OCEANIC
DÉVELOPPEMENT

Development of a framework document and an action plan for the improvement of the industrial shrimp fishery in Madagascar

FINAL REPORT

MAY 2015

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List of acronyms

AMP	Aire Marine Protégée
AMPA	Agence Malgache de la Pêche et de l'Aquaculture
BRD	By-catch Reduction Device
BV	Blue Ventures
CEDP	Centre d'Etudes et de Développement des Pêches (ex PNRC)
CNRO	Centre National de Recherches Océanographiques
CSP	Centre de Surveillance des Pêches
DGP	Direction Générale de la Pêche
DGPDD	Direction Générale du Partenariat et du Développement Durable
DRRHP	Directions Régionales des Ressources Halieutiques et de la Pêche
FIP	Fishery Improvement Project
GAPCM	Groupement des Aquaculteurs et Pêcheurs de Crevettes de Madagascar
IHSM	Institut Halieutique et des Sciences Marines
LMMA	Aires Marines Localement Gérées
MEEMF	Ministère de l'Environnement, de l'Ecologie, de la Mer et des Forêts
MRHP	Ministère des Ressources Halieutiques et de la Pêche
MSC	Marine Stewardship Council
OEPA	Observatoire Economique des Pêches et de l'Aquaculture (ex OEFC)
OEFC	Observatoire Economique de la Filière Crevette
PACP	Programme d'Appui aux Communautés de Pêcheurs
PCI	Pêche Crevettière Industrielle
PCT	Pêche Crevettière Traditionnelle
PGDRC	Projet d'Appui à la Gestion Durable de la Ressource Crevettière
PNRC	Programme National de Recherche Crevettière
TED	Turtle Extruder Device (Dispositif d'Echappement des Tortues)
WCS	Wildlife Conservation Society
WWF	Fonds Mondial pour la Nature
ZAC	Zone d'Aménagement Concerté
ZCBS	Zone Crevettière Biologiquement Sensible

SECTION 1 - INTRODUCTION

Introduction

Background to the fisheries

Management of the fisheries

1. Introduction

A memorandum of understanding was signed on 11.11.2014 between the Ministry of Water Resources and Fisheries - MRHP, the Group of Fish Farmers and Shrimp Fishers of Madagascar - GAPCM, and WWF Program in Madagascar and in Western Indian Ocean - WWF, with a view to the realization of a Fisheries Improvement Project (FIP) for the industrial shrimp fishery in Madagascar.

The MOU provides for three stages entitled respectively i) framing, ii) development of an action plan, and iii) implementation and monitoring of the progress.

In October 2014, after a selection process, WWF chose Oceanic Développement to undertake the first step, namely update the fishery diagnosis conducted in 2009 and the development of a draft action plan.

This project was submitted to the various stakeholders in shrimp fishery (Ministry and associated agencies, shrimp fishing industries, NGOs) in the winter of 2015. It was discussed, amended and validated during a workshop held in Antananarivo on 5 and 6 May 2015 (Appendices 2 and 3).

The report includes four parts:

- A contextualization of fisheries describing the policy framework and the evolution of the fishery in terms of catch and structures;
- The management framework;
- A fishery analysis template based on the MSC principles and criteria (version 1.3);
- An action plan based on the principles governing the Fishery Improvement Projects, FIP; this action plan is initially based on the results of the evaluation grid. As such, it was adjusted according to the opinion of the participants during the workshop

2. Background to the fishery

2.1. Policy framework

In the framework of the Comprehensive Program for the Development of African Agriculture (CAADP) of the New Partnership for Africa's Development (NEPAD), the Republic of Madagascar developed and adopted in October 2013 a Sector Programme for Agriculture, Livestock and Fisheries (PSAEP).

The challenges identified by the PSAEP include i) gradually achieve a short-term balance between the fight against poverty and growth; ii) achieve rapid productivity growth; iii) establish transparency in the governance of resources and production spaces; iv) take into account in the actions the environmental aspect, the climate change and the sustainable management of resources; and v) work in view of repositioning Madagascar export outside niche markets.

The PSAEP must be implemented over the 2014-2025 period, with five Specific Objectives, namely i) ensure the sustainability of resource use; ii) improve productivity and promote competitive production systems; iii) contribute to food and nutrition security, and reduce risk for the most vulnerable; iv) increase access to national markets and promote the repositioning of the Malagasy exports; and v) improve governance institutions and enhance the empowerment of actors.

The PSAEP process provides the formulation of policy letters that will develop the implementation of guidelines in each subsector.

Among the proposed reforms is the updating and adoption of the Fisheries Act, whose adoption was expected after the validation workshop of the bill which took place on 20 and 21 November 2014.

So it should be stressed that at the time of the realization of this consultation, the Fishing Sector Policy Letter and the new Fisheries Act have not yet been finalized or adopted.

2.2. The resource - target species and by-catch species

The biology of the target species for industrial shrimp fishery in coastal Madagascar has been widely described and there has not been any new element to this issue since the pre-assessment of the fishery conducted in 2009

The only elements worth developing here are: i) environmental factors that may explain the decrease in abundance of shrimp and ii) the by-catch growing importance in the industrial fishery, including mainly bony fish more or less specific to the same habitats.

- Environmental factors

Regarding environmental factors, the various stakeholders consulted unanimously cite first a considerable degradation of the mangroves in the north-western coast of Madagascar in recent years. This phenomenon, already noted by the previous pre-assessment, seems to have worsened to the point of leading to drastic measures, including a total and unrestricted ban on cutting mangrove trees at the end of 2014. Although it was applicable, such a measure could not be maintained for long without causing many crises at a very high local level given the number of communities who depend on mangroves for their subsistence, particularly firewood and timber, and on the collection of shellfish and other crustaceans such as crabs. The scale of this phenomenon largely exceeds the framework of this assessment, of course, but the importance of mangroves in the life cycle of penaeid shrimp should be kept in mind.

The second environmental factor quoted by the stakeholders interviewed during the mission is far more imprecise and concerns the climate change as a whole, generally referred to as "global warming". These phenomena, because it is global, are still very difficult to assess at the local level and particularly in the tropics. They could affect growth and reproductive cycles of some species under the effect of the change in terms of physicochemical parameters (temperature changes, acidification of ocean water, etc.) or even the spatiotemporal distribution of species

and food webs. The extent of these effects is now beyond the scope of existing resources and methods.

A third assumption is finally proposed by some stakeholders in the fishery to explain the decrease in the abundance of coastal shrimp: the long-term effects of some large-scale accidental disturbances, including the earthquake in 2004 in Indonesia and the subsequent tsunami across the Indian Ocean. For the time being, no evidence supports this hypothesis

- Biology of the PCI by-catch species

In recent years, fishing industries have developed strategies to further increase the volumes of catch. This strategy is not the same for all ship owners but it enjoys the regulations are flexible in so far as the volumes of fish landed are equivalent (or even higher) to the quantities of shrimp caught. This regulation is not in fact imposed for each tide, but must be globally respected by each vessel for the fishing season, allowing captains to focus more on the conservation of shrimp in times of greater abundance (generally at the beginning of the campaign) and keep larger quantities of fish when shrimp yields decline (toward the end of the season).

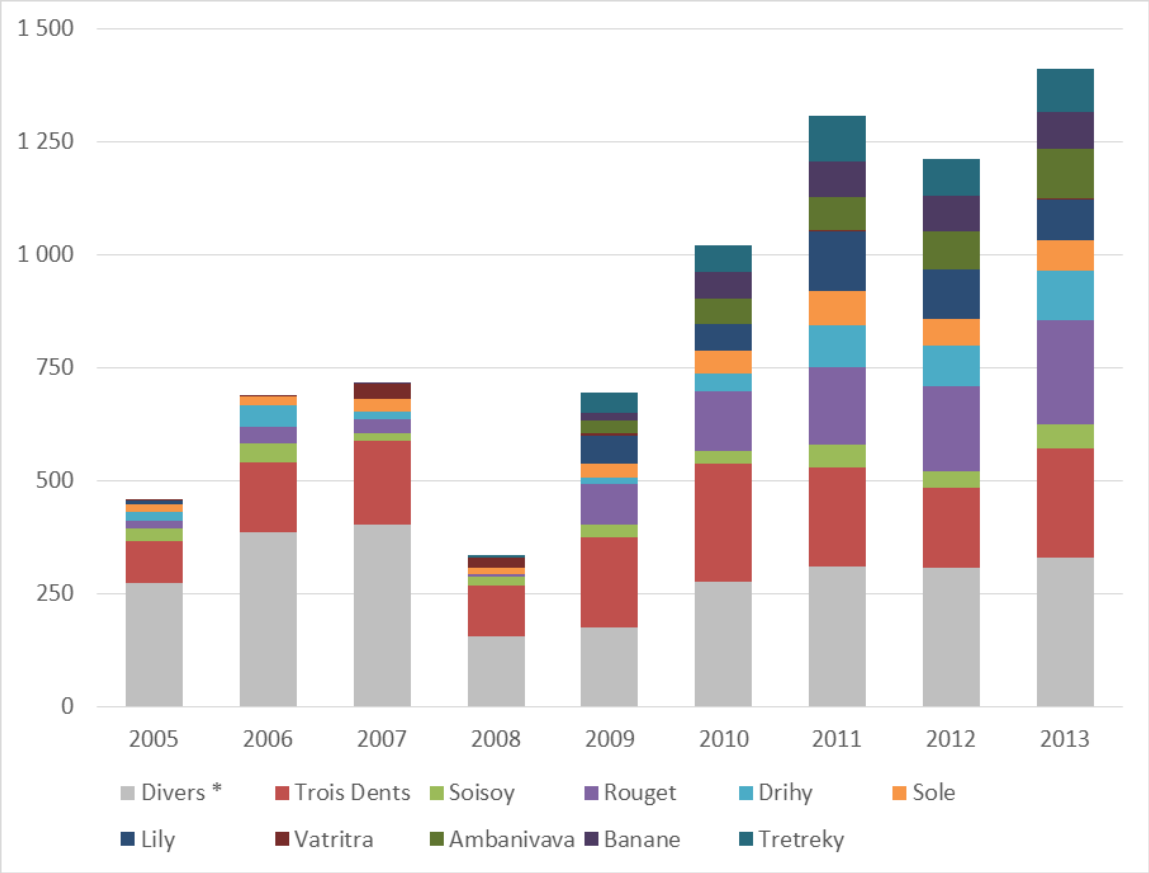
However, some fishing industries like REFRIGEPECHE have chosen to focus on the growing demand of the national and regional fish market, and have created companies specialized in the processing, storage and distribution of fish. REFRIGEPECHE OUEST Company helps to supply the domestic fish market (Antananarivo and major cities in the west) through its subsidiary SOPROMER. The data provided by this company cover all by-catch made on the west coast (zones A, B and C) and kept for the whole period 2005-2013.

Tab. 1. –REFRIGEPECHE Evolution of the share of by-catch kept and species

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Share of non-sorted by-catch kept	43,4%	46,3%	45,1%	39,1%	11,1%	11,3%	8,9%	9,6%	7,7%
Number of species kept representing more than 3% of the by-catch	8	5	4	5	8	11	11	11	12

Source : REFRIGEPECHE OUEST / SOPROMER

Figure 1. Fish conserved on board of REFRIGEPECHE OUEST trawlers (in tons)



* Divers =unsorted species or representing less than 3% of by-catch species over the entire season

Source : REFRIGEPECHE OUEST / SOPROMER

These data lead to some important observations on the evolution of the fishery over the past decade:

- There is a steady increase in volumes of fish kept, especially after 2009;
- The share of ungraded fish, that is to say, the species conserved but not sorted, also declined steadily in proportion (40-45% from 2005 to 2008, 11% in 2009 and 2010, less than 10% since 2011);
- The number of species retained and sorted for marketing has increased significantly over the same period (4 to 8 species until 2009, more than 10 species since 2010).

Note that most of these species reach relatively small sizes which, according to the company that has supplied the data, perfectly meet the local market demand.

One should, however, wonder whether the low abundance of large-size fish in the catch is related to the nature of the industrial fishing areas (very soft bottom), to the declining abundance in the ecosystem caused by overexploitation of resources, or to the effect of BRD.

Tab. 2. – Eléments de biologie des principales espèces de poissons conservées

Nom Local	Nom scientifique	Taille de capture	Résilience	Vulnérabilité	Prédateur de Crevette
Trois Dents	Otolithes ruber	40 cm	Average	Moderate	Yesi
Soisoy	Pomadasys argenteus	25 cm	Average	Moderate	Yesi
Rouget	Upeneus spp.	20 cm	High	Low	Yesi
Drihy	Terapontidae	20-25 cm	Average -high	Low to moderate	Yesi
Sole	Psettodes erumei	50 cm	Average	Low to moderate	Yesi
Lily	Leiognathus equulus	20 cm	High	Low	Yesi
Vatritra	Trichiurus lepturus	100 cm	Average	Moderate to high	Yesi
	Chirocentridae	60 cm	Average	Medium to high	?
Ambanivava	Johnius dussumeri	14 cm	High	Low	Yesi
	Leptomelanosoma indicum	80 cm	Average	High	Yesi
	Polydactylus plebeius	30 cm	High	Medium to high	Yesi
	Polydactylus sextarius	20 cm	High	Poor	Yesi
Banane	Albula glossodonta	-	Average	Medium to high	Yesi
Tretreky	Monodactylus argenteus	12 cm	-	Poor	Yesi

Source : REFRIGEPECHE OUEST / SOPROMER and FishBase

These data relating to only one fishing company may not reflect the general trend of industrial shrimp fleet. However, on at least one point, they are supported by the CSP data that break down the overall catch of the shrimp fleet over the 2007 to 2012 period, and show a steady decline in the quantity of catch thrown back into the sea/ Not retained.

Tab. 3 – Evolution of the composition of the catches in the industrial shrimp fishery composition de composition (trawlers) in %

	2007	2008	2009	2010	2011	2012
Targets	48,95	49,83	60,80	49,15	58,45	42,92
Others conserved	25,61	27,08	20,17	30,93	25,45	41,58
Discard	26,47	22,97	20,14	19,93	16,10	15,07

Source : CSP 2012

More importantly in the context of an assessment of the fishery for MSC certification, it must be stressed that most by-catch species have a rather high resilience (combination of biological characteristics related to longevity, age at sexual maturity and fertility) and are fairly vulnerable to fishing (the capability of the stock to rebuild under sustained operating conditions).

It is also interesting to note that all these species are known to be macrophages or first or second grade predators, and they're all expected to have shrimp in their diet. The fishing pressure on these species becomes clearly an issue for the shrimp fishery itself and it is essential to further study the matter in the shortest time possible, and to commit resources to study finer food networks in the area (and EcoTroph EwE models, for example).

It is also appropriate to compare these data with those produced by the IRD in a study on by-catch in 2005 and 2006 (IRD, 2008). Among the main species kept in zones B and C then recorded *Pomadasys maculatum, Saurida micropectoralis, Nemipterus bipunctatus* and *Pomadasys argenteus*, many of which seem to have disappeared from the catches.

2.3. Evolution of the fishery

- Industrial and small-scale shrimp fishing

The history of the shrimp trawl fishery has been widely documented in the Project to Support Sustainable Resource Management shrimp (PGDRC), funded by the French Development Agency, and several syntheses were made, including fishery in the pre-evaluation exercise conducted in 2009 and during the day of reflection for the recovery of shrimp fishing, held in Mahajanga in February 2013.

Here we will resume some key elements of the recent developments in the industrial fishery, since the said craft segment, operated by trawlers under 11 meters, completely disappeared in 2010.

The number of permits for industrial trawlers still set by the Decree 2007-957 and it is 59 for the west coast, that is to say the management areas A, B and C. All these licenses were still used in 2009, but the economic situation of Member arms GAPCM quickly led in recent years to a downturn in the flotilla to the south, that is to say the area C. in 2014, the zones a and B were no longer used by 13% of the fleet, against 22% in 2007 and 29% in 2000. According to the latest information obtained from the Member GAPCM, one weapons operated in 2014 in area A, and the pursuit this activity in 2015 requires restoration measures of the resource in this area.

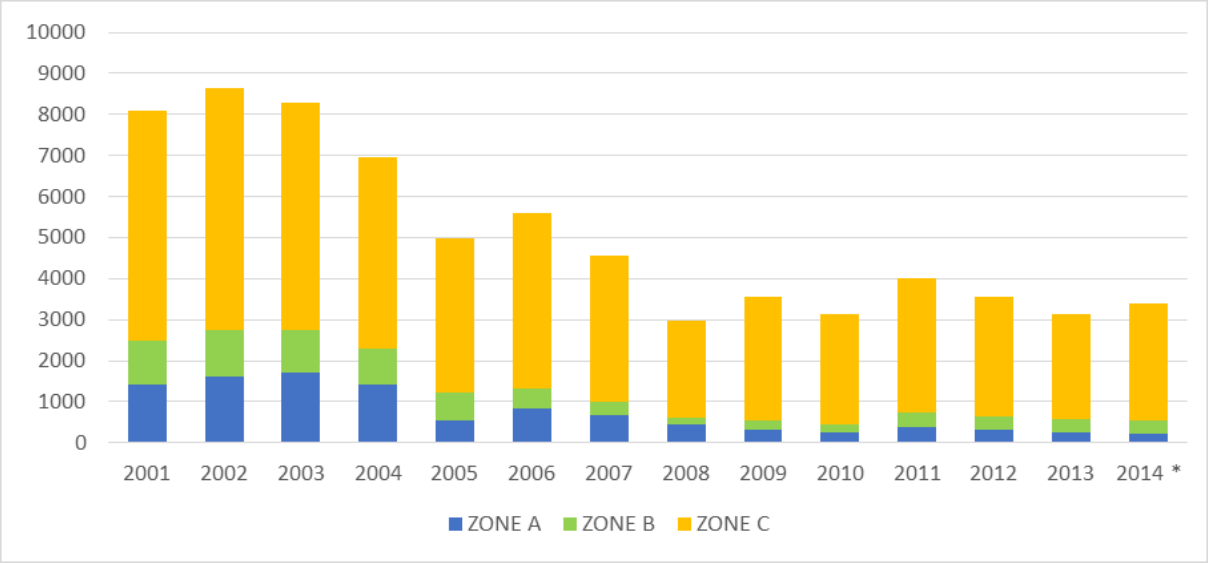
Tab. 3 – Evolution of the industrial ships operating in the east coast area

Navires Industrial vessels	A	B	C	West Coast
2000	10	8	45	63
2007	7	6	46	59
2014	2	3	33	38
Variation 2014/2007	-71%	-50%	-28%	-36%

Sources : Oceanic Développement 2003, Moody Marine 2009, GAPCM

With respect to the catches, the data provided by the Economic Observatory of Fishing and Aquaculture (OEPA), cover the period from 2001 to 2014 and give their breakdown by area (see Figure 2).

Figure 2. Industrial fisheries catches on the West Coast (in tons)

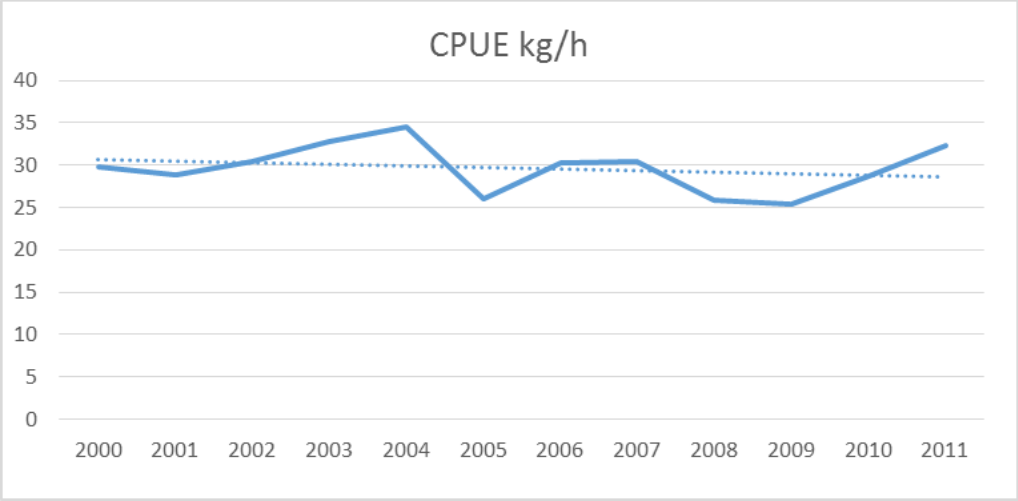


Source : OEPA

The minimum catch on the west coast seems to have been reached in 2008, down to under the 3,000 tons threshold. Since, apart from a slight increase to 4,000 tons in 2011, annual catches remain between 3,000 and 3,500 tons.

The yields of the industrial fleet can be calculated from data provided by the EDPS and the OEPA in the period from 1967 to 2011 (GAPCM, 2013). These data do not distinguish the fishing effort for the various management areas (A, B and C) of the west coast, but can analyze the overall trend. During the 2000s, we see that these yields are relatively stable at around 30 kg per hour of fishing (see Figure 3), which can be explained by the rapid reduction in fishing capacity of 63-39 vessels.

Figure 3. Shrimp catches by effort unit in the industrial fishery



Sources: Rafalimanana T. (2000) ; OEFC (2010)

The information provided by GAPCM Members reveals that the yields are most important for two to three months after fishing are resumed f after the three-month closing period introduced in 2007 (biological rest period from 1 December to 1 March) regarding all segments, including traditional fishing.

- Traditional fishing

Traditional fishing has been described by several authors in the early 2000s (IRD, 2008). One of the fishery monitoring systems was proposed as part of the PNRC and continues to be implemented by the CEDP using the same methodology.

This system is based on an estimate of fishing effort by counting canoes outputs by gear, catch estimates by gear and output through landing surveys, and surveys that provide frameworks extrapolation factors to estimate the total volumes of catches per machine.

The findings of this monitoring system are very approximate and the extrapolations do not take into account the recent evolution of the traditional fishery, particularly the significant increase in the number of fishing units and the modification of some gears (smaller meshes). Moreover, the estimate of the actual fishing effort does not seem to take into account the nature of certain techniques which are operational only for a limited period, subject to the tides for example.

All this contributes to recommend an evaluation of the system and its improvement in order to provide more accurate estimates of the impact of the traditional fishery.

The estimation of the traditional fishing catches should be complementarily addressed through monitoring of product flows, including that provided by the collectors of networks directly from fishing grounds. This control seems increasingly difficult to achieve given the increase in the number of permits issued to collectors which grew by 50% between 2009 and 2013.

Tab. 4. – Collection permits issued

	Permits
2009	879
2010	897
2011	968
2012	1142
2013	1314

Source : CSP

3. Management of fishery

3.1. Institutional framework

The Ministry of Fisheries was restructured in 2013 to become the Ministry of Water Resources and Fisheries (MRHP) (Decree 2014-298 of 13 May 2014).

Significant progress was also made in 2012, including access to the status of a Public Administrative Institution (EPA in French) for several bodies previously placed within the Ministry or under the authority of a Directorate. These include the Fisheries Monitoring Centre (FMC), the Economic Observatory of Fishing and Aquaculture (OEPA, ex OEFC) and the Centre for Studies and Fisheries Development (CEDP, ex PNRC). Note that for these two bodies, whose mandate was exclusively related to the shrimp fishery, access to the status of EPA also corresponds to an extension of their responsibilities to all fishing and aquaculture sectors.

The CSP is seen confirming its duties and powers by Decree 2012-770, which also specifies internal operation as that EPA, including the composition of its Board of Directors.

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OEPA has now a Board of Directors that defines its internal operation, its program and its annual budget. Unlike the Economic Observatory of the shrimp sector whom it has taken over, the OEPA is responsible for both the fishing and aquaculture sectors.

CEDP also sees its operation governed by a Board of Directors and its powers expanded compared to the PNRC; it has inherited inadequate equipment and particularly low level human resources, (Decree 2013-552 dissolving the PNRC). CEDP is now in charge of research applied to all fishing and aquaculture sectors by virtue of Decree 2012-767.

It would be highly desirable for the MRHP to adopt powerful advisory bodies able to assume the management functions of the shrimp fishery as a co-management technique, open to the industry and gradually to representatives of traditional fishing.

In the early 2000s, the creation of a Concerted Development Zones (ZAC) was planned. This project established five cooperatives and associations of fishermen in Ampangahia and another six in the village of Ambavanankarana. Some training on fishing was provided. This project began the implementation of an overall internal organization of fishermen

This ZAC experience seems to have paid off: it is at the origin of the start of the traditional fishermen's internal organization. It could be revitalized as part of the traditional fishing structuring process.

3.2. Regulation

In the context of political instability that characterized the period from 2009 to 2012, it seems normal that some new regulations have been taken.

Since 2012, the most important project undertaken has been of course related to the full scale revision of the Fisheries Act, whose adoption was expected in early 2015. It seems essential to consider the strong developments in the sector and the new institutional requirements that its management involves, both in the legal framework and the future implementing decrees.

SECTION 2 –FRAMEWORK DOCUMENT

Simplified assessment in the light of MSC principles and criteria

Results of the analysis: elements of the fisheries performance in the light of MSC principles and criteria

Simplified assessment in the light of MSC principles and criteria

The current assessment is in line with the evaluation grid developed by MSC. The 2009 pre-assessment followed the same approach. The grid has been modified and criteria reformulated since this pre-assessment, while 31 performance indicators (PI) have been retained. The description of PI used here, translated into French for this study, corresponds to the version 1.3 of MSC evaluation model. The multiple elements corresponding to each one of the PI have not been reproduced since this study requires more general analysis of fisheries compared with PI; however, they have been addressed in the comments.

The analysis is in line with the basic grid. For some aspects of fisheries, and mainly by-catch species (retained and discarded), by the Risk Bases Framework, RBF, will have to be used in the context of a certification. This approach uses a SICA analysis (*Scale, Intensity and Consequence Analysis* which requires information on the spatial and temporal dynamics of fisheries, structures of size/age and on species reproduction, and a PSA analysis (*Productivity, Susceptibility Analysis*) which requires biological data on fished species. In both cases, there is no data on by-catch species, as noted in the assessment. Therefore these analyses have not been considered, but it will be necessary to keep this aspect in mind for the action plan. The elements which appear to require action are indicated in ***italic and bold***.

PRINCIPLE 1 – HEALTH OF EXPLOITED STOCKS

Performance Indicator	2009 Assessment	2014 Assessment
P.I. 1.1.1 The stock is at a level which maintains high productivity and which shows a weak probability of overexploitation of recruitment.	The risk is high unlikelihood of fishing leading to an overexploitation of recruitment because of: ▪ The reduction of industrial fishery fishing effort; ▪ The trawling area which represents 43% of the shrimp distribution area; ▪ The very fast life cycle of shrimps. However, the catch of post-larvae and juveniles has a negative impact on recruitment in trawling fishery and results in a yield reduction. In conclusion, and in spite of the effect of traditional fishery, it appears highly probable that the rebuilding capacity of stock is	A shrimp stock assessment was carried out in 2013[1]. To determine the stock state, a per ratio approach was proposed. It supposes catches to be proportional to the biomass. Stocks are classified compared with the historic maximum of catches. The historic peak for the period considered (1967-2011) is estimated at 9,031 T, while the captures for the period 2009-2011 are estimated at 3,570 T, i.e. 39.5 % of the historic value. According to the selected criteria, stocks are declining. This decline is very sharp in zones A and B (respectively 14 and 16% of the historic maxima), and less in zone C (50 %). An estimate of the recruitment was carried out based on cohort analysis of *Fenneropenaeus indicus*[2] species on zone A. This analysis indicates a decrease in recruitment between 2001 and 2011, as much for the females (157 to 80 million individuals) as for the males (148 to 47). Taking into account the natural fluctuations of recruitment, its is difficult to draw definitive conclusions on this, but this strong signal is of real concern. The reasons of the decline are not clear. Traditional fishery, and particularly by illegal gears, catches a great quantity of post-larvae and also small males, which distorts the sex ratio in favour of females and

[1] Razafindrakoto, H.L. 2013. Coastal peneide shrimp stocks exploited in Madagascar: situations. Reflection day for the recovery of shrimp fishery. Ministry of living aquatic resources and fisheries – Group of shrimp Aquaculture and Fishery operators of Madagascar. Mahajanga, February 22, 2013.

[2] Razafindrakoto, H.L. 2013.Coastal peneide shrimp stocks exploited in Madagascar: situations. Reflection day for the recovery of shrimp fishery. Ministry of living aquatic resources and fisheries – Group of shrimp Aquaculture and Fishery operators of Madagascar. Mahajanga, February 22, 2013.

<table>
<tr>
<td></td>
<td>above the level under which recruitment would be compromised.</td>
<td>could affect the reproductive capacity.
According to the report produced in 2013[3], the non-selective gears in zone A would have captured, in 2010, 769 tons of shrimps of 3.5 g average weight.
Environmental factors, such as mangrove deforestation, could also be involved.
In addition, the stock in zone A may be considered as "economically extinct" for industrial fishing, since currently, trawlers do not operate in the zone any longer.

It seems obvious that the situation has degraded since 2009. Taking into account the illegal traditional fisheries catches, the risk of an overexploitation of recruitment cannot be excluded any more.</td>
</tr>
<tr>
<td>P.I. 1.1.2
The limit and target reference points are appropriate for the stock.</td>
<td>Several assessments of the Maximum Sustainable Yield (MSY) were carried out, using production surplus models (Schaeffer and Fox) by various researchers (1972, 1973, 1978, 1984, 1987, 1989, 1996).
The averages of these various assessments gave the following MSY: zone A = 1,490 T; zone B = 1,560 T; zone C = 5,147 T (total = 8,197 T). The fishing potentials mentioned in decree 2007-957</td>
<td>A new assessment, using Schaefer and Fox production surplus models, was produced in the course of the reflection day of 2013[4]. The time series used extends from 1967 to 2011.
The MSY values obtained are:

<table>
<tr><td>ZONE</td><td>Schaefer</td><td>Fox</td></tr>
<tr><td>A</td><td>1,941</td><td>2,301</td></tr>
<tr><td>B</td><td>1,182</td><td>1,509</td></tr>
<tr><td>C</td><td>5,245</td><td>6,946</td></tr>
<tr><td>Total</td><td>8,368</td><td>10,756</td></tr>
</table>

These values are within the orders of magnitudes of preceding values.</td>
</tr>
</table>

[3]Randriamiarisoa. 2013. Traditional fishing in the northern zone of Madagascar: from 2009 to 2012. Reflection day for the recovery of shrimp fishery. Ministry of living aquatic resources and fisheries – Group of shrimp Aquaculture and Fishery operators of Madagascar. Mahajanga, February 22, 2013.

[4] Razafindrakoto, H.L. 2013.Coastal peneide shrimp stocks exploited in Madagascar: situations. Reflection day for the recovery of shrimp fishery. Ministry of living aquatic resources and fisheries – Group of shrimp Aquaculture and Fishery operators of Madagascar. Mahajanga, February 22, 2013.

	were: zone A = 1,006 T; zone B = 4,968 T; zone C = 4,968 T (total = 7,544 T). These values can be regarded as target reference points.	These values can be regarded indeed as reference points. Even if they have the merit of existing, they do not have any operational value, however. No value of the biomass to the Maximum Sustainable Yield (B_{MSY}) is provided, whether by calculation or in the form of substitute indicators. In the absence of other information, a clear diagnosis cannot be derived from them, neither on the status of fisheries, nor on the reproductive capacity of stock. ***It is important to seek to define a series of indicators on the state of shrimp populations (catch data, catch per unit of effort, biological data…) which could provide a diagnosis on their status and their trends. Reference points (limits and targets) should be defined on the basis of these indicators. Measures and control rules governing relevant exploitation of the stock state thus determined should result from this.***
P.I. 1.1.3 When stocks collapse, there is evidence suggesting that stock will be rebuilt within a specified time.	Control measures of the traditional fisheries have been set up. If applied, they should limit the impact of this activity on recruitment. *However, there is not any system of monitoring, control and surveillance of traditional fisheries. It is not possible to make a judgment on the effectiveness of management measures*.	Shrimp stock cannot be considered to have collapsed. ***The 2009 findings on the absence of effective monitoring of traditional fisheries, in spite of the CEDP efforts, still remain valid.***
P.I. 1.2.1 A robust exploitation strategy respecting the precautionary pinciple is in place.	Control measures of fishing effort have been gradually set up: ▪ Fishing permits; ▪ Restriction on the length of the gear's headrope on the trawls;	It is necessary here to differentiate industrial fisheries and traditional fisheries, since fisheries as a whole have to be conisdered. Small-scale fisheries have totally disappeared and therefore are not addressed.

	▪ Fishing seasonal closure. The evidence is that the strategy is in place and that it addresses the issue of stock state, which complies with MSC criteria.	*Industrial fisheries* Fishing effort reduction has continued. On the 59 permits in activity in 2009, there only remain 39. *Traditional fisheries* Decree 2007-957 provides for the implementation of a series of measures : ▪ Obligation to hold a professional card ; ▪ Freezing of the fishing effort (number of authorized listed gears) ; ▪ Minimal mesh of 40 mm for the nets ; ▪ Register of fishing gears ; ▪ Prohibition of the pôtô and the vonosaha (and fishing gears of the same characteristics) in the Ambaro Bay, and of the mosquito in all areas. According to CSP, fishermen registration is steadily proceeding. Currently, 3,500 nets declared as targeting shrimps (i.e. they cannot be used during the fishing closure) were marked, and the fishermen owners registered. A progressive withdrawal of valakira is ongoing. The current situation is that, overall and despite the efforts of CSP, the decree is not respected. The data presented in 2013 [5] indicate that between 2009 and 2012, the number of listed nonselective gears rose in zone A from 311 to 2,235 (58 % of the total machines) and from 159 to 2,312 (55 %) in zone B,. Prohibited gears are always present and mosquito net is widely used, mainly by nonprofessional fishermen.

[5] Randriamiarisoa. 2013. Traditional fishing in the northern zone of Madagascar: from 2009 to 2012. Day of reflexion for the recovery of shrimp fishing. Ministry for living aquatic resources and fisheries – Group of shrimp aquaculture and fishery operators of Madagascar. Mahajanga, February 22, 2013.

		For traditional fisheries, the exloitation strategy does not function. As mentioned by a traditional fisherman, « if the situation continues, there will not be shrimp any more ». ***It may be assumed that, in spite of the legislation and the actions of CSP, the development of traditional fisheries is getting out of control. The setting up of measures to contain this development is a must.*** An element of the management strategy consists in the installation of « Biologically Sensitive shrimp Zones » (ZCBS). In zone A, two zones were defined in 2009 in the Ambaro Bay (Ministerial Order 2055-2009). These zones aim at safeguarding living aquatic populations for the regeneration of stocks, in particular of peneides shrimps. This management tool is part of the national framework of marine conservation policy with a twofold objective : at the environmental level (protection, restoration and use) and at the level of shrimp resources (management of shrimp fisheries). The safeguarding of living aquatic populations can lead to the rebuiliding of stocks, and in particular that of shrimps in the delimited zone. No action has been led to date for the installation of ZCBS. The principle of these ZCBS is interesting. It fits into a spatial management strategy which could be developed in the future. The PNRC study (Randriamiarisoa, 2008) which led to the Order N° 2055/2009, justifies the location of the two ZCBS sites on the basis of two general criteria (sedimentology and presence of mangroves) and two NCV specific criteria (river mouths and concentration of fishing zones for PCT and PCI). These arguments are relevant but need to be brought up to date, in particular the argument on the fishing effort. Complementary studies could be undertaken to specify if the zones selected shelter nurseries which feed adjacent adult populations. Moreover, the effectiveness of the ZCBS configuration (limited by parallels to the north

		and the south) should be evaluated from the point of view of applicability of management rules (good understanding by traditional fishermen) ***Pending for up to date and more complete information, the installation of the ZCBS should be postponed.***
P.I. 1.2.2 Rules and instruments of control of exploitation well defined and effective are in place.	For industrial fishing, the rules and instruments of control are in place: ▪ Fishing log-book and daily recording of catches; ▪ Monthly and annual reports of the ships by the shrimp ship owners; ▪ Measured and marked trawls; ▪ Electronic Beacons ("VMS"); ▪ Embarked observers; ▪ Unexpected controls at sea by CSP agents.	*Industrial fisheries* The rules for and instruments of control have remained unchanged since 2009. These measures are accepted by the industry, which often is at their origin, and are always applied. The CSP observers' programme envisages a coverage of 30 % of the fleet activities. In 2012, this coverage was 25 % and 33 vessels out of 39 had an observer on board at least once. ***The observation coverage is extremely important and has become a very heavy burden on ship-owners. The sheet filled out by these observers is simply a copy of the fishing log-book, and the question needs to be asked about the added value of this programme, for example for the knowledge of resources, since no other information apart from the volume of catch is collected. It is necessary to rethink the programme as a whole.*** ***Control rules are based on empirical ideas, or motivated by economic constraints. It cannot be determined whether they are efficient in terms of the respect of stock reproductive capacity. It would be of importance to monitor fisheries in relation to accepted indicators. Control rules should result from this in order to set up an "adaptive" fisheries management.***

		Traditional fisheries Even if in theory, this indicator relates only to the assessed fisheries, i.e. industrial fisheries, traditional fisheries should be considered, since the two activities exploit the same resources, and both affect its reproductive capacity. The rules of control include registraion of fishermen and gears, and the prohibition of several of these gears considered as non-selective. The almost anarchistic development of traditional fisheries and the multiplication of non-selective gears (including the extensive use of mosquito net) show that these controls require improvements. ***The settting up of measures to contain the expansion of traditional fisheries should be addressed. These measures will have to be most urgently put in place.***
P.I. 1.2.3 Relevant information is collected to support catch strategy.	The various data resulting from industrial fishery are collected and compiled by various bodies of the Ministry in charge of fisheries (CSP, OEFC). Thus, good information on trawl fishery structure, activity and catches is available. From the scientific point of view, there were many studies on Madagascar shrimp stocks and the PNRC has conducted biological monitorings and stock assessments. At the date of the assessment, the	In 2014, the Ministry of living aquatic resources and fisheries has been created. It has taken on the missions of the old Ministry of fisheries and living aquatic resources. This new name illustrates the will to emphasize the protection of living aquatic resources. CSP has remained operational and OEFC as well (the latter has become OEPA). Information on industrial fisheries continue to be collected as a matter of routine: ▪ Daily catch and fishing effort through the fishing log-books and the embarked observers; ▪ Control of landings at quay; ▪ Fishery monitoring by electronic beacon (VMS). Biological data remain fragmentary. The observers do not collect any information on this subject and samplings are done at landing on already standardized products.

	PNRC was at the end of activity and only one researcher was in activity. *The principal recommendation was to revitalize this research programme in order to continue collecting data on traditional fisheries and to update stock assessments.*	The PNRC has been institutionalized with the creation of the Centrer of Studies and Development of Fisheries (CEDP). This is a positive action which could ensure in the long term the permanence of research works. On the other hand, its means remain more than limited, with only two researchers, of which a senior. This situation is all the more critical as the mission of CEDP has been extended to the whole sector, and therefore not only confined to shrimps. With respect to traditional fisheries, information remain fragmented. A framework survey was carried out in 2012 by the line Ministry through the PACP project, but the report has not been published yet. CEDP has a survey programme in the villages. The objective is to make at least one annual monitoring of fishing activities. Investigators collect data on: ▪ Catches per fishing gear; ▪ Fishing effort; ▪ Composition of catches; ▪ Fishermen' incomes. It is noted that the geographic coverage is reduced as only one small part of zones A and B are monitored, and no activity occurs in zone C. The annual temporary closure is not always respected, due to financial constraints. In zone A, available data cover the period from 2009 to 2012[6]. In zone B, no inventory was conducted in 2010. For the southern part (Sofia), only one site was monitored in 2009. In 2013, eleven field investigators were

[6]Randriamiarisoa. 2013. Traditional fishing in the northern zone of Madagascar: from 2009 to 2012. Reflection day for the recovery of shrimp fishing. Ministry of living aquatic resources and fisheries – Group of shrimp Aquaculture and Fishery operators of Madagascar (GAPCM). Mahajanga, February 22, 2013.

		deployed in zone A (one village) and 18 in zone B (two villages), these three sites being supposed to provide 90 % of traditional catches. It appears that the 2014 inventory could not be completed. Since fishing activity shows stronger seasonality, a tighter temporal monitoring would be necessary. As a result this fishery sector total catches are the result of empirical extrapolations and remain very approximative. ***CEDP must be provided with the necessary means so that it can fulfil its mandate. One should, as soon as possible, set up a development plan over several years, which will in particular allow to rebuild a research team.*** ***A biological data collection plan of shrimp stocks is to be initiated. In this respect, it is necessary to review the programme of on board observers so that these data are collected directly aboard ship.*** ***The current traditional fisheries inventory plan was developed many years ago. It is time to review and optimize it to get more accurate and more reliable data available on this activity on the whole fishing zones.***
P.I. 1.2.4 There is an adequate assessment of the stock status.	Drawing on the analytical models published in 2008 (cohort analysis and catch analysis by recruitement), it is considered that the West coast four species are slightly underexploited to slightly overexploited and this, for the three fishing zones.	There were several shrimp stocks assessments in the past. The most recent one is that produced for the reflection day of 2013.This assessment, unlike that of 2008, was based on a production surplus model already used before. But no methodological detail is provided, which does not make it possible to rule on the reliability of this analysis. The only analytical assessment produced in 2013 relates to only one species and only one area, and for a very short period (2010-2011). No diagnosis is derived from this evaluation and it does not provide any operational information. The models used are strongly dependent on data of traditional fisheries.

		The uncertainties associated with these data make the models not very reliable. According to MSC standards, the assessment must be appropriate for the stock and the rules and control measures of the exploitation, take uncertainties into account and need to be discussed by peers. ***Modelling must continue, using as much as possible global and analytical approaches. But the methods used should be discussed and revised by external researchers ("review by peers"). It would result from this an approach that can be standardized and repeated on a regular basis.*** ***It must be possible to integrate these assessments into the decision-making process. Which is not currently the case.***

PRINCIPLE 2 – IMPACT ON THE ECOSYSTEMS

<table>
<tr><th>Performance Indicator</th><th>2009 Assessment</th><th>2014 Assessment</th></tr>
<tr><td>P.I. 2.1.1
Fisheries do not cause a serious or irreversible risk to the retained species and do not endanger the rebuilding of collapsed retained species.</td><td>Retained species are called "by-catch". Their presence in the landings increases in the course of season, when shrimp catches declines.
During the 2001-2006 period, trawlers captured between 3,100 and 4,200 tons of fish for shrimp catches between 5,300 and 9,500 tons.
Four dominant species represent</td><td>The situation has evolved since 2009. Because of the declines in shrimp yields, fishing companies turn to fish to improve their operating account. This trend was noted by CSP in their 2012 report (table). A decline in the discards and an increase in retained catches was noted. Its proportion was, in 2012, equivalent to that of shrimps. According to RÉFRIGÉPÊCHE-OUEST, there would be currently 1,6 tons of fish for 1 ton of shrimps. Shrimp fisheries become more and more mixed fisheries.

Evolution of industrial shrimp fisheries catch composition:
<table>
<tr><th></th><th>2007</th><th>2008</th><th>2009</th><th>2010</th><th>2011</th><th>2012</th></tr>
<tr><td>Targets</td><td>48,95</td><td>49,83</td><td>60,80</td><td>49,15</td><td>58,45</td><td>42,92</td></tr>
<tr><td>Others</td><td>25,61</td><td>27,08</td><td>20,17</td><td>30,93</td><td>25,45</td><td>41,58</td></tr>
</table>
</td></tr>
</table>

each one more than 5 % of catches:

- *Otolithes ruber*;
- *Pomadasys hasta*;
- *Nemipterus bleekeri*;
- *Saurida micropectoralis*.

A few species of high commercial value are caught occasionally:

- *Lutjanus malabaricus*;
- C *ephalopholis aurantia*;
- *Siganus sutor*;
- *Saurida gracilis*;
- *Plectorhinchus gaterinus*;
- *Pomadasys furcatus*.

Apparently, none of these species is affected by fisheries.
The strong recommendation is that:
In the perspective of a MSC certification, the absence of knowledge on the main by-catch species may be controversial; it is important to fill this gap. Within the framework of the monitoring programme targeting by-catch species, which PNRC should pursue, data should be collected to characterize these species: abundance variations (by season and zone); structure in categories of catch size, sex ratio and sexual

retained						
Discards	26,47	22,97	20,14	19,93	16,10	15,07

Source: CSP 2012
Since the IRD study issued in 2008, no information is collected on retained species.

RÉFRIGÉPÊCHE-OUEST fishing company has developed a conservation strategy of by-catch in order to feed the national market (Antananarivo and the main cities of the west) through its subsidiary company SOPROMER. The final data for Year 2012 and for the whole of the West coast (zones B and C) reveal, by decreasing order of importance :

Species	Local name	Volume (t)	%
Upeneus spp	Rougets	203,6	15,9
Otolithes ruber	**Trois-dents**	**182,4**	14,2
Leiognathus equulus	Salelo / Lily	143,6	11,2
Terapon theraps	Drihy	101,0	7,9
Pelates quadrilineatus	Tretreky	87,2	6,8
Johnius dussumieri	Ambanivava	86,8	6,8
Sillago sihama	Banane	84,8	6,6
Psettodes erumei	Sole	62,2	4,9
Gerres oyena	Ambariaka	61,5	4,8
Sphyraena spp	Barracuda	52,1	4,1
Rastrelliger kanagurta	Mahaloky	38,1	3,0
Others		176,6	13,8
TOTAL		1279,9	100

All these species, except for the sole, reach relatively modest sizes which meets local market demand. Most of them have a strong resilience and present weak vulnerability at fishing.
However the question needs to be asked whether the absence of big size species in these by-catch is linked to the nature of the PCI fishing zones

maturity.

(very loose seabeds), to the decline of their abundance in the ecosystem by overexploitation of resources or to the effect of BRDs.

Species	Resilience	Vulnerability
Upeneus spp	High	Low
Otolithes ruber	Average	Moderate
Leiognathus equulus	High	Low
Terapon theraps	High	Low
Pelates quadrilineatus	High	Low
Johnius dussumieri	High	Low
Sillago sihama	High	Low
Psettodes erumei	Average	Low to moderate
Gerres oyena	High	Low
Sphyraena spp	Low	Very high
Rastrelliger kanagurta	High	Low

It is also necessary to compare these data with those produced by IRD in the course of a study on by-catch in 2005 and 2006 (IRD, 2008). Among the main species preserved in zones B and C, were at the time recorded the *Pomadasys maculatum, Saurida micropectoralis, Nemipterus bipunctatus* and *Pomadasys argenteus* (ex P. hasta), which seem to have disappeared from the catches.
It must finally be noted that the pre-assessment of 2009 just indicates the main by-catch species listed in the IRD study without cross-checking with fishing companies.

Currently there is not any information making it possible to rule on the situation of retained species populations and on the impact of industrial fisheries on these populations. A monitoring mechanism for these catches is to be set up (see further below).

P.I. 2.1.2 A strategy is in place for the management of retained species and to ensure that fisheries do not cause a serious or irreversible risk to retained species and do not endanger the restoration of retained or collapsed species.	Since 2003, the administration imposes the installation of BRDs ("by-catch reduction devices "; devices meant to reduce by-catch). After adjustments, a model has become standards in 2007. It constitutes a partial management strategy for retained by-catch.	The situation has not changed since 2009. Given the growing share of fishes in the companies' incomes, some fishing companies question the installation of BRDs. The situation of trawl fisheries has changed significantly since the installation of BRDs. Currently, as mentioned above, they have become more and more mixed fisheries, and fishes can be regarded less and less as "by-catch". ***In this context, it would be judicious to analyze the effectiveness of the current BRDs as by-catch management tool.*** ***In the absence of reliable information on the retained catches (species, spatial distribution, etc), it will remain impossible to define a real management strategy for these species.***
P.I. 2.1.3 Information on the nature and the importance of the retained species are adequate to determine the risk posed by fisheries and the effectiveness of management measures for retained species.	The pre-assessment takes up again the above recommendation: *Within the framework of the by-catch monitoring programme, that the PNRC should pursue, data should be collected to characterize these species: variations of abundance (by season and zone); structure in categories of catch size, sex ratio and sexual maturity.*	Since the study published by IRD in 2008, no accurate information is collected on retained species. The fishing log sheets as well as observers' reports (which strictly take up again the categories of the log-books) record only volumes (weight) aggregated under the heading "retained species", which subsequently appears in the CSP reports as "other fishes". ***Considering the growing proprtion of these species in the landings, and in the perspective of a MSC certification, it is necessary to review information collection:*** ▪ ***To add a section in the fishing log-books where the species preserved on board would be detailed (as it is done for shrimps);*** ▪ ***To review the mission of observers and to entrust them with "a scientific task " in addition to their control function ; they should record the quantities per species, and also collect information on the size and sex frequencies, according to a***

		sampling design to be determined in collaboration with CEDP; ▪ ***A specific database on fishes, similar to BANACREM, should be created;*** ▪ ***These data will have to be analyzed by CEDP on a regular basis.***
P.I. 2.2.1 Fisheries do not put a serious or irreversible risk on species, or groups of species, discarded and do not endanger the restoration of species or group of collapsed discarded species.	The pre-assessment analyzes the whole of the not targeted species (retained and discarded), as from the PNRC studies (IRD, 2008). All the analyzed species are regarded as biologically robust.	No real new information has been added since the survey published by IRD (2008). The 2012CSP report shows a progressive reduction of discards the proportion of which rose from approximately 20 % of catches for the period 2007-2010 to 15 % in 2012. The observers' sheets include a section "main discarded species ", but such information does not seem to be analyzed, since the statistics simply report "discards". ***In the current state of knowledge, it is not possible to assert that fisheries do not pose a risk to discarded species.***
P. I.2.2.2 A strategy is in place to manage discarded catches and this strategy is designed to ensure that fisheries do not pose a serious or irreversible risk to the discard populations.	By-catch management by the fishery administration aims to: ▪ Increase fish landings to feed local market and to reduce wasting; ▪ Reduce the quantity of by-catch to meet international commitments as regards responsible fishing. Concretely, this has resulted in: ▪ Obligation to land at least 0,5 kg of fish per kg of shrimps; ▪ The installation of BRDs.	The measures observed in 2009 have remained in force and continue to be applied and respected by industrial fisheries. ***As for retained species, in the absence of reliable information on discarded species, it will remain impossible to define a real management strategy for these species.***
P. I.2.2.3 Information on the nature	By-catch and discards are recorded in the fishing log-books and are	The fishing log-books indicate only the total volumes of discards. The observers' sheets comprise a section entitled "principal species

and the quantity of the discarded catches are appropriate to determine the risk posed by the fisheries and the effectiveness of the management strategy for discards.	recorded in writing by the observers. As for the retained species, the report recommends: *A monitoring of the abundance variations (by season and zone) of the by-catch and discarded species is necessary to detect any change in the status of their respective population.*	discarded", but these information do not seem to be analyzed, since the statistics consider simply "discards". Information is not therefore appropriate to determine the impact of trawlers' activity on the discarded populations. The recommendation of 2009 remains relevant. ***Detailed information should be collected on a routine basis by the observers, according to a redefined mission (see the above recommendation concerning retained species).***
P.I. 2.3.1 Fisheries fulfill national and international requirements as regards the protection of endangered or threatened species. Fisheries do not pose serious or irreversible damage to these species and do not endanger their restoration.	In trawl fisheries, marine tortoises are likely to be found in the catches. Four species of marine tortoises are present in the shrimp fishing zones. Since the introduction of TEDs ("Turtle Excluder Device", device to exclude tortoises), catches do no longer exist. Various Elasmobranchii (rays and sharks) can be also caught. These species are not very frequent in the by-catch and TEDs limit the catches of large individuals. There is no risk posed with these various species by the shrimp fishing activity.	The situation has not changed since 2009. According to interviews with fishing companies, no turtle is currently captured. Elasmobranchii are generally not indexed in the sheets of the observers because they are not part of the main discarded species. ***The recommendation of the pre-assessment of 2009 is still relevant, i.e. that skates and sharks must be the subject of observers' monitoring.***

	The recommendation is that: *Like the marine tortoises, skates and sharks must be the subject of observers' monitoring. These groups of species belong to the "endangered, threatened and protected* species*".*	
P.I. 2.3.2 – Fisheries have i a precautionary management strategy n place designed to: ▪ Meet national and international requirements; ▪ Ensure that fisheries do not pose a serious or irreversible risk on endangered, threatened and protected species; ▪ Make sure fisheries do not endanger their restoration; ▪ Minimize the mortality of these species.	The strategy complies with the various International Conventions signed by the Malagasy Government.. It has proved to be effective in the the protection of marine turtles, and, correlatively for skates and sharks	At least as from an ordinance of 1993 (ordinance 93-022), it is prohibited to kill, wound or capture marine mammals and any other protected species. The strategy lies primarily on this prohibition which is still in force, and by the installation of TEDs. It proves indeed always effective in the protection of endangered, threatened and protected species.
P.I. 2.3.3 Relevant information is collected to support the management strategy for fisheries' impacts on threatened, endangered and	Data on marine turtles are routinely collected on board by observers. These data are sufficient to determine the effect of fishing on these species.	The same observation was made in 2014. ***The 2009 recommendation remains valid: to monitor the whole of the threatened or vulnerable species, like skates and sharks.***

protected species, including: ▪ Information for the development of management strategy; ▪ Information to assess the effectiveness of management strategy; ▪ Information to determine the results on the status of these species.	It is recommended that: *The same monitoring is made for skates and sharks.*	
P.I. 2.4.1 Fisheries do not cause serious or irreversible damage to habitats, considered on a regional or bio-regional basis, and to their function.	Only one type of habitat is concerned with shrimp trawl fishery. It concerns sandy-muddy loose seabeds. These seabeds are generally less sensitive to trawling. The scraping chain was removed from the gears, which minimizes the trail left on the seabed. A small proportion of the surface of the habitats considered is affected by trawling. It is considered that shrimp trawl fishery does not cause serious or irreversible damage.	The observation remained the same, in the absence of new data.
P.I. 2.4.2 A strategy is in place and it is designed to ensure that fisheries do not cause	Various fishing effort reduction measures (reduction of the length of the gear's headrope, limitation of night fishing, reduction in the	The observation remained the same, in the absence of new data.

serious or irreversible damage to the various types of habitats.	number of trawlers) have an indirect effect to reduce the impact of trawling on seabeds.	
P.I. 2.4.3 Information is appropriate to determine the risks posed by fisheries to the types of habitats and the effectiveness of the strategy to minimize impacts.	Thanks to the satellite monitoring of ships, reliable information is collected at CSP on the activity of these ships.	VMS data provide accurate and reliable data on the presence of vessels and their fishing activity. It appears, however, that these data are not analyzed, or at least, not for this purpose. ***It is necessary to carry out a VMS data analysis to:*** ▪ ***Retrospectively study the fleet spatial and temporal dynamics;*** ▪ ***Check this dynamics at relatively short intervals (half-season, season).in order to detect any anomaly in it*** ***It should be noted that these analyses do not relate to only the impact on habitats, but are also useful in the assessments of resources. Indeed, changes in the spatial and temporal dynamics of ships activity can reveal changes in the resources dynamic.*** Normally this performance indicator requires a good knowledge of the benthic habitats (sediment and fauna). Such knowledge requires an expensive and long-term work. It is not advisable, in the current situation and while remaining realistic, to recommend a programme of study in this direction. But it would undoubtedly be interesting to check and, possibly, to synthesize currently available data. In the same way, current and future prospections for offshore hydrocarbons could be made profitable. The contribution of university researchers should be sought.
P.I. 2.5.1 Fisheries do not cause serious or irreversible damage on the key elements of ecosystem structure and	Currently, with the control measures dealing with fishing effort, fisheries are not very likely to affect in a serious or irreversible way the ecosystem structure and	As indicated in the report, the zone has been trawled for a long time. There is not any data on the original state of the ecosystem. In time this ecosystem had to adjust itself to this disturbance, and, in the current situation (reduced fishing effort, not very large area prospected compared to the available habitat), it is possible to consider that fisheries

function.	function.	do not affect the ecosystem structure and function in a serious or irreversible way.
P.I. 2.5.2 There are measures in place to make sure that fisheries do not cause serious or irreversible damage on the ecosystem structure and function.	Effort control measures, installation of TEDs and BRDs correspond to indirect measures to minimize the impacts on ecosystems.	Beyond the principles, there is no official legal or technical measure limiing the fisheries impact on the ecosystems. ***Such measures, set up after discussion with the industry, could result from the analyses of the spatial distribution of the effort and the data produced by a revisited observer programme.***
P.I. 2.5.3 There is an adequate knowledge of the fisheries impacts on ecosystems.	The knowledge of the impacts is derived from studies on comparable ecosystems, elsewhere in the world. Observers data are adequate to determine the impact of fisheries on ecosystems	Knowledge appears insufficient. Observers collect only aggregate data on retained and discarded by-catch species. No information is routinely collected on the composition, abundance, and size structure of these species. ***An observer programme reconsidered and modified to collect ecological and biological data becomes essential.***

PRINCIPLE 3 –GOOD MANAGEMENT

Performance Indicator	2009 Assessment	2014 Assessment
P.I. 3. 1. 1 Management system exists within a legal or traditional framework and: ▪ Is able to ensure sustainable fishing in accordance with MSC	Shrimp fisheries are governed by a legislation in conformity with the principles of responsible fishing and comply with International Conventions. The legal framework is defined	Fisheries are currently ruled by Decree 2007-957 of 2007 and subsequent orders relating specifically to traditional fisheries. Enforced, these texts should indeed allow sustainable fishing according to MSC Principles 1 and 2. A new law on fisheries is under development. It is currently impossible to

principles 1 and 2; ▪ It observes the statutory rights explicitly created or established according to the customary principles of people depending on fishing for their livelihood or their way of life; ▪ Incorporates an appropriate conflict resolution framework.	after discussion and in agreement with GAPCM. Fisheries respect the regulation in force. The rights of traditional fishermen are respected. The legal framework can ensure the sustainability of fisheries in accordance with MSC principles 1 and 2.	give an opinion about the effect of this law.
P.I.3.1.2 The management system has an effective consultation process. This process is opened to all stakeholders or any party affected by fisheries. The roles and responsibilities of organizations involved in the management process are clear and are understood by all the relevant parties to the process.	The Ministry in charge of fishery is willing to listen to actors gathered in the GAPCM. The Ministry's organizations (CSP, OEFC, PNRC) ensure a permanent monitoring of fisheries. Traditional fishermen provide information on their activities. Collected information is used in the decision-making process.	The Ministry of aquatic living resources and fisheries is of recent creation (a decree in 2014). The structure of the new ministry and the functions of its various bodies are defined in the decree. Concerning directly the decision-making process in fishery, the following Directorates are worth mentioning: ▪ The Directorate-general of aquatic living resources and fisheries (DGRHP) has the mission of planning and implementing the Ministry's sectoral policy as regards fish farming and fisheries, living aquatic stock management. It supports the Regional directorates in the implementation of technical activities ; ▪ The National advisory council for fisheries and fish farming management (CCNGPA) which comes under the Directorate-general of fish resources and fisheries; ▪ The Directorate of Environment and aquatic living resources valorization (DEVRH); ▪ The Directorate of fisheries (DP); ▪ The Regional directorates of living aquatic and fishery resources (DRRHP);

		▪ The Directorate-general of partnership and sustainable development (DGPDD). CSP and OEPA keep their attributions as public corporations. As this structure is new, the linkage between the various directorates is not yet clear. In particular, it is not known how the new DGPDD, with its cross-cutting function in regards of other Directorates and which deals with the strategic and planning aspects, will effectively integrate into the process. The mission of CEDP within the MRHP must be clarified. It is important to define which is the "customer" of the research centre. A vagueness in this domain may constitute a major hindrance in the production of scientific data and recommendations needed to fisheries management. ***The means needed as regards research on shrimp fisheries should quickly and accurately be defined by the MRHP and examined at the highest level of the State to make it possible to provide CEDP with the needed means to fulfill its duties in this domain. CEDP could be endowed with a legal status which will allow it to establish, with the MRHP, an annual plan defining its priorities of action, its budget and procurement procedures (recruitments, services, equipment).*** There is no formal process of participation for the shrimp fisheries management. GAPCM has regular contacts with the ministry. It proposes management mechanisms or control rules which are discussed and then legalized by a ministerial order. In addition, a GAPCM's representative is member of the CSP's Board of directors.

		There is not any process involving traditional fisheries in the decision-making process. A multitude of groupings is found[7]: ▪ Fishermen associations at the village level; ▪ Federations including various associations; ▪ Co-operatives or union of fishermen associations. Only one small fraction of traditional fishermen (1/3) is member of an association. Consequently, it is very difficult to define a representative group of interlocutors likely to be involved in the decision-making process. In the current context, the roles and responsibilities of the various authorities involved in the decision-making process are not clearly identified. The communication circuits are not determined. ***It is advisable to set up an improved consultation process clearly defining each one's roles in the process, and the rules of this process (rate, agenda and objectives of meetings, for example).*** ***In this context, it will be necessary to define the circuits of the nformation flow and the decision-making mechanisms.*** ***Mechanisms to involve traditional fisheries in the process should be identified.***
P.I. 3.1.3 The management policy has clear and long-term	The objectives are specified in the 2007-957 Decree and their application is in conformity with	In the current situation, a new law on fisheries is under development and it is impossible to give an opinion on this subject.

[7] Bandar, A.D., & E Ranaivoson. 2014. Inventory and assessment of the capacities of fishermen professional organizations in the IOC countries. Indian Ocean Commission.

objectives to guide the decision-making process and these objectives are consistent with MSC principles and criteria and they incorporate the precautionary approach.	MSC principles.	
P.I. 3.1.4 The management system provides economic and social incentives for sustainable fisheries and does not operate with subsidies which would contribute to non-sustainable fisheries.	In the fisheries, there is no, practice which can contribute to non-sustainable fisheries.	The situation has not changed.
P.I.3.2.1 Fisheries have clear specific objectives, designed to achieve the expected results stated in MSC principles 1 and 2.	Specific objectives in conformity with MSC principles are expressed by various management measures: effort reduction, introduction of TEDs and BRDs, trawl selectivity, effort spatial distribution.	The current situation remains unchanged. Clear objectives are not yet defined, but fiheries new law should bring new elements.
P.I.3.2.2 The management decisional system includes an effective decision-making process resulting in measures and strategies to meet the goals. This process has a suitable	Fishing is managed through a co-management system associating the ministry with GAPCM. The decisions are based on the results of the PNRC, CSP, and EOFC analyses. These information ensure	There is no formal decision-making process including the various stakeholders. Co-management operates rather on a basis of not officially legalized partnership between the industry and the administration. Communication among these various parties does not appear to be completely satisfactory. OEPA publishes a news bulletin, which, by nature, remains brief. Reports, statistical results, and other relevant

approach to solve conflicts in the assessed fisheries.	the relevance of the management system.	information concerning decision-making are neither clearly communicated nor discussed with industrial fishing operators. The reports of observers transmitted to industry contain only some lines, which cast doubt on the relevance of this programme. **As mentioned above, it will be necessary to set up an improved consultation process and to define a circuit of effective communications between the various stakeholders, within the ministry as well as in the fisheries environment.**
P.I. 3.2.3 The monitoring, control and surveillance mechanisms ensure that fisheries management measures are enforced and respected.	Monitoring, control and surveillance are under the CSP responsibility. They include: ▪ The programme of sea-going observers; ▪ VMS system; ▪ An inspection of the fishing gears at the beginning of campaign. Very few infringements are noted in shrimp industrial fisheries.	The 2014 Decree defining the operation of the Ministry of living aquatic resources and fisheries defines the CSP's functions: "within the framework of a sustainable and rational exploitation of living aquatic resources, the Centre's role is to protect and conserve living aquatic and fish farming resources relating to its field of operation within the territory, in accordance with the water under Madagascar jurisdiction. For this purpose, it is in charge of the fishing effort control and monitoring and the surveillance of traditional, small-scale and industrial fishing activities of ships operating in the national waters and the control of economic operators' activities in the fish farming and fisheries sector ". The functions are basically the same as before. CSP produces periodical reports, which account the various controls, and infringements observed. According to the 2012 report, the last one available, very few infringements have been noted in shrimp trawl fisheries, which then complies with the rules and policies in force. Although this P.I. relates to only industrial fisheries, it is important to also

		to consider traditional fisheries, given its impact on shrimp resources. ***Effective control and monitoring mechanisms of traditional fishery are to be studied and put in place to ensure that these fisheries do not cause serious or irreversible damage to shrimp populations.***
P.I. 3. 2.4 Fisheries have a research plan that meets the needs for information required by management.	The research plan matches that of the National Shrimp Research Programme (PNRC). At the time of the pre-assessment, this programme was put on the back burner and the recommendation was: *The uncertain future of PNRC heavily weighs on the capacity of shrimp fisheries to obtain a MSC certification. Indeed, it is imperative that the management system can rely, when that is necessary, on research concerning shrimp stocks and the ecosystems on which they depend, to achieve the goals compliant with MSC principles 1 and 2.*	Research activities have been perpetuated with the institutionalization of PNRC in the form of the Centre of Study and Development of Fisheries (CEDP), the mission of which has been extended to the whole of fisheries. The CEDP has only two researchers, of which one senior, and very limited material and financial resources. It has essentially taken on again the objectives of PNRC, but without the adequate capacity to meet them. ***In this situation, and considering the needs for knowledge to ensure the fisheries sustainability, it is imperative:*** ▪ ***To prepare a development plan for CEDP, including a recruitment plan and human resources trainings. This plan must be prepared and implemented as of now, considering that several years will be needed for CEDP to build a qualified team of researchers.*** ▪ ***To provide CEDP with adequate financial and material means so that it can fulfill the mission it is entrusted with.*** ▪ ***A research plan on shrimp fishery must be set up. It needs to include the monitoring of catches, efforts and biological data on shrimp populations (industrial and traditional fishing), the monitoring of data on by-catch (by-catch and discards), the monitoring of the spatial distribution of fishing activities (VMS data, for industrial fisheries, and surveys for traditional fisheries), the assessment of stocks, and other relevant issues.*** This aspect is all the more important as the MSC assessment rules

		become very strict, in particular for principle 2, since the new procedures (effective in April 2015) will require that the "cascading effects" of fisheries on ecosystems be analyzed. It would certainly be judicious to also enhance the collaboration of CEDP with other research organizations (CNRO, IHSM) to carry out certain programmes and to provide the future skills needed for this research plan.
P.I. 3.2.5 There is a monitoring and assessment system of the management performance specific to fisheries with regard to its objectives. There is an effective and periodical review of the management system specific to fisheries.	Performance monitoring and assessment are carried out with the reports of CSP and OEFC, as well as with the fisheries log-books. In the process of co-management, there is an internal mechanism of review within the industry, and a *bottom-up approach* where GAPCM gives its opinions on the management process.	Performance monitoring and assessment of management measures and rules continue according to the same procedures. In fact, it cannot be said that there is "a monitoring and assessment of management system performance specific to fisheries relatively to its objectives". Performance is assessed in an empirical way, primarily by the industry according to its own observations. There is not relatively objective mechanism to assess the effectiveness of the management and decision-making process. ***The process of improved dialogue, proposed above, should allow to carry out this assessment, on an ongoing basis, and to bring adjustments and corrective measures ifthis proves necessary***.

Results of the analysis

Elements of fisheries performance in light of the MSC principles and criteria.

A MSC certification must meet three principles:

- Principle 1: fisheries should not have adverse impact on stock health and on the capacity fo stock to renew itself. One is again faced with an assessment of the situation, the means implemented to ensure the stock health, or to contribute to its restoration, and available information to define this state and to apply control measures;

- Principle 2: fisheries should not cause serious or irreversible damage to the various ecosystem components; it should not endanger caught but not targeted species (retained or discarded), nor protected, threatened or endangered species; the withdrawal of species in the environment should not modify trophic structures (to avoid trophic cascade, including indirect effects); the use of gears should not modify, in a serious or irreversible way, the habitat structure. In the three cases, one must consider the current status of each component, the means implemented to preserve the state of the ecosystem components, and available information.

- Principle 3: the fisheries management model must be in compliance with international standards, and must in particular be based on the most reliable scientific information available, associates the whole of concerned stakeholders and be the subject of a regular and rigorous monitoring and control.

Principle 1

This principle relates to the resources as a whole, i.e. information coming from industrial fisheries and those from traditional fisheries must be considered at the same time.

The state of the shrimp stock remains poorly known. The last assessment, produced in 2013, is fragmented and presents many uncertainties. It cannot provide a clear diagnosis. But, contrary to the status observed in 2009, an excessive exploitation of recruitment cannot be excluded any more.

The principal weakness comes from the data collected in traditional fisheries. The field surveys are fragmented, irregular and relate to only part of the activities. Without an improvement of these data, it will remain very difficult to determine the real state of shrimp stocks.

Other information gaps are detected. In particular, there is no biological information collection on board vessels, which impairs the quality of assessments. A revision of the mission of embarked observers should be considered, so that they can also collect this biological information.

Control measures on industrial fisheries are numerous, effective and they are respected. On the traditional fisheries side, there are also control measures (prohibition of certain fishing gears, registration of fishermen and gears) but they are practically not applied. Actions to contain the traditional fisheries development are imperative.

Principle 2

It is a majort weak point, relatively to MSC criteria.

- No information is collected on the nature of by-catch, retained ("by-catch species ") and rejected species. A brief analysis of the species marketed by a fishiing company shows that there have been many changes, in the retained species, in terms of quantity as well as of composition. Reliable and constant information is needed. This can be done by modifying the vessels' fishing log-books (addition of information on fish catches), and, as for shrimps, by modifying the functions of embarked observers.
- No conclusion can be deduced from the scarce information available on ecosystems. It should be possible to develop some simple indicators to carry out a monitoring (specific composition of by-catch, effort spatial distribution, etc).

Principle 3

The fisheries main force is the involvement of GAPCM in the decision-making and management process. Several mesures and control rules of the industrial exploitation originate from this group iinitiatives. It entailed a type of co-management which appears effective in the management of trawling fisheries.

This co-management process which exists on a relatively informal basis should be improved by reconsidering the consultation mechanism.

The Ministry of living aquatic resources and fisheries has been created recently. So the roles and responsibilities of the various authorities participating in the decision-making process are not clearly identified yet. Likewise, the main objectives assigned to fisheries will undoubtedly be defined in the law on fisheries under development.

With respect to the monitoring, control and surveillance of industrial fisheries appears in conformity with MSC requirements.
Another major weakness relates to all that concerns knowledge production needed for management. The CEDP, which replaced the PNRC, has been institutionalized, which could ensure its sustainability. But its means are too inadequate to enable it to carry out its mission. In the absence of good scientific information, it is certain that no certification can be envisaged.

SECTION 3 – ACTION PLAN

Action plan matrix

Details of the Action plan

Stakeholders

Logical framework of the Action plan

Budget considerations

Summary of the assumptions and risks

Matrix of the Action plan

ACTION / TÂCHE	RESPONSABLE	TEMPS	Liens avec les Indicateurs de Performance du MSC — P1. Stocks: 1.1.1 Etat du stock	1.1.2 Points de référence	1.1.3 Reconstitution du stock	1.2.1 Stratégie de capture	1.2.2 Outils et règles de contrôle des	1.2.3 Information / surveillance	1.2.4 Evaluation du stock cible — P2. Ecosystèmes: 2.1.1 Espèces retenues : Etat	2.1.2 Espèces retenues : Gestion	2.1.3 Espèces retenues : Information /	2.2.1 Espèces accessoires : Etat	2.2.2 Espèces accessoires : Gestion	2.2.3. Espèces accessoires : Information / …	2.3.1 Espèces ETP : Etat	2.3.2 Espèces ETP : Gestion	2.3.3 Espèces ETP : Information / …	2.4.1 Habitats : Etat	2.4.2 Habitats : Gestion	2.4.3 Habitats : Information / surveillance	2.5.1 Ecosystèmes : Etat	2.5.2 Ecosystèmes : Gestion	2.5.3 Ecosystèmes : Information / — P3. Système de gestion: 3.1.1 Cadre légal / coutumier	3.1.2 Consultation, rôles et responsabilités	3.1.3 Objectifs à long terme	3.1.4 Incitations à la pêche durable	3.2.1 Objectifs spécifiques à la pêcherie	3.2.2 Processus de prise de décision	3.2.3 Conformité et application	3.2.4 Plan de recherche	3.2.5 Surveillance / performance de la
1. Evaluation des stocks			*(note: H = priorité haute, M = priorité moyenne, B = priorité basse d'après la pré-évaluation MSC)*																															
1.1. Révision par les pairs des modèles d'évaluation	CEDP	Fin 2016																																
1.2. Développer des points de référence opérationnels	CEDP	Janvier 2016																																
2. Systèmes d'information																																		
2.1. Révision du système de suivi de la PCT et élargissement à toutes les zones de pêches	CEDP	Mai 2016																																
2.2. Intégration des données du suivi de la PCT dans BANACREM	CEDP	Juin 2016																																
2.3. Révision du programme d'observation embarquée	CSP	Février 2016																																
2.4. Recueil de données sur les espèces accessoires et création d'une base de données poissons	CEDP	Février 2016																																
2.5. Caractérisation et cartographie des zones de pêche	CSP, CEDP	Fin 2016 / fin 2018																																
3. Cadre et mécanismes de la cogestion																																		
3.1. Plan de développement du CEDP	MRHP, CEDP	Fin 2017																																
3.2. Mise en place d'un cadre de concertation amélioré	MRHP	Juillet 2015																																
3.3. Identification des circuits d'informations et mécanismes de prise de décision	MRHP, GAPCM, PCT	2016-2017																																
4. Stratégie et Plan de Gestion de la PCT																																		
4.1. Elaboration d'une stratégie de gestion de la PCT	MRHP, ONG	2015-2016																																
4.2. Identificatiion, sensibilisation et encadrement des acteurs de la PCT	MRHP	2015-2016																																
4.3. Appui à la professionnalisation de la PCT et promotion de la gestion communautaire	MRHP, ONG, GAPCM	2016 +																																

Priorité Haute Moyenne Basse

Details of the Action plan

This action plan was designed according to the method recommended by the MSC to improve fisheries, and presented in the previous section (Action Plan Matrix). Its content has been validated during the workshop held in Antananarivo on May 5 – 6, 2015. Minor adjustments regarding its structure were made by consultants in order to comply with the usual project presentation standards. It is organized into four main technical components:

1) Inventory of stocks
2) Information system
3) Joint management frameworks and mechanisms
4) Traditional shrimp fishing management strategy

A monitoring and evaluation component will be added to the potential requests by the financial and technical partners identified by the Steering Committee.

1 – Inventory of stocks

1.1 - Peer review of valuation models

The shrimp stocks were assessed through two types of models: surplus production models (or "global models"), which only enquire about the total catch and a measure of fishing effort, and what is called analytical models, which request data on the age (or size) structure of the populations. The second category of model has been used in the stock assessment published by IRD in 2008. The assessment produced in 2013 includes a global model for all of the stock by fishing area, and an analytical model for a species and for a single zone. At this stage, these models cannot be used to support decision making. An evaluation process that can serve this purpose should eventually be put in place.

For both existing analyzes, biologists have faced the inaccuracy of data on total catches, generating hypotheses on catches of traditional fisheries, and the structures in sizes, in both traditional and industrial fishing, all because measurements are done on landing calibrated on board. In summary, there are a number of biases in the modeling carried out, which are currently impossible to assess. Moreover, there are several categories of models and more calibration options (calibration that does not seem to have been done in the current cohort analyzes). Considering the importance of this modeling to carry out an accurate diagnosis of the condition of the stocks, it is necessary to provide an outside view of the models used. Beyond these aspects, the MSC criteria require that these approaches be peer-reviewed.

An interesting action would be to organize a working group bringing together national researchers and at least two foreign experts to analyze:

- The data available, their degree of reliability, their usefulness, and how to process them;
- The most appropriate models based on available and usable data;
- The calibration models, if sequential population analysis ("cohort analyses") are selected.

Foreign experts would also have the responsibility to supervise and train national researchers in order to ensure ownership of the models selected by the CEPD and continuity of the evaluation work.

This action is considered to be a "medium priority" as it depends on the improvement of data on traditional fishery.

Pending these models, it is possible to develop other indicators that can be used immediately (see Action 1.2. below).

1.2 - Develop operational benchmarks

For efficient fisheries management, it is necessary to be able to position oneself in relation to a reference condition determined by limits and targets. Thus, it is possible to know if the situation is degrading (e.g. overexploited) or, on the contrary, if it is improving. Whenever possible, this evaluation should be done during and towards the end of the fishing season. So, we must develop indicators, some of them can be used as proxies to biomass measures giving the Maximum Catch at Equilibrium (B_{MSY}). These indicators must help define the harvest control rules and serve as "triggers" to take the measures that the situation observed would require.

For example, these indicators are of several types:

- Yield of trawl fishery: total catch; catch per effort unit;
- Spatial distribution of fishing effort (a contraction can mean a significant reduction of the resource in some areas, and therefore issues in producing this resource) ;
- Economic indicators (e.g. value of catches compared to operating costs) that could justify changes in fishing strategies and control measures.

This approach is valid both for target species (shrimp) and for "by-catch species."

These indicators should be developed through consultation between the trawl industry, the ministry and scientists. This could be done through a local workshop, for which an external expert could possibly be requested (those experts at 1.1 could be involved).

2 - INFORMATION SYSTEMS

2.1 - Review of the PCT's monitoring system and extension to all fishing areas

PCT's current monitoring system is in line with the methodology defined in the PNRC, with IRD's support since 2005 (IRD, 2008). This monitoring is implemented under the responsibility of the CEPD, which has thirty investigators divided into Zone A (11 investigators) and B (18 investigators) only. Area C is not covered, and only some sites are monitored in zones A and B, those supposed to represent the majority of the traditional fleet. However, even on this reduced number of sites, it is impossible to cover the entire fishing season for lack of resources (only 3 to 4 months covered per year since 2012).

Now is the right time to assess the performance of PCT's current tracking system and to propose a new scheme to take account of developments in fishery (larger number of fishermen, increased number of landing sites and extension of fishing areas, changed gear specifications, etc.)

This new scheme should be based on

- an estimate of the potential fishing effort by implementing a general census of fishing units (framework investigation) taking all developments in fishing techniques into account;

- an estimate of the actual fishing effort based on accurate tracking of the number of fishing operations conducted monthly by each category of gear;
- an estimate of catch per fishing operation for every gear (the notion of fishing day may be particularly unsuited to certain techniques) ;
- a sampling of shrimp catches made for each type of gear to have an image of their structure by species, sex and size.

This scheme is necessary to have a reliable and regular estimate within a reasonable time, regarding PCT's catch, overall and by gear, their spatial and temporal variability (seasons, tides, day/night) and the catch's composition in species, sizes and sex according to these different parameters.

This new scheme will determine the means to be made available to the CEPD in human and financial terms, but must necessarily be designed to meet performance targets: reliability of estimates, respect for timeliness when producing data, etc.

The introduction of the fishing area in the survey questionnaires upon landing will help, in the medium term, better identify the ZCBS or other spatial management measures.

2.2 - Integration of PCT's monitoring data into BANACREM

Currently, BANACREM only collects data from industrial fishing. In order to get an exact idea of catches on the stocks, it is necessary to record all these catches. The catches of traditional fisheries by species and area, should be included in the statistical bases.

2.3 - Review of onboard observation program

In the current program, onboard observers have only one role to play: make sure fishing operations are carried out in compliance with the rules. The forms are only a copy of the fishing books and their reports are merely a certificate of compliance. Therefore, there is some doubt as to the usefulness of this program, which is costly for the industry.

On the other hand, there is a lack of important information on the biology of shrimps and on non-target species (fish, mainly), while the observation coverage is extremely high.

An optimization of the observation program is needed.

As in most observer programs throughout the world, these observers should also have scientific tasks. As such, their mandate should include biological observations:

- For shrimps: quantity (weight and number), size frequency determination, and sex, by species;
- For fish (and possibly other catches: rays, sharks, turtles, etc.): quantity (weight and number), determination of size frequency and sex, by species;
- These data should be collected according to a sampling plan to be clarified with CEPD's biologists.

An agreement must be signed with the CSP, on which the program depends, to change the observers' status and roles.

2.4 - Collection of data on by-catch species

There are currently no statistics on fish species caught by the industrial shrimp fishing. The limited information collected by observers pertains to the main species discarded, and this information is apparently not processed in any way.

For now, the only data available come from the sales of a shipping company, and may not be equivalent to official statistics. Yet, we noticed that the quantity of unloaded fish is constantly increasing. Some species are particularly targeted and others that were discarded are now preserved. The shrimp fishery is becoming more and more a mixed fishery, with activities directed towards the fish.

A good knowledge of fish resources becomes a necessity. It is of an absolute necessity to create a national database on fish ("BANAPOM", National Base on Madagascar's Fish). This database will serve several purposes:

- Information on fish resources useful for national policies on fisheries;
- Management and planning of fishery;
- The diversity of fish (quantity, list of species) is an important indicator of changes in the ecosystem, caused by the activities of catches or by external environmental factors.

This database should follow the BANACREM structure so that both bases are compatible and can be cross-referenced.

2.5 - Fishing area characterization and mapping

The dynamics of fisheries exploitation include not only the landed catches, but also where and when the activity takes place.

For industrial fishing, there are VMS data which, beyond an objective control, represent important information about the number of users in the fishing areas (cf. the action on the development of indicators).This information would be independent from fishing books, i.e. "objective". These data also serve to compare the surface actually trawled and the known habitat of shrimps, and thus serve as indicators of the impact of fishing activities on the benthic environment.

Good knowledge of these fishing areas and the spatial dynamics of PCI trawlers will also be useful in resolving potential conflicts with other seaborne activities, such as the possible exploitation of hydrocarbons.

First, there should be a retrospective analysis of all available data, which requires some time for geomatics technicians. This analysis would be the starting point of a georeferenced database, a cartography (an "atlas" of activities), which would then be fed in real or semi-real time, to allow for testing during a campaign.

We need to note that it is necessary to know the benthic ecosystems in the context of an MSC certification. A complete characterization of trawling areas is not feasible in the short or medium term. There is certainly some historical information, which could probably be compiled. Surveys to search for offshore oil and gas are in progress and are expected to develop; these data could also be used. We should seek the participation of the academia (university, IHSM) as well as the CNRO for this activity.

For traditional fishing, field investigators should, as soon as possible, begin to document the fishing sites, initially in fishermen's own words, then by mapping. Here we build another georeferenced database. This base would help understand the activity's spatial and temporal dynamics. Ultimately, it would also help specify the possible locations of ZCBS or marine protected areas, and to determine

their borders according to geographical landmarks that traditional fishermen can understand, versus longitude-latitude coordinates, with which they are largely unfamiliar.

3 – JOINT MANAGEMENT FRAMEWORK AND MECHANISMS

3.1 – Development Plan of the CEPD

Scientific knowledge should be the basis for decision making. Indeed, the success of the overall action plan described here largely depends on the analysis and treatment of the data that must come from the research sector (natural and human sciences). This work falls within the CEPD's mandate. As part of this plan to improve shrimp fishing, it will particularly have to:

- Evaluate shrimp stocks periodically
- Prepare and monitor indicators of the shrimp fishery; produce periodic reports on the status of these indicators
- Treat the biological samples needed for evaluation
- Keep track of endangered and vulnerable species
- Conduct regular surveys of the PCT's activities and produce regular reports on this activity
- Compile and process data from industrial fishing and on-board observers (shrimp catches); produce periodic reports
- Produce maps of (industrial and traditional) fishing areas.

It is clear that in the current situation, this centre is absolutely unable to fulfil this mandate. It is therefore imperative to prepare a development plan for the CEPD which will include:

- A plan for recruitment and training human resources. This plan must be prepared and implemented immediately, considering that it will take several years for the CEPD to have a competent critical mass of researchers
- A plan for securing the hardware and equipment essential to the required scientific work.

In terms of human resources, the following needs were identified:

- Two biological researchers
- One researcher in sociology and economy
- One GIS specialist
- One statistician
- One data entry operator and data quality control
- Senior research technicians (laboratory work and data collection upon landing)
- An adequate number of field investigators to monitor the PCT.

It is also imperative to provide the CEPD with financial and material resources for it to fulfil its designated mission.

3.2 – Implementation of an enhanced consultation framework

There is already a form of joint management between the industrial fishing and the MRHP. This joint management is currently relatively informal. It is now time to formalize a joint management framework to be endorsed at the ministerial level (order or decree).

In this context, it is proposed that the MRHP sets up a committee on joint management of shrimp fishing. Its mandate and composition will be specified at a constituent meeting which will bring together the MRHP and its related agencies (OEPA, CSP, CEDP, ASH), the MEEMF and GAPCM, representatives of the PCT, covering the fishing areas and representatives of NGOs working in the field (e.g. LMMA).

The MRHP is expected to establish a platform of traditional fisheries by the end of 2015. This platform will identify the relevant PCT representatives.

The committee will set up a technical secretariat to coordinate the actions, maintain the ties between actors, and circulate information.

Ultimately, the PCT is expected to integrate GAPCM, which should facilitate and harmonize joint management actions.

- **The review of industrial fisheries management principles and the review of its rules and instruments for operation control could be part of the mandate of the joint management committee. However, all stakeholders (ministry, industry) believe that the current principles and rules are satisfactory and that there is no reason for revising them for the moment.**

3.3 – Identification of information channels and decision-making mechanisms

Following the establishment of the joint management framework, stakeholders will define which of them will be in charge of producing the necessary information to determine, for instance:

- The performance indicators of trawler fishing: GAPCM provides data (effort and CPUE by area, for target species and by-catch) to the OEPA on a monthly basis; CEPD analyzes the data;
- The CSP provides biological data from PCI observers to the CEDP, after the training for these on-board observers (see Action 2.3) ;
- CEDP investigators monitor the PCT sampled elements and provide indicators of effort and CPUE by gear category and area;
- PCT fishermen provide information on fishing effort per area;
- GAPCM and the CSP provide economic indicators, including the thresholds of profitability of industrial units, taking into account the catches of target species and by-catch; the data are analyzed by OEPA.

For each of these indicators, we will state the rate of production of information (e.g. mid-season and end of season) as well as their format and the framework in which this information will be presented and validated, knowing that the presence of all stakeholders is not strictly necessary for the validation of each type of information.

Depending on the types of indicators, we will compare them with alarm thresholds (action 1.2), the crossing of which should lead to one or more management decisions (distribution of fishing effort by area, change of dates of starting and ending the season, etc.)

The biological data provided by onboard observers and by sampling of landings performed by the CSP (for PCI) and the CEPD (for PCT) will be analyzed at a rate of two to three years by the scientific working groups to be attended by international experts (peer review) and will help update the

structural models for different target species and for fish species making up the by-catch (retained and discarded).

4. PCT'S MANAGEMENT STRATEGY

4.1. Development of a PCT management strategy

In the short term, the MRHP should consider drafting a strategy document for the management of traditional fisheries in general, and traditional shrimp fishing in particular. This strategy should cover all aspects related to traditional fisheries management, including the definition of rights of access to resources, control of fishing effort, monitoring the implementation of business rules and technical measures, control and supervision of branches of products up to their marketing.

This strategy could be developed during a workshop open to a wide base of stakeholders, and should be based on the results of Action 2.1, namely the study of typology of actors in the traditional fishery, to achieve a better definition of the categories of actors now gathered under the name "traditional fishermen" and identify differentiated management options as appropriate.

As part of this strategy, the MRHP should make an accurate identification of ongoing or planned projects and programs in areas where the PCT operates. Indeed, many initiatives are underway along the coast of Madagascar in environmental management and protection. These initiatives are being implemented by several international and national NGOs such as WWF, WCS and Blue Ventures, partly under the coordination of the MEEMF, and relate to the establishment of MPAs or LMMA. To the extent that these organizations have significant resources in the field, both human and material, and operate closest to traditional fishing communities, it would be wise to coordinate their actions at the MRHP's level.

Memorandums of collaboration should be formalized between the MRHP and these organizations to ensure that their interventions fully fit into the strategy defined for PCT management. Formal meetings between these different stakeholders could help facilitate coherence of interventions in the field.

4.2. Identification, awareness and coaching the PCT actors

All measures taken in the recent past to guide the development of traditional fisheries were inadequate or were not conducted during the necessary time. The nature of these measures remains relevant, such as the identification of fishing units (fishermen, canoe, marking of gear) or the minimum size of some nets. These measures should be implemented in the light of more accurate and timely data in the context of Action 2.1, particularly during the implementation of a new inventory of traditional fishing units, then extended to the entire coastline along the west coast of Madagascar, including as well an update of the definition of technical specifications of some devices.

These actions will be coupled with the actions specified in 2.1 and will benefit from the human and technical resources deployed in the field by those NGOs involved in the management and environment conservation.

Beyond the operations to mark vessels and fishing gears, the partners in the field can intervene in information operations and sensitization of stakeholders on regulations concerning the distribution of cards for professional fisherman. This action can also be achieved with the support of duly constituted fishing associations and mandated to identify their membership. The list of these

associations of fishermen will be published and regularly updated to strengthen the monitoring system implemented by the CEPD (Action 2.1) and have a better estimate of the capacity of traditional fishing that exploits shrimp.

These actions should also pertain to the identification of other actors involved in the PCT, firstly upstream operations, including private operators that supply fishermen with fishing gear, and secondly those intervening downstream from the industry, i.e. wholesalers, collectors and traders of products from PCT. In the short term, identifying these actors should allow these professionals to better regulate and ensure the traceability and control of the quantity and quality of PCT products, which will improve parallel evaluation of the quantities of shrimp caught by traditional fishing. These actions will complement or enhance the flow of control measures on the flow of catches by traditional fishing, e.g. by introducing permit quotas for collecting products.

4.3. Support to the professionalization of the PCT and promotion of community management

Other measures, such as the creation of special management areas, also remain relevant but have never been actually tested (Order 2055/2009 on ZCBS Zone A has never been applied). Before continuing on this path, it will be necessary to collect additional information on the strategies of traditional fishing, especially fishing areas and, if possible, to carry out further studies on the geographical origin of post-larvae influencing predominantly on the recruitment of shrimp on which the industrial fishing bases its operations. This study could be made from genetic markers in a two-year period if the necessary resources are available.

Once the areas suitable for management measures are adequately identified, there should be a proper assessment of the impacts of the proposed measures ("no-take zone", prohibition or limitation of certain gear) and to widely inform local fishing communities. The proposed measures should be largely inspired from and/or in line with existing traditional laws (*dina*).

Such studies could also relate to MPAs and Locally Managed Marine Areas (LMMA) recently established or in the process of being so, and allow these areas to contribute more effectively to the management of traditional fishery, e.g. through the management and restoration of mangroves in the most important areas for juvenile shrimps.

More generally, it is convenient to reflect on the possibility of granting access rights to traditional fishermen who are considered to be the most professionalized, rights that could be inspired from the system of concessions granted to industrial fishing (long duration, conditional transferability, etc.) In addition, some consultations should be undertaken to transfer other powers to professional organizations and communities of traditional fishermen, for example in participatory monitoring of fishing areas, consultation designed to avoid conflicts with industrial fishing, management of sites for landing catches, or control of inputs for the manufacture of fishing gear to ensure compliance with regulations.

Stakeholders

Following are the stakeholders identified for the implementation of the Action Plan to improve the shrimp fishery:

Public institutions

- Ministry of Marine Resources and Fisheries
  - Directorate General of Fishing Resources and Fisheries
  - Directorate General of Partnership and Sustainable Development
    Office in charge of Statistics

- Economic Observatory of Fisheries and Aquaculture
- Fisheries Monitoring Centre
- Centre for Studies and Development of Fisheries
- The Malagasy Agency for Fisheries and Aquaculture
- IHSM
- CNRO

- Ministry of Environment, Ecology, Sea and Forestry
  - organizations supervised by the MEEMF

Private sector

- Group of Fish farmers and Shrimp Fishers in Madagascar
- Members of GAPCM – Fishing Division

Civil society and non-governmental organizations

- WWF
- Blue Ventures
- WCS

- Socio-professional organizations representing traditional fisheries

- LMMA Network

The Action Plan Logframe

Indicator of result	Intermediate activities	Officer and partners	Period/deadline	Means	Costs (Euros)
COMPONENT 1 - STOCK ASSESSMENT					
1.1 Peer review of the evaluation models				IP : 1.1.1 1.2.4, 3.2.4.	
▪ Reliable valuation models and validated for operational decision-making ▪ Two national researchers trained in stock assessment	▪ Compilation and validation of the available data ▪ Development of models for assessing stocks of shrimp ▪ Commitment, training and involvement of national researchers ▪ Validation of the scientific approach in working groups	**CEDP**, IHSM, CNRO	End 2016	▪ 2 months int expert. ▪ 1 working group involving national experts	20 k€ 20 k€
1.2 Develop operational benchmarks				IP : 1.1.1, 1.1.2, 3.2.4 1.2.2.	
▪ Real or semi-real time monitoring indicators on the situation of fishery ▪ Benchmarks are developed	▪ A working group with the support of an international expert	MRHP, **CEDP**, OEPA, GAPCM, IHSM, CNRO	January 2016	▪ 1 month int. expert (idem action 1.1) ▪ 1 working group involving national experts	PM 10 k€
COMPONENT 2 – INFORMATION SYSTEMS					
2.1. Review of the PCT system for monitoring and extension to all fishing areas				IP : 1.1.1, 1.2.3, 3.2.4	
▪ Performance of the PCT's current monitoring system evaluated ▪ New monitoring scheme of the PCT	▪ Study of the PCT typology ▪ Implement the sampling plan	**CEDP**, OEPA, DSP, DRRHP	May 2016	• 2 national experts • Field mission (2h x 3 months) • 1 month international expert if needed	PM 12 k€ 10 k€

approved and budgeted					
2.2. Integration of PCT's monitoring data into BANACREM				IP : 1.1.1, 1.2.3, 3.2.4	
▪ A comprehensive and reliable database on all shrimp fisheries	▪ Integrate PCT data into BANACREM	**CEDP**, Department of Statistics, OEPA, DRRHP	June 2016	CEDP staff	PM
2.3. Review of onboard observation program				IP: 1.1.1, 1.2.3, 2.1.1, 2.1.2, 2.1.3, 2.2.1, 2.2.2, 2.2.3, 3.2.4.	
▪ Appropriate information to decision-making ▪ An optimization program ▪ Action Plan finalized ▪ Trained observers	▪ Working meeting between the CEPD, the CSP, the IHSM, the industry ▪ Development of an action plan ▪ Observer upgrade program	**CSP** with support of CEDP and IHSM, GAPCM	Meeting before the end of 2015 Action plan before beginning of 2016 campaign	▪ Meeting ▪ Two training sessions for 10 observers for 10 days	5 k€ 25 k€
2.4. Collection of data on by-catch species and discards				IP: 2.1.1, 2.1.2, 2.1.3, 2.2.1, 2.2.2, 2.2.3, 3.2.4 2.3.1., 2.3.2., 2.3.3.	
▪ Appropriate information to decision-making ▪ Monitoring of fish catches required to manage and ecocertification	▪ Working meeting between the CEPD, the CSP, the IHSM, the industry (2.3) ▪ Review of logbooks ▪ Review of data collected on board (see 2.3) ▪ Creating a database for by-catch, discards and vulnerable species	GAPCM, Department of Statistics, **CEDP**, CSP, OEPA, IHSM, CNRO	Meeting by end of 2015 Action plan before beginning of 2016 campaign	▪ Meeting and training sessions scheduled in 2.3	PM
2.5. Fishing area characterization and mapping				IP : 3.2.4 2.4.1, 2.4.2, 2.4.3	
▪ Better monitoring of fishing activities for decision-making ▪ Indicator of trawling's	▪ Implementation of a memorandum between CSP, GAPCM, CEDP ▪ Creating a dynamic atlas based on VMS data	**CSP**, **CEDP**, IHSM, CNRO, GAPCM, DRRHP	VMS database by end of 2016 Mapping by end	▪ Local expertise in Geomatics or 1 month intern. expert. ▪ Computer and	10 k€ 5 k€

impact on the ecosystem ▪ Elements for spatial management of fisheries, including PCT; establishing ZBCS or AMP	▪ Summarize existing data on benthic habitats ▪ Develop a data collection program on ecosystems ▪ Mapping of major marine ecosystems ▪ Collecting information on PCT fishing areas (see 2.1) ▪ Mapping of PCT fishing areas ▪ Creating a georeferenced database ▪ Hiring of a GIS expert and biologist by the CEPD		of 2018 PCT database by early 2017	software to process data ▪ Local Expert in biology	PM
COMPONENT 3 – COMANAGEMENT FRAMEWORK AND MECHANISMS					
3.1. Development Plan of the CEPD				IP : 1.1.1, 1.1.2, 1.2.3, 1.2.4, 3.2.4 1.2.2, 2.4.1, 2.4.2, 2.4.3	
▪ The CEPD is able to meet the needs of management and decision-making	▪ Recruitment and training of scientific personnel required to implement the Action Plan ▪ Purchase of computer equipment, laboratory and land necessary for scientific activity	**MRHP and CEDP**	End 2017 to set up a complete team	▪ CEPD budget for salaries ▪ Equipment	PM 20 k€
3.2. Implementation of an enhanced consultation framework				IP : 3.1.2, 3.2.2, 3.2.5 3.2.1	
• Establishment of a formal framework for joint management of fishery, endorsed either by order or by decree	• Establishment of the Committee by the MRHP (mandate and composition) • After creation of the Traditional Fishing platform (late 2015), identification of one PCT representative per area and appointment of a technical secretariat • Holding the inaugural meeting of the Committee • Integrating the PCT within the GAPCM	**MRHP** and related organizations (OEPA, CSP, CEDP, ASH), MEEMF, GAPCM, PCT representatives, LMMA network	July 2015	• A meeting 20 people • 1 week external expertise in support • Exchange visit in the subregion for 5 people	5 k€ 5 k€ 10 k€

3.3. Identification of information channels and decision-making mechanisms				IP : 3.1.2, 3.2.2, 3.2.5  1.2.1, 1.2.2 	
▪ Routine production of indicators and proposals for measures at short notice ▪ Approach for an adaptive management to the condition of the resource	▪ Maintain regular communication mechanisms between the MRHP and GAPCM ▪ Study the equivalent information exchange mechanisms for PCT ▪ GAPCM provides monthly data (effort and CPUE per area) to the OEPA ▪ CSP provides PCI biological data to the CEDP after training onboard observers (see 2.3) ▪ CEDP investigators monitor PCT sample and provide indicators of effort and CPUE by gear category and area ▪ PCT provides information on fishing effort by area ▪ Consultation to resolve and avoid conflicts between PCI and PCT	**MRHP, GAPCM, PCT** and all stakeholders	In routine 2016 and 2017	▪ 2 meetings per year (during the pause and during the campaign) ▪ 2 weeks external expertise in support	10 k€ 10 k€
COMPONENT 4 –DEVELOPING A MANAGEMENT STRATEGY OF THE PCT					
4.1. Development of a PCT management strategy				IP : 3.1.1, 3.1.3, 3.2.1 	
▪ Strategy Paper for PCT management coordinated by MRHP	▪ Working Group to design a PCT management strategy ▪ Mapping of non-governmental actors working in the field ▪ Formalizing partnerships between the MRHP and NGOs working in the field	**MRHP** and **NGO** (WWF, WCS, BV, etc.), DRRHP	2015-2016	▪ A workshop to draft the Strategy Paper ▪ 2 consultation meetings between the MRHP and NGOs	5 k€ 2 k€
4.2. Identification, awareness and coaching PCT actors				IP : 3.1.1 	

▪ Set of effective measures to supervise the PCT and control product flow	▪ Census of fishermen simultaneously with allocation of maps, marking canoes and gear (see Action 2.1) ▪ Publication of fishermen's organizations entitled to participate in fisheries management ▪ Identification and coaching of actors linked to the PCT (ship owners, collectors, wholesalers, etc.) to ensure product traceability ▪ Information/awareness of current regulations including issuing cards	**MRHP**, CSP and NGO (WWF, WCS, BV, etc.)	2015-2016	▪ Creating tools to identify actors and production units ▪ Means of intervention on the ground	50 k€ 200 k€
4.3. Support for the professionalization of the PCT and promotion of community management				IP : 3.1.2, 3.1. 4	
• Package of measures to professionalize the PCT, control access to resources and develop local management systems recognized and accepted by the communities	• Implementation of ZCBS • Further studies on ZCBS and AMP (limits, rules, ecological studies related to the biology of shrimp, etc.) • Continued actions of community management including mangrove management and participatory monitoring in ZCBS, LMMA and AMP • Study of supply options in adequate inputs for PCT • Actions for participatory management of the PCT unloading points	**MRHP**, CEDP, IHSM, **NGO** (WWF, WCS, BV), LMMA network, AMP, **MEEMF** and **GAPCM**	Starting from 2016	Means to be defined later	Costs to be set

Budgetary considerations

The budget estimates contained in the logical framework above are for information purposes only and will be refined by the stakeholders.

Nevertheless, we need to distinguish several possible and desirable sources of financing for different categories of needs identified.

- The recruitment and salaries of the administrative staff should always be paid from the budgets of the relevant institutions to ensure sustainability of the fishery management system. In most cases, the cost is not estimated and “Pour Mémoire” (PM) is written in the cost column of the table.
- Recurrent operating costs such as meetings should be covered by the various stakeholders involved, and if the parties would not be able to finance their participation, the other parties should assist in this respect.
- Occasional costs such as purchases of equipment or occasional field operations could be borne by one or more parties, or exceptionally by some external partners to be identified.

In any case, we should note that the action plan's funding requirements are largely dependent on state budgets to be allocated to the relevant public institutions. Other costs, relatively low overall, should be covered by other stakeholders, including industrial ship owners and NGOs operating on the ground. Component 4, which relates more specifically to the supervision of traditional fishing, is the one that shows the most important needs in financial terms, and it seems quite logical to seek external partners to support them, giving priority to NGOs present in Madagascar if their future interventions are in line with the strategy defined by the MRHP for traditional fishing.

Summary of assumptions and risks

- Assumptions

The future document of Sector Policy and the new Law on Fisheries give priority to the certification of industrial shrimp fishery.

These policies and legal frameworks are compatible with the proposed action plan and the administration agrees to initiate a review of the EPA's mandates (OEPA, CSP, CEDP).

The means, in human and financial terms, necessary to carry out the mandate of the CSP, the CEPD and OEPA are available in the short term.

The GAPCM members remain broadly in favour of the current process.

- Risks

The impacts of traditional fisheries are not properly valued and the assessment of the stock of shrimps remains uncertain for another year or more.

Information on by-catch is not available, preventing any possibility of certification.

SECTION 4 – ANNEXES

Background Documents

Minutes of the national validation workshop for the Action Plan

Opening remarks at the National workshop

Terms of Reference of the National workshop

Agenda of the National workshop

List of Participants

Background documents

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- Decree No. 2007-957 of 31 October 2007, determining the conditions for the exercise of fishing in coastal shrimp.
- Order No. 16952/2008 of ……, determining the administrative procedures for the management of industrial and traditional fishing rights for coastal shrimp.
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METHODOLOGY

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Minutes of the national workshop to validate the Action Plan

NATIONAL CONSULTATION WORKSHOP FOR

DEFINING THE PLAN TO IMPROVE INDUSTRIAL SHRIMP FISHING

IN MADAGASCAR

Le Pavé, Antananarivo

5 - 6 May 2015

WORKSHOP REPORT

May 2015

EXECUTIVE SUMMARY

The National Consultation Workshop to define the Improvement Plan for industrial shrimp fishing in Madagascar was held at the Hotel / Restaurant "Le Pavé" in Antaninarenina, Antananarivo, on May 5-6, 2015. The workshop was officially opened by three speeches delivered successively by Claude BRUNOT, Chairman of the GAPCM (Group of Fish farmers and Shrimp Fishers in Madagascar); Gérard RAMBELOARISOA, Conservation Director of WWF Madagascar; and Jean Jacques RASAMOEL, Secretary General of the Ministry of Marine Resources and Fisheries, representing the Minister.

The workshop began with a presentation by Mr. Martin PURVES, Representative of the Marine Stewardship Council (MSC), on the MSC ecolabel and standards, as well as projects to improve fisheries in general, with the specific example of a project to improve a shrimp fishery in Suriname.

Mr. Andrianirina RALISON, as a representative of the Steering Committee, made a presentation on the background and current status of shrimp fishing in Madagascar, as well as the development the project for improved industrial shrimp fishing in Madagascar. He concluded his presentation by stating the expected of the workshop results.

Then, Jean Claude BRETHES and Philippe TOUS, consultants from Oceanic Développement, presented the state of the shrimp fishery in relation to MSC standards and the proposed draft action plan to address the gaps identified.

Following the presentation of the action plan, the participants were divided into two (2) working groups to discuss the details of the action plan: group 1 was tasked with discussing actions related to stock assessment and information systems, while group 2 addressed in greater detail the framework and mechanisms for co-management. The working groups were held during the afternoon and the morning of the following day.

Next, the participants then met in plenary. The minutes of the discussions of each working group was presented by Mr. RETHES and TOUS, and all participants were invited to provide their comments and suggestions. Their contributions were taken into account upon developing final action plan.

Mr. Ruffin SAMBANY, a member of the Steering Committee, then presented the whole revised action plan for final adoption. The Action plan was unanimously approved by the participants.

Finally, Mr. Didier VAN, also a member of the Steering Committee, briefed the participants on the process for implementing the action plan as well as possible funding sources.

To close the workshop, Minister AHMAD intervened to commend everyone’s active participation and pledged full commitment by the administration on this FIP project. The long eco-certification process must start now, and has to be led under the sign of dialogue and transparency.

1. INTRODUCTION

Shrimp trawl fishery in Madagascar began in the 1960s on the Northwest Coast. Many boats were developed very quickly and as of the early 2000s, the fleet had a total of 70 industrial and 36 artisanal trawlers. Traditional fishing has been practiced for many, many years. Industrial and traditional fishing sectors are catching shrimps from the same stock but in different habitats. Products from traditional fisheries are primarily for local consumption, while industries export most of their catch.

In order to achieve sustainability for shrimp fishery, which had become the first provider of foreign currency to the national economy, various initiatives were taken, such as the "Project for the sustainable management of the shrimp resource" (PGDRC) which was set up in the early 2000s. Some management tools were created, including the National Research Program on Shrimp (PNRC), the Economic Observatory for the Shrimp Industry (OEFC) and the Fisheries Monitoring Centre (CSP). Some fishery management measures have been implemented (e.g. regulation principle based on trawlers' head ropes) and new regulations for fishery management have been developed and published. An early dialogue between industrial and traditional fishermen had also been initiated.

Unfortunately, such efforts have been unsuccessful and the industrial and artisanal fisheries are facing a crisis. The fleet began to decline in the early 2000s. In 2012, there were only 50% of the industrial fleet left while the artisanal fleet had completely disappeared, causing many people to lose their jobs. On the other hand, catches fell by 30% between 2005 and 2011, a sign of apparent decline in stocks. Meanwhile, available data and information suggest that there were increased effort in traditional fishing recently.

The stakes are high for Madagascar: shrimp export accounted for about 7% of the value of exports from Madagascar in all sectors between 2008 and 2012 (the share of shrimp in fishery exports dropping nevertheless from 68% to 53% in value during the same period). In 2012, the industrial fleet caught a total of around 3,800 tons of shrimps (yet approximately 9,000 tons in 2002).

In November 2014, the Ministry of Marine Resources and Fisheries (MRHP), the GAPCM and the World Wide Fund for Nature (WWF) signed a Memorandum of Understanding to implement a Fisheries Improvement Project (FIP) in Madagascar. The three parties hired a consulting firm to implement the first stages of this project, namely the development of a proposal for FIP, including a framework document and a draft action plan. Then, this National Consultation Workshop was held in order to define and adopt the proposed Action plan representation of all stakeholders.

2. HOW THE WORKSHOP DEVELOPED

The National Consultation Workshop to define the improvement plan for the industrial shrimp fishery in Madagascar was held at the Hotel / Restaurant "Le Pavé" in Antaninarenina, Antananarivo, on May 5-6, 2015. It brought together forty participants representing all stakeholders (see attached list of participants).

The workshop was conducted in French, with Malagasy translation. The workshop was facilitated by Mr. Juan Pedro MONTEAGUDO, an international expert in the field of fisheries and familiar with the FIP process.

The workshop was officially opened by three remarks delivered successively by Claude BRUNOT, Chairman of the GAPCM (Group of Fish farmers and Shrimp Fishers in Madagascar); Gérard RAMBELOARISOA, Conservation Director within WWF Madagascar, and Jean Jacques RASAMOEL, Secretary General of the Ministry of Marine Resources and Fisheries (MRHP), representing the Minister.

A. First plenary session

Three major issues were discussed during the morning of the first day. After each presentation, plenary discussions were briefly opened for clarification questions, to allow participants to discuss the Action Plan during the working group sessions.

The first presentation was made by Mr. Martin PURVES, Southern Africa Program Manager on the MSC and fishery improvement projects (Fisheries Improvement Projects - FIP). There was an overview of the MSC was provided, then an explanation on the principles for MSC certification, as

well as the benefits related to the FIP process and MSC certification. There was also a discussion on the use of eco-certification as a conservation tool, then Mr. PURVES explained to the audience how the FIP progresses (development and implementation). Finally, some specific examples were also presented, namely pertaining to the benefits of certification for fisheries and the initiatives in order to involve all stakeholders. These were mainly case studies of the clam in Ben Tre (Vietnam) and India, sole in Gambia and shrimp fishing in Suriname.

Then, Mr. RALISON Andrianirina, representative of the FIP Steering Committee provided the audience with the historical background on shrimp fishing in Madagascar, as well as its current status, at the same time for industrial, artisanal and traditional fishery. He addressed the plight of the resource, resulting in very significant reductions in many sectors. The general context, biology, economic issues and the potential causes of the industrial shrimp fisheries crisis were explained. He informed the participants about the history of the approach towards MSC eco-certification in Madagascar and the FIP process. He concluded by stating the results expected for the workshop, the main objective being the completion of an Action plan approved by all participants.

The experts from Oceanic Développement delivered the last presentations during the plenary. Mr. Jean Claude BRETHES first presented the state of industrial shrimp fishing in Madagascar compared to MSC standards, based on the updating of the final pre-assessment that they had conducted. Then, Mr. Philippe TOUS specified the processes for developing the action plan, which was the subject of the working groups.

The presentations stirred some comments from the participants, including a suggestion from Martin PURVES to use the "benchmarking tool", a tool developed by MSC to monitor the progress of the implementation of the FIP. Regarding Oceanic Développement's report, participants were invited to submit by email any comments requiring no substantive discussion or not related to the action plan.

B. Working Groups

In the afternoon, participants broke into two working groups to work on the activities of the action plan to make sure it reflects the contributions of all stakeholders.

Group 1 was tasked with the aspects relating to stock assessment and information systems, while group 2 focused on frameworks and management mechanisms.

The group discussions went on until the first coffee break of the second day. An expert from Oceanic Développement was present in each group. The section below shows a summary of the discussions in both working groups.

Group 1

Action 1.1 Review of evaluation models:

The debate focused on implementation means and the need for an international or national expertise in a context where national capacity does not yet exist. The CEDP and the IH-SM shall take over to ensure the sustainability of the action.

Action 1.2 Develop operational benchmarks.

General agreement on the need to define a trigger threshold for biological relevance or the level of catch per unit effort. This action will be led by the CEDP.

Action 2.1 Review and extension of the traditional shrimp fishery monitoring system on all areas.

Issues pertaining to the lack of funding to carry out that activity over one year were discussed. The participants agreed on the need to develop a sampling plan to make a study of the typology of traditional shrimp fishing, and monitor the daily catch per fishing gear and fishing technique (as well as rhythm and seasonality) in order to make a reliable extrapolation. National expertise was solicited, to be supported by international expertise if necessary.

Action 2.2 Integration of data on the monitoring of traditional shrimp fishing into the ANACREM.

No discussions on this action, the leader is still the CEDP.

Action 2.3 Review of the onboard observer program.

This action is aimed at giving an added value to current observations, particularly for scientific data collection (biological sampling: sexing, height, weight, etc.), observation of by-catches and vulnerable species (marine mammals, sea turtles, etc.), without neglecting control at sea.

Participants proposed an upgrade of the pool of observers already set up. A work meeting between the CSP, the EDPS, the IHSM and GAPCM is to be organized by the end of 2015 to discuss the details and implications of this action (as well as to define the coverage rate by the fleet by onboard observers).

Action 2.4 Monitoring the by-catch.

Given the increasing fish catches by the trawls, it is important to monitor those by-catch useful for the management, eco-certification as well as for decision-making. Participants agreed on the sub-activities to be implemented and on responsibilities.

Action 2.5 Mapping of the fishing areas

The purpose of this activity is to study the impacts of industrial shrimp fishing on the seabed. The group proposed to draft a MOU between the CSP, the EDPS and GAPCM to create a dynamic atlas from aggregate VMS databases. There were also suggestions to create a mapping of marine ecosystems, organize the collection of information on traditional fishing zones and come up with a map of these fishing areas.

Group 2

Action 3.1 Create an improved framework for dialogue

It is imperative to integrate traditional fishermen into the system (some regions already have platforms of traditional fishermen). The responsible entities identified for this action are the MRHP, GAPCM the MEEMF and groups of traditional fishermen per fishing area. The MRHP will be in charge of setting up this joint management committee and validating the mandate and putting it together in compliance with the regulatory text.

There was a proposal to set up a technical secretariat of the group of traditional fishermen, and integrate this platform into the GAPCM.

Action 3.2 Information circuits and decision-making mechanisms.

The participants discussed ways to get the dynamic data necessary for the co-management of the fishery, particularly through the GAPCM or by changing the onboard observer program. In this context, it is important to organize and professionalize the traditional fishing sector, but that requires substantial resources. This is also important for the finalization of the allocation of fishers' cards by the MRHP, which requires membership in a group of fishermen recognized by the MRHP and adequate means. The NGOs present in some areas could support such process.

Action 3.3 Review of the principles of industrial fisheries management

Participants agreed to remove this activity from the action plan.

Action 3.4 Revaluation of existing management measures

Participants agreed to remove this activity from the action plan.

Action 3.5 Review of harvest control rules and instruments

The GAPCM is able to change fishing strategies based on the indicators.

Action 3.6 Development of management measures for traditional fishing

The importance of granting the fishers' card was again raised, especially to cope with the strong migration of occasional fishermen, and to be able to differentiate the categories of fishermen. The study of the typology of traditional shrimp fishing, as proposed by group 1, will also be important at this level.

As to enforcement, the intervention of the Regional Directorates for enforcing the existing texts should be improved, while management and community supervision need to be promoted.

Other avenues for improving traditional fisheries have been proposed, such as the review and resumption of the ZAC project and the management of marine protected areas.

Conflicts between industrial and traditional fishermen were also mentioned several times, and potential solutions were proposed.

It will be necessary to draft a clear framing of all these activities in the action plan.

C. Second plenary session

After the group works, participants met in plenary. The action plans reviewed by both groups were presented and received questions, comments and suggestions from all participants.

Discussions mainly related to the need to manage conflicts between traditional and industrial fishermen, and the importance of developing a strategy to manage and professionalize traditional shrimp fishing. The action plan has been revised on the basis of contributions from participants.

Mr. SAMBANY, member of the Steering Committee, then presented the entire revised action plan for final adoption. The Action plan was unanimously approved by all participants.

Mr. FOURGON, also a member of the Steering Committee, briefed the participants on the next steps for the project as well as the implementation processes. The Steering Committee will be responsible for promoting and coordinating the implementation of the Action Plan and monitoring and reporting on any progress. An annual meeting will be held for the sake of monitoring and possible review of the FIP. The Steering Committee will also support the research for the necessary funding for implementing the FIP, and contact potential donors and partners.

Finally, Mr. FOURGON outlined the results of the workshop to Minister AHMAD.

Minister AHMAD closed the workshop at 17:00h. He commended everyone's active participation and pledged full commitment from the administration on this FIP project. The eco-certification process will be long and must start now, and must be run under the sign of dialogue and transparency.

Opening remarks at the national workshop

Speech by MR. Claude BRUNOT – Chairman of the GAPCM

Distinguished Representatives of the Ministry of Marine Resources and Fisheries;

Mr. WWF Representative in Madagascar;

Distinguished Representatives of NGOs and state institutions;

Distinguished Representatives of various agencies and organizations;

Honorable guests;

Ladies and Gentlemen.

The shrimp trawl fishing as practiced by the members of GAPCM has already existed for 50 years now.

In the early 2000s, it had mobilized up to a hundred naval units, including 70 high-performance industrial trawlers and thirty small-scale units; representing thousands of jobs both at sea and ashore in packing plants, logistics support facilities (workshops, offices, self-control laboratories, etc.)

Thus, for decades, shrimp remained the first export product from Madagascar, before cash crops such as coffee or vanilla.

The Malagasy shrimp fishery is sequential; i.e. it is made of two main segments, namely a segment called traditional, and an industrial one.

Both exploit the same resource but operate in different places and at different stages of biological development.

Without underestimating traditional fishing during this workshop, we will look particularly at the industrial segment, which is primarily responsible for the prominence of the Malagasy shrimp in the national economy and its recognized excellence in international markets.

Since its creation in 1994, the GAPCM had carried out various activities in connection with the Fisheries Administration under a thoroughly thought co-management.

In collaboration with the Ministry in charge, the objective has always been to consolidate the sector's activities, either at the institutional, economic, social or environmental level.

These actions include namely the following:

- creating the PNRC (now called CEDP),
- creating the OEFC (now called OEPA),
- studies on the optimization of trawls,
- preservation and identification of marine turtles,
- creation of specific port infrastructure,
- carbon footprint of its members,
- the ZAC project designed to integrate traditional fishermen,
- trials on the use of bio-fuel by trawlers, etc…

In short, all actions that can contribute to sustainable and responsible exploitation of the resource, also with repeated steps towards MSC eco-certification of industrial fishery.

We said "repeated steps" for MSC eco-certification, because the step to start the process, namely the pre-assessment, had been carried out on 2 occasions, but had no final implementation.

Recently, a 3rd pre-assessment has been undertaken, we hope that it will eventually lead to tangible results.

The MSC eco-certification is all the more necessary as it is understood to be one of the solutions, not only to make sure that shrimp farming as a whole is economically and environmentally sustainable in Madagascar, but also to represent one of the options for the recovery of the shrimp trawl fishery, which has suffered a crisis for some years now.

Thus:

- small scale shrimp fishery has come to a complete stop since 2010;

- industrial shrimp fishing has shrunk by almost half, both in number of vessels, quantities of catches, employment, foreign exchange earnings and in tax contributions to the state's funds.

The GAPCM and its members do not plan to just witness this development but continue to react and address it.

So today, with the support and understanding of WWF and with assistance from the Fisheries Administration, with everyone's involvement, we will make a further important step to move towards eco-certification of the shrimp industry.

Our workshop will therefore have the following main focus:

- first of all, validating the 3rd pre-assessment report drafted earlier,

- then, adopt the ensuing action plan.

Let us not fool ourselves: there is still a long road ahead towards the MSC eco-certification.

Our goal remains ambitious, up to what the shrimp industry represents in the Malagasy economy and this product's prestige in foreign markets.

So, on behalf of GAPCM, thank you for responding to the invitation and thus contributing to this workshop to enable us to achieve all these objectives together.

Ladies and gentlemen, thank you for your attention.

Speech by MR. Gérard RAMBELOARISOA – Conservation Manager, WWF Madagascar

Dear Minister,

Distinguished Representative of the GAPCM

Dear partners and colleagues,

Dear participants,

WWF is always ready to lend its expertise to support the environmental improvement project of industrial shrimp fishing in Madagascar. Our organization works to preserve the environment. Particularly for the fisheries sector, our action is mobilized around the promotion of sustainable fisheries and the rational use of natural resources, in this case, a proper management of shrimp stocks.

For WWF, the main challenge of this project is to develop sustainable and environmentally friendly fisheries. There are many benefits to that. A well-managed fishery is not only essential for this promising sector to come back to life, but it also allows to have a healthy stock. We need everything from fishing methods to the conservation of mangroves, natural shrimp nurseries, healthy and rational approach, for both the traditional and the industrial sector. This is why WW, along with the GAPCM and the Ministry of Fisheries and Fish Resources, decided to consolidate our efforts to promote a socially and economically viable, and an environmentally acceptable sector.

The implementation of the Fisheries Improvement Project is a long process. Today, thanks to our joint efforts with inclusive and iterative process, and the support from Oceanic Développement's experts, we were able to develop the draft Action Plan as a framework for intervention to improve the shrimp sector, and achieve the MSC certification's standards.

I urge everyone to take an active part in this workshop since we will need the opinions and expertise of different groups (industrial & traditional fishermen, NGOs, ministries) to facilitate the implementation of this Action Plan; and in order to achieve sustainable, win-win exploitation of our shrimp resources.

WWF will always be present and reaffirms its commitment to support such initiative, especially for a sector set to be an engine of development.

Ladies and gentlemen, thank you.

Speech by Jean-Jacques RASAMOEL, Secretary General of the MRHP

Ladies and gentlemen, Representatives of actors in the shrimp sector

Ladies and gentlemen, representatives of our partners

Dear colleagues and friends,

We are here to defend the same conviction: the one that tells us that our sector, shrimp fishing, is a promising sector that deserves its place in Madagascar's development. We know that through this sector, an industry is waiting to bloom again, traditional fishing can feed families and pink gold is likely to become an economic lever for Madagascar.

By partnering with the Association of Fish farmers and Shrimp Fishers in Madagascar and WWF, the Ministry of Fishing and Fishery Resources has decided to take up the challenge to make sure this sector becomes again the pride of a local and national economy. Thus, in November 2014, our three entities have signed this MOU for a project to improve industrial shrimp fishing in Madagascar. This is also the reason we are all here together, in this workshop.

By signing this agreement, we are consolidating our common approach towards a sustainable shrimp sector. We join efforts for the sound management of our reserves, the application of environmentally-friendly fishing methods. Ensuring the ecological and environmental dimension of the shrimp sector's operation, also means ensuring that our reserves are used in a rational fashion. Knowing that traditional fishing sustains some 95,000 people in the northwest of Madagascar, and that industrial fishing provides 1,323 direct jobs, the fact of better managing our shrimp stocks will allow our local and national economy to rebound rapidly.

Dear partners, I can only commend and encourage your involvement, which reflects a common awareness of the urgency and importance of setting up and running an action plan to improve shrimp fishing in Madagascar. Over the next two days, your opinions and recommendations regarding our project of improvement will be collected and together we will draw out a common strategy to achieve the certification standards of the Marine Stewardship Council. Thanks to your involvement today, Madagascar has the necessary foundation to become again the leader in the shrimp fishery. I can only encourage you and welcome your involvement and wish that these days of sharing and reflection be rich and fruitful for all. Ladies and gentlemen, I declare the National Consultation Workshop dedicated to the improvement plan for industrial shrimp fishing in Madagascar is now open.

I wish you have fruitful working sessions.

Terms of Reference of the National Workshop

Title **:** National Consultation Workshop to finalize the plan to improve industrial shrimp fishing in Madagascar

I. Background

Shrimp trawl fishery in Madagascar began in the 1960s on the Northwest Coast. Many boats were developed very quickly and as of the early 2000s, the fleet had a total of 70 industrial and 36 artisanal trawlers. Traditional fishing has been practiced for many years, in or near mangroves, and is done on foot or by using a paddle-operated boat or sailing boats. Industrial and traditional fishing sectors are catching shrimps from the same stock but in different habitats. Products from traditional fisheries are primarily for local consumption, while industries export most of their catch.

In order to achieve sustainability for shrimp fishery, which had become the first provider of foreign currency to the national economy, various initiatives were taken, such as the "Project for the sustainable management of the shrimp resource" (PGDRC) which was set up in the early 2000s. Some management tools were created, including the National Research Program on Shrimp (PNRC), the Economic Observatory for the Shrimp Industry (OEFC) and the Fisheries Monitoring Centre (CSP). Some fishery management measures have been implemented (e.g. regulation principle based on trawlers' head ropes) and new regulations for fishery management have been developed and published. These include the mandatory VMS on vessels, freeze of fishing permits, increased mesh, prohibition of scraper chains for trawls and prohibition of non-selective fishing techniques, mandatory TED and BRD, etc. An early dialogue between industrial and traditional fishermen had also been initiated.

Unfortunately, such efforts have been unsuccessful and the industrial and artisanal fisheries are facing a crisis. The fleet began to decline in the early 2000s. In 2012, there were only 50% of the industrial fleet left while the artisanal fleet had completely disappeared, causing many people to lose their jobs. On the other hand, catches fell by 30% between 2005 and 2011, a sign of apparent decline in stocks. Meanwhile, available data and information suggest that there were increased effort in traditional fishing recently.

It is in this context, aggravated by the economic crisis, that the various actors (fisheries administration, industrial ship owners, traditional fishermen, etc.) have met during a "Day to reflect on the recovery of shrimp fishing" held Mahajanga in February 2012, and took a recommendation related to the mandatory resumption of the MSC (Marine Stewardship Council) certification process for the shrimp fishery. The stakes are high for Madagascar: shrimp export accounted for about 7% of the value of exports from Madagascar in all sectors between 2008 and 2012 (the share of shrimp in fishery exports dropping nevertheless from 68% to 53% in value during the same period). In 2012, the industrial fleet caught a total of around 3,800 tons of shrimps (yet approximately 9,000 tons in 2002). In social terms, traditional fishing is thought to sustain some 95,000 people in the northwest of Madagascar, while industrial fishing provides 1,323 direct jobs.

The GAPCM (Group of Fish farmers and Shrimp Fishers in Madagascar) had already initiated a process of certification on two occasions (2003 and 2009), and 2 MSC pre-assessments were conducted. Back then, the main problems and obstacles to certification were 1) lack of monitoring, control and surveillance of traditional fisheries, 2) non-selectivity of traditional fisheries, 3) lack of data on stocks of shrimp, 4) lack of data on by-catch and the ecological impact of the fishery, and 5) uncertainty regarding the future of the PNRC and research directions.

In November 2014, the Ministry of Marine Resources and Fisheries (MRHP), the GAPCM and the World Wide Fund for Nature (WWF) signed a Memorandum of Understanding to implement a Fisheries Improvement Project (FIP) in Madagascar. The three parties hired a consulting firm to implement the first stages of this project, namely the development of a proposal for FIP, including a framework document and a draft action plan. A stakeholder consultation is currently underway to finalize these documents and will end with the national consultation workshop to be held in May 2015.

II. Participants

All stakeholders in the shrimp fishery in Madagascar.

III. Workshop Objectives

Following are the main objectives of this workshop:

- Updating the participants on the MSC standards and certification, as well as on the process of fishery improvement plan;
- An exchange of experiences on shrimp fishing in Madagascar among participants;
- Presentation of the proposed FIP, including the framework document of fishery and the action plan;
- Consultation of all stakeholders on the FIP project;
- A common understanding of the current state of industrial shrimp fishing in Madagascar, challenges and strategies to be implemented to achieve MSC standards;
- Agreement of all stakeholders on the FIP action plan including activities, responsibilities, timelines, key performance indicators and associated budgets;
- Identification of avenues for financing the implementation of the FIP.

III. Deliverables

- A detailed workshop report,
- A final FIP validated by all stakeholders including:
    - A final scoping document. This section contains a summary of the MSC pre-assessment already carried out in 2010, and any change that would have occurred since 2010. The performance of the industrial shrimp fishing is assessed against the MSC standard. Any issues, gaps and barriers to MSC certification will be identified. This section also includes potential strategies to be implemented to improve the sustainability of fisheries.

- A final action plan which lists the activities that will help the shrimp fishery compensate for any weaknesses identified. This action plan will include the steps, activities, parties in charge, key performance indicators and the implementation schedule.

IV. Duration of the workshop

May 5-6, 2015: 2 days.

Agenda of the National Workshop

AGENDA

National consultation workshop to

define the plan to improve industrial shrimp fishery

in Madagascar

Le Pavé, Antananarivo

May 5 - 6, 2015

Tuesday, May 5, 2015

Time	ITEM	ACTION
9:00 **9:30**	**- Keynote speech by the GAPCM and WWF.** **- Opening of the workshop by the MRHP**	**WWF and GAPCM, MRPH**
9:30 **10:10**	**Presentation of the MSC and fishery improvement projects**	**MSC**
10:10 **10:40**	**COFFEE BREAK**	
10:40 **11:10**	**- General presentation of the FIP process in Madagascar** **- Presentation of the workshop objectives and deliverables**	**Steering Committee**
11:10 **12:45**	**- Presentation of the situation of fisheries in relation to MSC standards** **-Presentation of the proposed action plan**	**OD**
12:45 **13:45**	**LUNCH BREAK**	
13:45 **16:00**	**Break up into working groups** <u>Group 1: Assessment of stocks and information systems</u> 1. Review of evaluation models 2. Develop operational benchmarks 3. Review the PCT monitoring system 4. Integrate the PCT monitoring data 5. Review the sea observation program 6. Collect data on by-catch 7. Characterization and mapping of fishing areas 8. Characterization and mapping of the benthic ecosystems <u>Group 2: Co-management framework and mechanisms</u> 9. Create an improved framework for dialogue	**G1+G2**

	10. Identify information circuits and decision-making mechanisms 11. Review the principles of industrial fisheries management 12. Reassess existing management measures (techniques, spatiotemporal, etc.) 13. Review the rules and instruments to control operation 14. Develop management measures for traditional fisheries	
16:00 16:15	**COFFEE BREAK**	
16:15 17:00	**-In Working Group: summary of the afternoon's work -In plenary: presentation of the main results of the working groups**	**G1+G2**

Wednesday, May 6, 2015

Time	ITEM	ACTION
9:00 10:30	**Continuation of the working groups and summary**	**G1+G2**
10:30 11:00	**COFFEE BREAK**	
11:00	**Presentation of the results from G1 and discussion**	**OD + Chairman G1 and participants**
13:00	**Presentation of the results from G2 and discussion**	**OD + Chairman G2 and participants**
13:00 14:00	**LUNCH BREAK**	
14:00 16:00	**Presentation and validation of the action plan resulting from the working groups**	**OD and Steering Committee**
16:00 16:15	**COFFEE BREAK**	
16:15 17:00	**Summary: -Actions to be implemented -Budget implications -Overall discussion**	**Steering Committee + OD + Participants**
17:00	**Workshop closing ceremony**	**MRHP**

List of participants to the national workshop

Atelier de consultation nationale pour la

définition du plan d'amélioration de la pêche crevettière industrielle à Madagascar

Le Pavé, Antananarivo 5 -6 Mai 2015

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Atelier de consultation nationale pour la

définition du plan d'amélioration de la pêche crevettière industrielle à Madagascar

Le Pavé, Antananarivo 5 -6 Mai 2015

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