in the area			

Pilots / Partners (role of each) :
to be defined

Conditions necessary for the implementation of the action:
Hiring staff (one full-time equivalent) to carry out the synthesis work.
Time and manpower of qualified personnel in each of the structures to research and capitalize on documents and collections.
Specific skills necessary to identify rare and endemic taxa.
Financial resources to organize identification workshops.

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Synthesis of existing mission reports and other research										
Identification, sorting and analysis of existing or future collections										
-> organisation of identification workshops										
Development of a strategy to improve the knowledge needed for conservation										

10- Acquire data on bathymetry on protected seamounts

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: An improvement of the knowledge necessary to define management actions on bathymetry in the SIOFA area.

Link with antoher action: « Establish the inventory and mapping of marine habitats ».

Geographical area(s) concerned: SIOFA area

Description of the Action:

Context/ Reasons for action:

Currently, most research programs use the GEBCO and ETOPO bathymetric reference frames for their work, those data set are a mix of several sources including satellite measurements of sea level. Those data set covers the entire oceans and seas, but in some areas are of low accuracy and resolution compared to data collected in situ from ships. Indeed, the data available at a finer scale (from fishing and research vessels) show errors in the GEBCO model of several hundred meters in some sectors. It would therefore be important to share existing data sets and collect bathymetric data to fill gaps and produce an accurate digital elevation model.

Global description of the action

Therefore, this action should first take stock of the existing bathymetric data (spatial coverage, resolution, accuracy and availability of data) for protected seamounts. In particular, bathymetric data from the Marion Dufresne's oceanographic campaigns and fishing vessel data (recordings of vessel sounders and fish data) could be mobilized. Based on this inventory, if bathymetry is not known for certain areas for which needs are identified, means of collecting this data in the field should be funded and implemented.
Finally, the last operation would consist in creating a scientific partnership with oceanographers who would model the data and feed international bathymetric databases such as GEBCO and ETOPO to ensure accessibility.

Expected results of the Action:
Precise, high-resolution and exhaustive bathymetry of the seamounts, including the protected seamounts

Action Indicators:
% of the territory covered by seamounts

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Capitalisation and synthesis of existing bathymetric data	Report on existing data and their availability			
Organize the collection of missing data	Raw data			
Produce a complete bathymetric reference frame	Bathymetric reference frame			

Pilots / Partners (role of each) :

Oceanographers???

Necessary conditions for implementation:

Need to create partnerships with all stakeholders with bathymetric data.
Have sufficient financial resources to finance the synthesis of this data and the acquisition of new data.
Have all the necessary data (existing or to be collected) to enable the production of the bathymetric reference frame

Provisional ten years schedule for operations:

Operation	**N1**	**N2**	**N3**	**N4**	**N5**	**N6**	**N7**	**N8**	**N9**	**N10**
Capitalisation and synthesis of existing bathymetric data										
Organise the collection of missing data										
Produce a complete bathymetric reference frame										

11-Acquire complete and good quality environmental data grid

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: To have a complete and good quality environmental data grid

Link with antoher action:
" Monitor the impact of fishing on benthic marine ecosystems"

Geographical area(s) concerned: zone SIOFA

Description of the Action:

Context/ Reasons for action:

Some biological data in the SIOFA area are accessible through scientific programs that have taken place and are ongoing; and some physico-chemical data sources for the marine environment. Some oceanographic campaigns have collected data in the SIOFA area. In addition, these campaigns are scattered, opportunistically harvested, and their spatial coverage is not complete.
However, environmental data such as temperature, salinity or pH are essential to a good understanding of the functioning of pelagic and benthic ecosystems and can be used to model populations and habitats. They are also essential for monitoring global changes. The scientific community has already pointed out this lack, which still limits the scope of many study and conservation programs.
In the future, several campaigns should be carried out to obtain more biological and physico-chemical data.

Global description of the action

The action aims to deploy instruments (CTD) for the acquisition of environmental data (temperature, salinity, dissolved oxygen, chlorophyll concentration, etc.) from fishing vessels and oceanographic vessels, to complement the data already acquired, thus allowing a wide geographical coverage of the SIOFA area at a lower cost and throughout the year. The first step would be to synthesize the available data and current data acquisition means, then build a sampling plan representative of the area according to the seasons and thus define the exact material requirements. Several scenarios could be constructed to adapt to the available funding. This must be done in close collaboration with the fishing compagnies, which have already been asked to implement various scientific protocols. The instruments will then be deployed on fishing vessels through fishery controllers and reserve officers, and on oceanographic vessels.
The raw data collected must then be capitalized and made available to the scientific community or transmitted to enable the integration of reference systems.

Expected results of the Action:
-Raw data will be obtained on the SIOFA area.
-An environmental grid will be obtained after a second processing step.

Action Indicators:
-Number of instrument deployments (CTDs)
-Number of sampling stations
-Spatial and temporal coverage of the sampling: areas covered/total area of the EEZ, measurement duration/plan duration?

Associated operations :

Operation name	Deliverables	Faisability	Pilots	Partners
Carrying out a sampling plan on the SIOFA area Definition of an optimal coverage (pelagic and benthic and offshore) taking into account the availability and seasonality of the boats present in the area and the data already available. Identification of the technical means to be implemented + protocols. Estimated budget and schedule.	Sampling plan			
Instrumentation of boats and data collection through adapted protocols In close connection with armaments	Instrumented boats Mission report			
Data capitalization and construction of a complete and good quality environmental grid. Build on existing IS allow time for modelling to build grids and process data Capitalisation of the collected data, availability of the grid to the scientific community and partners.	Environmental grid			

Pilots / Partners (role of each):

Necessary conditions for implementation:

-Time and manpower of qualified personnel in each of the structures to ensure the supervision of the program, the collection and processing of data.

-An agreement with the shipping companies to exploit ships.

-Financial means to buy the instruments.

Provisional ten years schedule for operations:

Operation name/ Tasks	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Carrying out a sampling plan on the SIOFA area										
Instrumentalisation of vessels and implementation of protocols										
Data capitalization and construction of a complete and good quality environmental grid										

12-Establish the inventory and mapping of marine habitats

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: An improvement in the knowledge needed to define management actions on marine habitats.

Link with antoher action:
" Implement measures to limit by-catch and incidental catches ".

Geographical area(s) concerned: SIOFA area

Description of the Action:

Context/ Reasons for action:

The SIOFA area covers a large part of the Indian Ocean, particularly in the south. Geomorphological and oceanographic characteristics and the limited biological data available predict the existence of rich but vulnerable benthic and pelagic marine habitats that support endemic and threatened species, some of which are "keystone species" of marine ecosystems. However, our knowledge of the pelagic and benthic environments in the SIOFA zone remains too fragmented or even non-existent and we don't yet have a mapping of these habitats to set up appropriate zoning or technical prescriptions on site, that is why it is essential to implement a precautionary approach.

Global description of the action

The objective is therefore to implement the studies necessary for the acquisition of data on marine habitats, in particular through inventories, but also through the use of photography and video, in order to obtain a mapping of benthic habitats, pelagic habitats and substrates in the SIOFA area. Priority will be given to mapping (modelling) the areas likely to be impacted by fishing, in order to ensure the proper adequacy of the regulations to maintain sustainable fishing and areas concerning proposed protected sites. This action must be linked to a data acquisition program through fisheries observers. Due to their interface position and the possibility of local natural or anthropogenic disturbance (frequentation, new uses), seamounts bottoms will also have to be surveyed whenever this is compatible with a scientific program.

Expected results of the Action:

To have a mapping of benthic and pelagic habitats in the SIOFA area

Action Indicators:

Maps available: almost non-existent for the SIOFA area

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Synthesis and analysis of fisheries data *(To be carried out as part of the operation to capitalise and enhance accidental catch data)*	Synthesis (if possible mapped) of fishing data			
Establishment of the typology of marine habitats	Typology of marine habitats			
Inventory campaigns on pelagic species to be defined to address identified knowledge gaps *Geographical priorities: protected seamounts + fishing area*	Campaign report, inventory			
Seamount surveys of benthic invertebrate inventories to be defined to address identified knowledge gaps	Campaign report, inventory			
Offshore inventory campaigns on benthic invertebrates to be defined to address identified knowledge gaps	Campaign report, inventory			
Mapping of substrate types	Substrate map			
Mapping and modelling the distribution of seamounts benthic habitats	Mapping of marine habitats in the SIOFA area			
Mapping and modelling the distribution of offshore benthic habitats	Mapping of marine habitats in the SIOFA area			
Mapping and modelling the distribution of pelagic marine habitats	Mapping of marine habitats in the SIOFA area			

Pilots / Partners (role of each) :

Necessary conditions for implementation:
This action requires sufficient financial resources to set up data acquisition campaigns and the human resources (time and skills) necessary to process them. The final mapping step is dependent on the results of all previous operations

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Synthesis and analysis of fisheries data (to be carried out as part of the operation to capitalise on and exploit accidental catch data)										
Establishment of the typology of marine habitats										
Inventory campaigns on pelagic species										
Seamounts inventory campaigns on benthic invertebrates										
Offshore benthic invertebrate inventory campaigns										
Mapping and modelling the distribution of seamounts benthic habitats										
Mapping and modelling the distribution of offshore benthic habitats										

13-Identify benthic taxa and assemblage with heritage value

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: An improvement in the knowledge needed to define management actions on marine habitats.

Link with antoher action: " Establish the inventory and mapping of marine habitats "

Geographical area(s) concerned: SIOFA area

Description of the Action:

Context/ Reasons for action:

Knowledge of benthic taxa and assemblages is very limited in SIOFA area. The data may initially be collected by the program for the acquisition of fisheries data by controllers. Some benthic species are locally within the SIOFA area, for example on some seamounts, and it is suspected that many of these taxa structuring benthic habitats are threatened (global changes, fishing).

Global description of the action:

In continuity with the action "establish an inventory and mapping of marine habitats" and following the acquisition of data on benthic taxa, the objective of the action is to identify taxa and benthic assemblages for which measures to reduce the impacts of fisheries and improve their conservation should be implemented. Pressures on these taxa will have to be identified and management recommendations defined. This action is intended to be continuous, allowing the list to be updated regularly according to new data available.

Expected results of the Action:
Have a prioritized list of taxa and benthic assemblages to implement appropriate management measures.

Deliverables:
A prioritized list of taxa and benthic assemblages with a description of pressures and management recommendations for each entry

Action Indicators:

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Benthic data acquisition	Campaign report, inventory			
Identify benthic taxa and heritage assemblages	Study report			
Mapping and modelling of benthic heritage assemblages	map			

Pilot / Partners (Roles of each) TO BE DEFINED

Conditions necessary for the implementation of the action:
For this action, manpower time will be needed, in particular for the scientific coordinator.

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Benthic data acquisition										
Identify benthic taxa and heritage assemblages										
Mapping and modelling of benthic heritage assemblages										

14-Monitor the impact of fishing on benthic marine ecosystems

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: An improvement in the knowledge needed to define management actions on marine habitats

Link with antoher action: « Establish the inventory and mapping of marine habitats »

Geographical area(s) concerned : SIOFA area

Description of the Action :

Context/ Reasons for action:

The marine ecosystems of the SIOFA area are home to rich and diverse species communities. These ecosystems face different pressures linked to global changes (changes in marine currents and fronts, changes in salinity, temperature, acidification, seasonal shifts, etc.) but also linked to fishing (exploitation of resources, habitat degradation, possibility of the establishment of exotic species, etc.). Knowledge about the resilience and resistance of these ecosystems is insufficient to plan for the long-term impacts of these pressures and the management directions to be considered to mitigate them. A program should be put in place to monitor the state of conservation of important seamounts.

Global description of the action

The action aims to set up and maintain a coherent and representative network of observatories for the conservation of benthic domains (coastal and offshore) in the SIOFA area. The analysis of long-term data from these observatories should support informed management in the SIOFA area based on objective scientific data. Particular attention will be paid to the protected seamounts.

Expected results of the Action:

A network of marine observatories to monitor the conservation status of offshore and seamounts benthic environments
Management decision-making tools and regulations

Action Indicators:

Number of observatories developed
Ratio number of observatories recorded each year/number of observatories
Number of mission and scientific reports submitted by the partner laboratories of the action

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Identification of a relevant network of observatories	Mapping of a provisional observatory network with priority level Development plan (budget and provisional planning) + biannual update			
Development of the high seas and seamounts observatories *Ensure the necessary conditions for the development of observatories (means at sea and human, financial) and for the analysis of the data collected (human and financial).* *Development of observatories according to the necessary network identified* *Development of international partnerships where necessary*.	Observatories installed Mission reports/Annual activity reports			
Achievement of a zero state on marine areas of enhanced protection and implementation of monitoring	Activity report			
Analysis and monitoring of the state of conservation of marine ecosystems and development of recommendations to adapt management actions and regulations	Annual scientific reports			

Pilots / Partners (role of each):

Necessary conditions for implementation:
Qualified staff time and manpower in each of the structures to provide program supervision and scientific expertise. Recruitment of divers for data collection and personnel for post-processing (doctoral type). Means at sea and sufficient funding to set up the observatories and ensure annual monitoring. Have an inventory and mapping of marine habitats + bathymetry

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Identification of a relevant and feasible network of observatories in seamounts and offshore areas										
-> Mapping of the prioritized provisional observatory network and provisional budget and planning										
-> Update of the development plan and maintenance of the observatories										
Development of the high seas and seamounts observatories in connection with international networks										
Zero reporting on marine areas of enhanced protection and monitoring										
Analysis and monitoring of the state of conservation of marine ecosystems and recommendations for management										

15-Establish the inventory and mapping of essential functional zones (spawning grounds, nurseries, primary and secondary production areas, etc.)

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: Improvement of the knowledge needed to define management actions in key functional areas.

Link with another action: " Establish the inventory and mapping of marine habitats " " Monitor the impact of fishing on benthic marine ecosystems " ;" Stock assessment of exploited marine resources to define appropriate harvest levels "

Geographical area(s) concerned: SIOFA area

Description of the Action:

Context/ Reasons for action:

The SIOFA area covers a large part of the Indian Ocean, particularly in the south. The geomorphological and oceanographic characteristics allow the development of areas of high primary and secondary productivity, allowing the feeding of all marine species in the SIOFA area and more broadly in the Indian Ocean. Many of these species breed in the waters of the SIOFA area. The identification, location and understanding of spawning grounds, feeding grounds and primary and secondary productivity areas are not yet carried out in the SIOFA area. However, this information is essential for updating technical fishing requirements in order to ensure sustainable management of resources and limit by-catches.

Global description of the action

The objective is therefore to implement the studies necessary for the acquisition and processing of data on functional areas. This will include studies on food webs, processing and analysis of previous oceanographic surveys, organization of new surveys, modelling and mapping of essential functional areas (spawning grounds, primary and secondary production areas, nurseries...). This action must be linked to a data acquisition program through a fisheries controller.

Expected results of the Action:

To have a mapping of the essential functional areas for the SIOFA area.

Action Indicators:

% of the area studied for the SIOFA area (???)

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Study of benthic and pelagic trophic relationships	Study report			
Elaboration of a sampling campaign plan on the priority areas/issues identified and implementation. *To be shared with the "Establish an inventory and mapping of marine habitats" actions "Set up campaigns to assess the marine resources exploited in all districts".* *Priority on, fishing areas, protected seamounts* *Update of the campaign plan at mid-term.*	Campaign plan Campaign report			
Characterisation, modelling and mapping of essential functional areas	Mapping of functional areas in the SIOFA area			

Pilots / Partners (role of each):

Conditions necessary for the implementation of the action:

This action requires sufficient financial resources to set up data acquisition campaigns and the human resources (time and skills) necessary to process them. It is also dependent on the implementation of knowledge acquisition campaigns at sea. The final mapping step is dependent on the results of all previous operations.

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Study of benthic and pelagic trophic relationships										
Elaboration of a sampling campaign plan on the priority areas/issues identified and implementation:										
-> Elaboration of the sampling campaign plan *Priority on fishing areas and protected seamounts*										
-> Implementation of the sampling campaign *To be shared with the "benthic and pelagic species inventories" and "Set up campaigns to assess the marine resources exploited in all districts" campaigns*										
Characterisation, modelling and mapping of essential functional areas *Identification of areas of ecological interest*										

16-Identify pressures on the marine environment and assess their impacts

Main issue: Sustainable exploitation of marine resources

Long-term objective: Know the diversity and richness of marine species and ecosystems in order to better protect, conserve them and reduce the impact of fishing on them

Operational Objective: An improvement in the knowledge needed to define management actions on the sensitivity and vulnerability of marine habitats.

Link with antoher action : " Monitor and evaluate the impacts of fisheries on bycatch and incidental catches ; " Collect and manage data from commercial fisheries ".

Geographical area(s) concerned : SIOFA area

Description of the Action :

- *Context/ Reasons for action:*

The marine natural heritage of the SIOFA area is composed of rich ecosystems, sensitive to pressures related to global changes (temperature increase, salinity, acidification, front movements, etc.) and human activities (fishing, pollution, tourism, etc.). Understanding the nature of these pressures and their impacts on marine ecosystems is essential to better plan the management and conservation of these ecosystems. To date, data on these pressures are limited, fishing data are collected but data on other human activities are hardly available.

- *Global description of the action*

The objective of this action is to be able to identify and characterize pressures on marine ecosystems by capitalizing on existing data and developing new protocols if necessary. Research programs will be developed to study each of these pressures and their impacts in order to provide management recommendations. This action will be carried out in close collaboration with other actions related to the impacts of fisheries.

Expected results of the Action:
Understand the pressures and their impacts on the marine environment in the SIOFA area.

Action Indicators :
?

Operations associated with the action:

Operation name	Deliverables	Faisability	Pilots	Partners
Categorisation and description of the different sources of pressure, identification of available data and additional studies to be carried out	Report containing the list of pressures, description, impacts, identification of available data and additional studies to be carried out			
Studies on pressures on marine environments	Status report on pressures on marine environments (N5) (description, impacts and management recommendations) Review report on the state of play on pressures on marine environments (N10)			

Pilots / Partners (role of each) :

Necessary conditions for implementation:
Specify here all material and immaterial conditions necessary for the implementation of operations to carry out the action. The elements mentioned here reflect the feasibility criteria identified in the table. However, they can be detailed and written here to provide a better understanding and better identify the difficulties to be addressed.
This action requires the mobilization of qualified people working on these issues. Financial resources may be required to finance an intern or person to carry out the first operation

Provisional ten years schedule for operations:

Operation	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
Catégorisation et description des différentes sources de pressions										
-> Etat des lieux des pressions sur les milieux marins										
-> Révision de l'état des lieux des pressions sur les milieux marins										