2013 – Madagascar Crocodile Project Final Report

EU-CITES Capacity-building project
No. S-423

2013

CITES Secretariat

About the EU-CITES Capacity-building project

The project *Strengthening CITES implementation capacity of developing countries to ensure sustainable wildlife management and non-detrimental trade* was approved for funding by the European Union in 2009.

A major challenge for many countries is the difficulty in meeting the requirements for trade in CITES-listed species, ranging from legal sourcing and sustainability requirements, to the effective control of legal trade and deterrence of illegal trade. Mechanisms exist in CITES and in both exporting and importing countries that promote and facilitate compliance – although Parties are often hampered by a lack of capacity or a lack of current biological or trade information with respect to certain species. This can result in levels of trade which are unsustainable, which in turn can impact on economic growth and local livelihoods, and reduce options and incentives for conserving and managing wild resources effectively.

The overall aim of EU's support is to strengthen capacities to implement the Convention and satisfy the CITES-related requirements of trading partners (such as the European Union), to prevent overexploitation and to ensure legal international trade in wild fauna and flora does not exceed sustainable levels.

This publication is one of the reports and tools developed under this project, which provide information and guidance to Parties in a particular area of concern based on needs identified by developing countries.

This document was prepared by General Directorate for Forests, Ministry of Environment and Forests of Madagascar (CITES Management Authority) under a contract with the CITES Secretariat and made possible through funding received from the European Union.

Suggested citation:

Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 2013. *2013 – Madagascar Crocodile Project Final Report*. Report prepared by General Directorate for Forests, Ministry of Environment and Forests of Madagascar (CITES Management Authority). Geneva, Switzerland, 155 pages.

REPOBLIKAN'I MADAGASIKARA
Fitiavana - Tanindrazana - Fandrosoana

2013

MADAGASCAR CROCODILE PROJECT FINAL REPORT

DIRECTORATE-GENERAL FOR FORESTS
CITES MANAGEMENT AUTHORITY, MADAGASCAR
SCIENTIFIC AUTHORITY (ANIMALS), CROCODILES
November 2013

CONTENTS

LIST OF TABLES

LIST OF MAPS

LIST OF FIGURES

LIST OF PHOTOS

Introduction and General Considerations

Background to the project

Madagascar's 2010 – 2015 strategy to improve on a pilot basis the implementation of CITES relating to crocodiles has been designed in line with the Convention's objectives in accordance with Resolution Conf. 14.2.

Thus Madagascar needs to undertake the actions necessary at national level in order to help to guarantee that the goals set forth in the CITES Strategic Vision: 2008-2013 are achieved.

The underlying aim is to seek a way to implement monitoring and management procedures which will respect the commitment of the Conference of the Parties, expressed in Decision 13.1, to contribute to the achievement of the World Summit on Sustainable Development target of significantly reducing the rate of biodiversity loss.

Madagascar hopes to play a role in providing relevant analysis data to the Standing Committee so that it may examine the progress made towards implementation of the Strategic Vision and achievement of its objectives.

With reference to the Strategic Vision the goal is to underpin the capacity of the Conference of the Parties to devise practical solutions for resolving increasingly complex wildlife trade and conservation problems.

Madagascar has had a ranching programme since the very beginning of the 1990s, but this has given rise to grave management problems. Analysis of such difficulties within a framework of seeking appropriate management solutions in an African context will be of use to all the countries of Africa in their adaptation of management and monitoring procedures.

The CITES Strategic Vision drawn up at its 13th meeting (Bangkok, 2004) sought in particular to contribute to the achievement of the World Summit on Sustainable Development (WSSD) target of significantly reducing the rate of biodiversity loss.

Experience has shown that bans on international trade have not – at least in the case of crocodiles – had outcomes beneficial to conservation of these reptiles, nor to preservation of biodiversity in general.

With the new CITES Strategic Vision, the Conference of the Parties to CITES has defined the way forward for the Convention in the new millennium, incorporating, within the context of its mandate, the following aspects:

- ✓ Understanding the cultural, social and economic factors at play in producer and consumer countries ;
- ✓ Promoting transparency and wider involvement of civil society in the development of conservation policies and practices.

Madagascar intends to work on a basis of scientific evidence, aligning its research needs with approaches that are consistent with the anticipated objectives.

Objectives:

1- To ensure the conservation of the Nile crocodile in Madagascar by:

- Integrating the conservation of this flagship species into wider programmes on conservation of biodiversity and the functioning of ecosystems;
- Integrating the objectives of specific programmes and conventions into the wider Millennium Development Goals.

2- In the specific context of CITES:

- Guaranteeing that international trade does not jeopardize the survival of the species;
- Establishing management and monitoring models meeting the requirements of CITES and enabling its harmonization with the objectives of other international conventions.

Essential Goals

- ✓ To pursue the biodiversity conservation strategy developed in 2002 in order to guarantee that a maximum of new protected areas provides a comprehensive guarantee of the conservation of the island's crocodiles in all key ecosystems;
- ✓ To guarantee tracking of the farms and ranches under strict control and to share the findings both with the Crocodile Specialist Group and with the CITES Secretariat;
- ✓ To monitor the local artisanal market in order to track its evolution relative to what has been recorded about it (Behra O. and J. Hutton, 1992. See *Analyse du marché intérieur des peaux de crocodiles et des produits dérivés à Madagascar* (Analysis of the domestic market for crocodile skins and derived products in Madagascar). In: The Nile Crocodile Project. Eds. J.M. Hutton and I. Games.
- ✓ To provide for a system for slaughter of animals dangerous to people in the wild, which will be strictly restricted to the resolution of conflicts outside protected areas.

Integrated Development and Conservation Objectives

The issue for Madagascar is to respond to the requirements of CITES by establishing management measures guaranteeing the maintenance of local populations without being compelled to carry out scientifically dubious and expensive surveys.

Implementing strict monitoring measures, in association with a strategy guaranteeing wide coverage in crocodile habitat preservation efforts, will make it possible to guarantee effective crocodile conservation and also to ensure that trade does not represent any threat to the species.

Following completion of the four main thrusts of activity selected for this project, effective implementation of:

- an effective farm monitoring system, verifiable by the CITES Secretariat to guarantee that there will be no harvesting not authorized by CITES;
- a very extensive network of protected areas guaranteeing that there will be no killing of crocodiles in the greatest part of their habitat on the island (See Annex I);
- management and monitoring of slaughter and trade for local traditional craft purposes.

Chapter I: Tracking of the wild population

Part 1: Tracking the wild population

I- Introduction

Exploitation of *Crocodylus niloticus* in Madagascar has for a considerable time been a component of a number of environmental and economic policies. The species in its natural habitat has always played an important ecological and also social role. Additionally, exploitation of it generates income both for the people directly involved and also for the State, through the levying of fees.

However, data on Madagascar's wild population are deficient, even though the crocodile has long been an integral component of the landscape of Madagascar and the daily lives of its people (Decary, 1949). Having crossed ocean waters to establish itself well before the arrival of mankind on the main island (Raxworthy, 2003), Madagascar's crocodile population has been able to adapt to and colonize different types of habitat, such as marshlands, lakes and rivers and is now distributed over the whole island, where it is considered a common species. This wide distribution is confirmed by the names of several villages such as Bemamba, Marovoay, Marovoaikely, etc., which attest to the abundance of the crocodile population in Madagascar at a certain time.

Since then, several studies of the Malagasy crocodile population have been undertaken. Although such studies were of capital importance for understanding the crocodile situation, they were considered still inadequate for drawing conclusions on the real state of the population.

The objective of the present study is to verify the current state of the wild population as impacted by the exploitation of it and to make predictions on its situation on the basis of analyses carried out using existing data and results collected during the present research.

II- Methodological approaches

CITES has recommended:

- To gather the views of all actors in order to draw up a reliable methodology which can be replicated at low cost.
- To discuss the method selected with national and international experts and with people involved in the crocodile industry, including local populations.

In order to establish sustainable management for the species, it is necessary to develop the methodology for tracking the populations as appropriate to the situation in Madagascar, and to undertake studies at representative sites. The approach adopted involved analyzing scientific and grey literature in order to draw an appropriate methodology from it, discussion with experts, and application of the methods adopted thereby.

II.1.- Literature on the various tracking methods

Several studies on *Crocodylus niloticus* in Madagascar have already been undertaken, using various surveying methods.

II.1.1- Air surveying

For the studies undertaken by O. Behra in 1987 and those performed by O. Behra and Dr. J. Hutton in 1988, surveying from the air was preferred over nocturnal surveys. This surveying method is one of the most reliable and is frequently used in countries such as the USA, Australia and some African countries. The reliability of this method arises primarily from its feature of allowing surveying of sites

and habitat types that are not accessible by road. On the other hand, this method is suitable for open and clear habitats and is very expensive, making it less feasible for a developing country like Madagascar. As a consequence, air surveying has been abandoned in favour of nocturnal surveying.

II.1.2- Nocturnal surveying

Nocturnal surveying was chosen in 2008 for the studies carried out by Ottley *et al.* Further, nocturnal surveying had already been used in 2006 and 2007 in studies on the wild population in the bodies of water at the Qit Madagascar Minerals operating site.

Since 2008, nocturnal surveying coupled with inventorying of human activities has been selected for subsequent investigations such as those undertaken by Rakotondrazafy and Andrianasolo, Rakotondrazafy *et al*. and Jablonicky in 2011 and 2012.

Using this method has truly made it possible to determine abundance indices as well as the level of pressure impacting each population, but it too has its limits. The relatively high cost of each expedition makes it difficult to perform spot checks on the state of the population in those sites that are difficult to reach.

Furthermore, the timing of the earlier studies and the choice of sites for them have been vigorously criticized as being unsuitable for observation of crocodiles, by those working in conservation and utilization, primarily NGOs and people working in the business. Nevertheless, it has always been the case that surveys of crocodiles in general have traditionally been done during the dry periods (Lippai C., personal communication, 2013), the time when the sites are accessible and water levels are relatively low, allowing better observation of the crocodiles.

Local actors, however, stress that crocodiles are easy to observe during high-water periods, when they are more active.

These differences of opinion as well as the fact that there are several different surveying methods have led CITES to recommend the creation of a methodology which can be accepted by all stakeholders. Such methods must be simple, reliable, and suitable for low-cost replication so as to allow periodic follow-up on the state of the wild population in Madagascar. The methods will also take into consideration the indices gathered from direct and indirect observations, demographic factors and also the methodologies found in grey literature.

Over and above the establishment of a tracking method acceptable to all stakeholders, CITES has also urged active participation of the rural population in the tracking of the state of the wild population at each site visited.

Since crocodilians may be surveyed by different methods, varying with the sites studied and the results expected (Platt 2000), following consultation among all the stakeholders, it was decided that the methods adopted for Madagascar would be as follows:

- study of habitat
- nocturnal survey
- diurnal surveying comprising direct and indirect observation
- study of nesting
- study of factors impacting man-crocodile conflicts

II.2- Analysis of existing data

The studies carried out in the 1980s and 1990s partially ascertained the range of the wild Malagasy population. Ramandimbison *et al.* , 1998, has a calculation of the surface area of the catchment areas harbouring wild crocodile populations. These surface areas do not include the sites in Madagascar's protected areas.

- 1988: Study of the industry and wild population (Behra)
- 1990: Study of the feasibility of captive breeding (Bolton)
- 1998: Inventory of the wild population in Madagascar (Ramandimbison)
- 2008: Adaptation of inventorying method for Madagascar (Ottley)
- 2009: Inventory and study of man-crocodile conflict (Rakotondrazafy)
- 2011 – 2012: Study of factors influencing crocodile distribution (Jablonicky)

Historical Crocodile Distribution

Montagne d'Ambre and Tsaratanana rivers	20,000	km^2	Approximately 20 rivers including the Mahahavy (160 km), Maevarano (203 km), Sambirano (124 km) and Bemarivo (140 km).
Sofia	27,315	km^2	Drains to the west for 350 km. The main tributary is the Bemarivo. The basin includes approximately 30 lakes along the course of the river.
Mahajamba	14,500	km^2	Drains into the Betsiboka.
Betsiboka	49,000	km^2	Major river in the west with a flow reaching 12,000 m^3/s between January and March. The area of lowest altitude is surrounded by about 150 small lakes (80 km^2).
Mahavavy	16,475	km^2	Major gorges crossing the Bemaraha escarpment.
Besalampy	6,040	km^2	Maningoza, Sambao, Mamambaho rivers and numerous lakes
Manambolo	13,970	km^2	
Tsiribihina	49,500	km^2	Three main tributaries: Mahajilo, Mania and Sakeny. Approximately 70 lakes along the course of the river.
Morondava		km^2	Periodically dried up
Mangoky	55,750	km^2	The most significant basin in Madagascar
Onilahy	32,000	km^2	
Total	**284,550**	**km^2**	

Table 1: The main catchment areas harbouring crocodiles in the north and west of Madagascar

II.3- Selection of sites

Initially, four sites were selected for the present study, namely Mitsinjo (Mahavavy river), Antsohihy/Mampikony (Tsinjomorona river), Ankavandra (Manambolo and Manambolo-Maty river) and Besalampy (Maningoza, Sambao, Bemarivo).
These sites were designated pilot sites on the basis of their high potential for egg production and their potential for hunting to supply the local market, which had been demonstrated in studies in former years, and also owing to cases of man-crocodile conflict deserving of deeper study.

The Manambolo was viewed from the air in 1989 by O. Behra and Dr J. Hutton, in 1990 by O. Behra , and in 1997 by I. Games and Ramandimbison; the Maningoza was viewed from the air by O. Behra in 1990 and I. Games and, Ramandimbison in 1997 and from a boat by Ottley *et al.* in 2008. Following those studies, abundance indices were obtained. It is thus important to have comparative information on the current state of the population in order to evaluate the effect of hunting during the intervening years.

In the light of the importance of studying the wild population in order to create a basis for more appropriate management, incorporating as much information as possible to enhance decision-making, the Scientific Authority and the Management Authority decided to extend the survey to the Sava and Menabe regions.

Following investigations carried out among tanners, it transpired that a considerable quantity of skins treated by them come from the Sava and Menabe regions. The Sava Region has never been studied in the past and thus its population should be surveyed.

The Tsiribihina river, which had not been included in the initial list, was also studied. It is one of the main rivers of the Menabe Region which has a high potential for crocodile numbers (from which the skins are harvested) and for man-crocodile conflict.
It proved impossible to carry out the survey of the Besalampy sites owing to a lack of communication with resource persons, guides or egg collectors. The impossibility of carrying out a reconnaissance, together with those other difficulties, forced the team to select another site for studying the potential for egg production. Hence Trangahy was added to the list of sites to be examined, in addition to Ankavandra. This type of obstacle is common in crocodile-surveying and was encountered by the Ottley team in 2008.

The final list of the water bodies to be surveyed thus comprises:

- Mahavavy and Kotomay rivers (Boeny Region)
- Tsinjomorona river and its tributary (Sofia Region)
- Manambato river, Lake Ambidara and Lake Antenabe (Sava Region)
- Mahajilo river, Tsiribihina river, Manambolo river, Lake Ankepo and Lake Ambala (Menabe Region)
- Andolonomby river and Andobonilegila river (Melaky Region)

Map 1: Distribution of the survey sites (Google Earth, 2013)

III- Methods applied

III.1- Study of habitat

This type of study gives a description of the transect surveyed, including the state of the body of water, the banks and shores and the vegetation around it, and incorporating, where possible, a comparison with earlier studies to gain an impression of the changes to the sites that have occurred. The human activities observed on the banks are marked using a GPS and details of the activity noted down. The survey of human activities is also included in this section, and the density is calculated as follows:

$$IHA = HA/L$$

where:

IHA: Index of human activity
HA: Number of human activities
L: Length of transect surveyed

III.2- Diurnal and nocturnal surveys

III.2.1- Nocturnal survey

The nocturnal survey is carried out on foot or on a boat, along a transect of the body of water under study.

A high-intensity lamp is used to count the specimens (Messel, 1981; Bayliss 1987; Nichols 1987). Each reflection from a pair of eyes indicates one specimen, and once a specimen has been located, the surveyors attempt to get close to it to estimate its size and mark its location using a GPS. If the specimen submerges before its location Is reached, however, the distance between the surveyor and the location is noted as “minimum approach distance”. The point where the crocodile was located is recorded by the GPS and is noted in writing, as “MW“ if the location is in the middle of the water, “SW” if it is in the water but close to the shore and “OB” if it is on the bank.

The size of each specimen obtained by direct or indirect observation is noted and subsequently classified in accordance with the following scale (Botha, 2005):

- Babies: under 40 cm
- Juveniles: 40 cm to 140 cm
- Subadults: 140 to 210 cm
- Adults: over 210 cm

Specimens for which it was not possible to estimate the size are noted as “ES”, standing for Eyeshine.

Importance

The nocturnal survey is the commonest method of obtaining an abundance index of crocodiles in a body of water. As crepuscular animals, they are more active from nightfall on, and carrying out observations at night increases the chances of spotting them. The results obtained by this method give an indication of the number of crocodiles over a given unit of distance.

The abundance index is calculated as follows:

$$AI1 = N/L$$

where:
AI1: Nocturnal abundance index
N: Number of specimens observed
L: Length of transect surveyed

III.2.2- Diurnal survey

III.2.2.1- Direct observation

For this type of survey, the method described by Magnusson in 1982 was adopted.

This involves using a boat to survey a transect of a body of water. The boat approaches each crocodile observed and the distance at which it submerges is noted as the "minimum approach distance". The point where the crocodile was located is recorded by the GPS and is noted in writing, as "MW" if the location is in the middle of the water, "SW" if it is in the water but close to the shore and "OB" if it is on the bank.

The size of each specimen is noted and the specimen assigned to the classification above in accordance with its degree of ontogenetic growth.

The GPS coordinates at the beginning and the end of each segment of the body of water being surveyed are recorded.

Importance

The results obtained from the diurnal survey amplify those from the nocturnal survey, in the sense that the numbers are counted twice. Where it is possible only to carry out the diurnal survey, the abundance index may be calculated from the number of specimens observed, relative to the length of the transect surveyed.

III.2.2.2- Indirect observation

This method consists in detecting the traces of crocodile activity in a site being surveyed. Where their habitats comprise swamps, meanders or reed-beds, depending on their behaviour specimens often leave visible traces such as:

- prints of feet, tail or belly
- vegetation pushed aside or crushed near to the shores
- droppings and food remains.

A GPS location is assigned to each recent trace (under 48 hours old), which is evaluated on the basis of outdoor techniques related to tracking (humidity, hardness, definition and proportion of adhesion of a fine layer of sand or dust from the area scattered on to the trace) and the type of trace (feet, belly, tail, basking, vegetation pushed aside or crushed) is noted in writing.

The traces left by the head and/or the belly while basking sometimes give indications of the size of the crocodile, provided that they are clear.

However, it is fundamentally hind footprints that allow precise calculation of the overall size of the specimen, by relating the length of the print to Hutton's formula:

- 1/14 if HFP (hind footprint) <150 mm,
- 1/13.5 if HFP >150 mm (Hutton, 1987a).

The number of specimens surveyed from direct observation and the number derived from observation of hind feet may be added to give an abundance index in those cases in which nocturnal surveys are not possible. However, this total must be reduced by the number of specimens which are of the same size. For example, where a specimen 3 m long has been recorded from direct observation and a specimen of the same size from indirect observation, these specimens are considered to be the same animal. This gives the following formula:

AI2 = N1+N2-n/L

where:
AI2: Diurnal abundance index
N1: Number of specimens observed directly
N2: Number of specimens obtained using Hutton's formula
n: Number of specimens of the same size recorded both from direct and indirect observation.
L: Length of the transect

But in some cases, the traces left are fore footprints or prints of hind feet that are not clear. In such cases, the stage of ontogenetic development is determined on the basis of the size of each print (Andrianjaratina R. L, unpublished data, 2010), using the following scale:

- Babies: size under 5 cm by 3 cm
- Juveniles: size between 5 cm by 3 cm and 8 cm by 6 cm
- Adults: size over 8 cm by 6 cm

As the juvenile and subadult age groups are difficult to distinguish by means of prints or traces, it is more prudent to class them all as juveniles.

Traces left by the tails only make it possible to note that a crocodile has passed by, since there are several factors impacting trace size and depth: the weight of the crocodile, the way it was walking or running and the physical condition of the shore.

Importance

Including traces of activities makes it possible to verify the presence of all age groups at a given site.

Using Hutton's formula makes it possible to identify specimens that were not recorded by diurnal or nocturnal surveys. There may, for example be traces of specimens that passed through a given spot on the day before a diurnal survey. If these specimens cannot be observed, at least their traces indicate their presence. If the sizes calculated on the basis of Hutton's formula reveal the presence of specimens of a size not corresponding to any of those surveyed, they may be considered as additional specimens, over and above those already recorded.

III.2.3- Location and surveying of nests

Surveying nests gives information only on females of reproductive age (Leslie 1997; Botha 2005).

Although the results are limited to that sector of the population, this method does give an idea of current trends and the future state of a population. It is used in several countries to track wild population trends, such as in the case of Papua New Guinea, the USA, Zimbabwe and so on.

For the purposes of the survey, local guides familiar with egg-collecting take on the task of indicating the nests they have located.

A GPS location is assigned to each nest, and note is made of information such as its horizontal and vertical distance from the body of water and the type of habitat where it is found.

Sampling is carried out to obtain clutch size, number of viable eggs and egg size. Each time a nest is uncovered, the eggs have to be handled using multiple precautions in order to avoid interrupting embryo development. They also have to be placed back into the nest in exactly their initial position.

Traces of activities around each nest are recorded in order to determine the size of each laying female.

It is possible to estimate the size of the females by way of the nests, making use of their diameter and depth as well as of the number and size of the eggs (Andrianjaratina R L, Unpublished data, 2010) on the basis of the following table:

Estimated size of the female	Total length of the female	Number of eggs in the nest	Egg size
YA (young adults)	2.00 to 2.50 m	12 to 29	small
RA (fully reproductive adults)	2.50 to 3.00 m	30 to 49	small or medium
DA (dominant adults)	3.00 to 4.00 m	50 to 70	large
OA (old adults)	over 4.00 m	over 70 under 40	large very large

Table 2: Estimating the size of laying females and classification by their reproductive stage

III.3- Identification of factors impacting man-crocodile relations

III.3.1- Demographic study of each site

The goal is to gather the data on the demographics of each region studied. The studies carried out by Rakotondrazafy *et al.* in 2009 and Jablonicky in 2011 and 2012 revealed a negative correlation between human activity and crocodile abundance, as well as the impact of those activities on their distribution. The indices of the activities and the demographic factors reflect the intensity of the man-crocodile conflicts at each site. It would therefore be of relevance to study these factors in order to be able to delimit the risk areas.

The data used in this analysis come from national monograph studies carried out in 2003 and deal with inhabitant density by region, proportion of the rural population and the number of fishermen. These data are considered reliable, in the light of the low rate of growth, namely 2.73°/$_{00.}$

III.3.2- Study of the impact of hunting on the wild population

Information on harvesters of skins and on hunters were obtained following the investigations carried out among tanners. Once on the site, these harvesters and hunters were questioned in turn on hunting volume, timing and areas.

III.3.3- Survey of crocodile attacks

The aim is to question the riverside populations and the local authorities on the attacks taking place in their localities.

Importance

Identification of the factors impacting man-crocodile conflicts serves as basic data for follow-ups in future years and will make it possible to prevent such conflicts.

Study of habitat and above all of changes in the nature and number of anthropogenic activities is of primary importance in order to track the changes that have impacted a site in order to determine the impact of these changes in the biology and ecology of the population.

In addition, identification of man-crocodile conflicts will enable a zoning exercise dealing with conservation and utilization.

IV- Results and interpretations

IV.1- Description of habitat

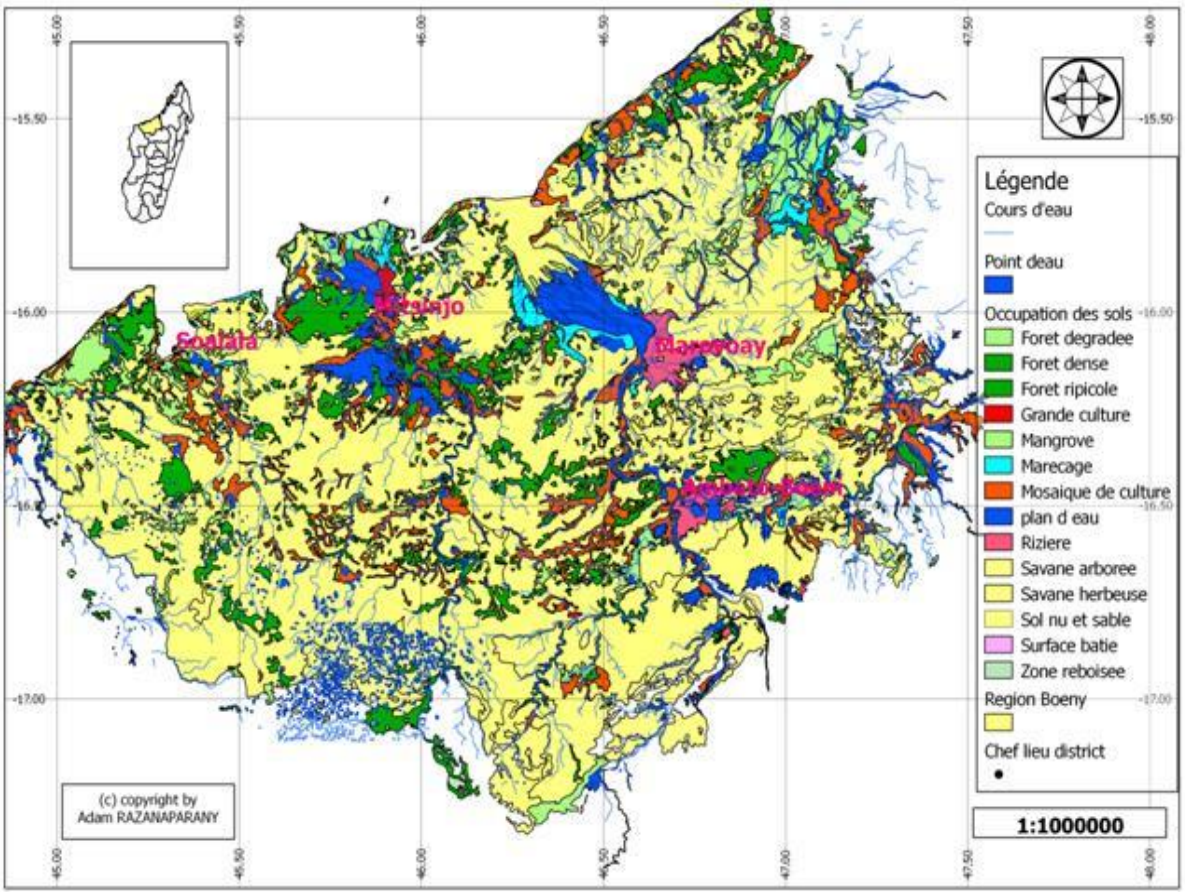
IV.1.1- Boeny Region

Located in the western part of the island, this region represents approximately 6 per cent of Madagascar's total area. At 61,071 km², the area of the region accounts for 41 per cent of the area of Mahajanga Province. The region is largely drained by a particularly dense hydrographic network which provides a very considerable amount of water, making a significant contribution to activities such as river and maritime transportation, water supply, fishing, agriculture and hydroelectric power.

The principal rivers in the Boina region are the Betsiboka, the Mahajamba, the Kamoro, the Mariarano, the Ikopa, the Mahajamba, the Mahavavy, and the Betsiboka.

In addition, this network includes large lakes with water favourable to inland fishing and river transportation:

- Lake Kinkony (second-largest lake on the island, after Lake Alaotra).
- Lake Mahoho (Amboromalandy) and Ampijoroa which are both major dam-created reservoirs, and Lakes Ambilivily, Mahazoarivo, Matsabory and Bondrony. (Min. of Agriculture, 2003)



Map 2: Ground coverage and hydrographic network of the Boeny Region (BD 500)

IV.1.1.1- Kotomay river

This river is a tributary of the Mahavavy, linking it to Lake Kinkony. The shores of the Kotomay vary between 1 m and 2 m in height and the banks comprise, alternating, tobacco plantations and tree- and shrub-covered savanna on which the density of human activity is 4.5/km, although in 2008 Rakotondrazafy *et al.* recorded a density of 4.8/km. The Kotomay is much travelled by the canoes linking Mitsinjo to Lake Kinkony.

The depth of this tributary of the Mahavavy varies between 10 m and 50 m, given that tree trunks frequently fall into it owing to the effects of erosion, which would seem to indicate that this river is widening with the passage of time.

IV.1.1.2- Mahavavy river

The Mahavavy river has banks which comprise, alternating, remains of primary forest, villages and crop-growing areas. The shores are either clear, or else covered with bamboo of the genus *Phragmites sp.*, thus creating a favourable habitat for the birds and fish which are a part of the crocodiles' diet.

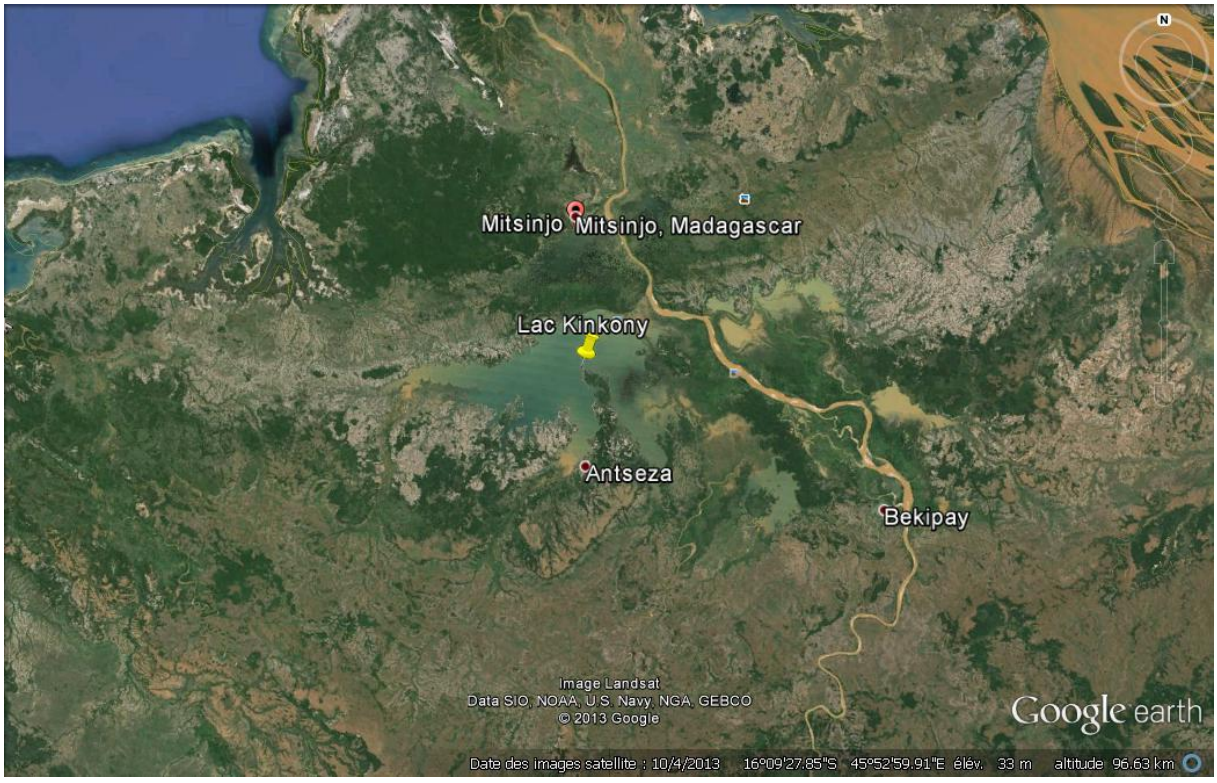
The crop-growing areas primarily create "baiboho"[1] which are used for "jeby"[2] in the low-water season. These formations are comprised of silt coming from the nutrient-rich alluvial deposits, which feature has allowed them to become crop-growing areas. In total, the density of human activity on the banks of the Mahavavy reaches 5 HA/km.

[1] Crop-growing zone formed by alluvial deposits and characterized by a silty texture with a lamellate structure located on the shores of large rivers.
[2] Crop growing on the "baiboho" in the dry season.

Banks of the Mahavavy river

Shores covered with reeds

Photo 1: Type of habitat along the Mahavavy river



Map 3: Mahavavy river (Google Earth, 2013)

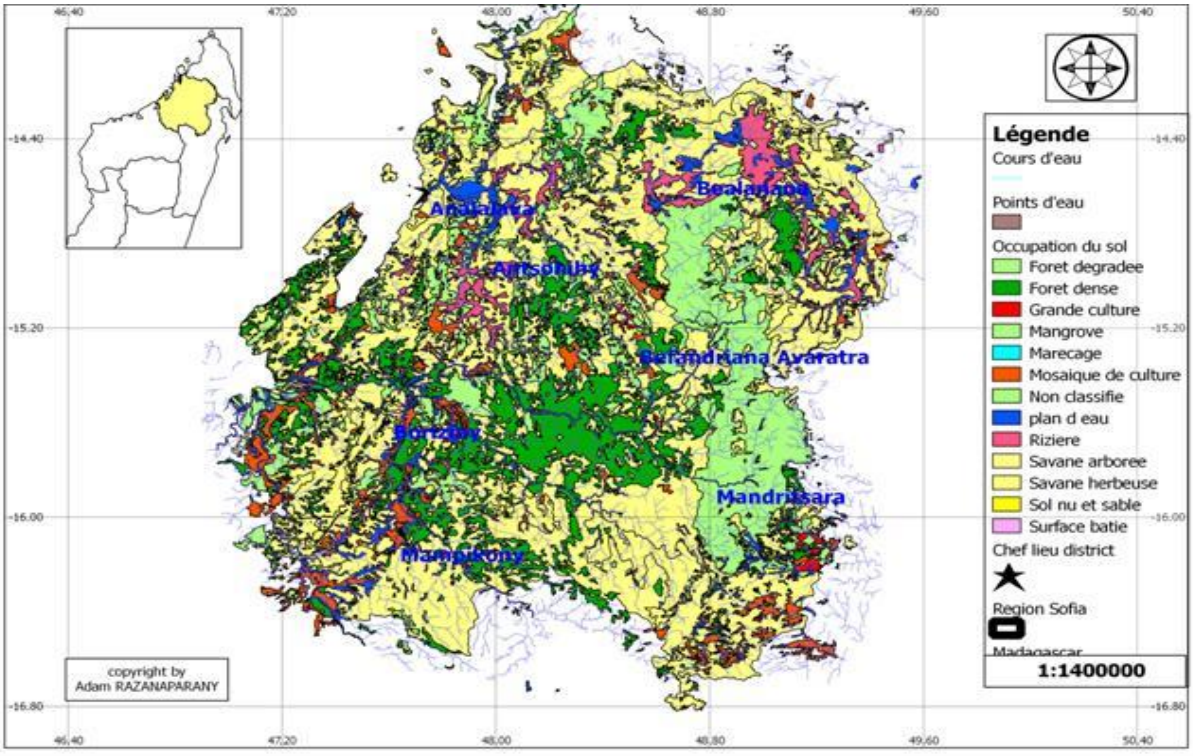
IV.1.2- Sofia Region

The Sofia Region is located on the north-western coast of Madagascar. It is a huge territory covering an area of 52,504 km², amounting to about 8.5 per cent of the main island and 33.4 per cent of Mahajanga Province.

The north-west has very large catchment areas which promote flow and drainage of the major rivers into the Mozambique Channel. The region is crossed by the Sofia river, which has two tributaries, the Anjobony and the Bemarivo, and discharges into the sea at Mahajamba Bay.

The water regime of the region is characterized by voluminous floods in the rainy season between December and March and a moderate dry season from July to October.

The waterways feeding into the major rivers are the Maevarano, the Tsinjomorona and the Andranomalaza. The region is well supplied with lakes, including those of Tseny, Amparihy, Bemakamba, Marovariho, Sofia, Andrampongy, Matsaboribe, Mangilihilia and Maroankoay. (Min. of Agriculture, 2003)



Map 4: Ground coverage and hydrographic network of the Sofia Region (BD 500)

IV.1.2.1- Tsinjomorona river

The banks of the Tsinjomorona river consist of, alternating, sandbanks, alluvial deposits and crop-growing areas, together with vegetation comprising shrubby strata. The shores are either clear, or covered with herbaceous plants of the genus *Phragmites sp*. The depth of the part surveyed varies with the high and low tides. Density of human activity is 4 HA/km.

Shore of the Tsinjomorona river colonized by reeds or large trees

Stretch of the Tsinjomorona river where crocodiles emerge to warm themselves in the mornings (as confirmed by fishermen and boatmen)

Photo 2: Type of habitat along the Tsinjomorona river

Map 5: Tsinjomorona river (Google Earth, 2013)

IV.1.3- Sava Region

The Sava Region covers an area of 23,577 km², or around 4 per cent of national territory and 54.8 per cent of Antsiranana Province upon which it is administratively dependent.

Overall, the Sava Region enjoys a dense hydrographic network. Considerable numbers of rivers, running deep between high grounds, cut across the region from south-east to north-east.

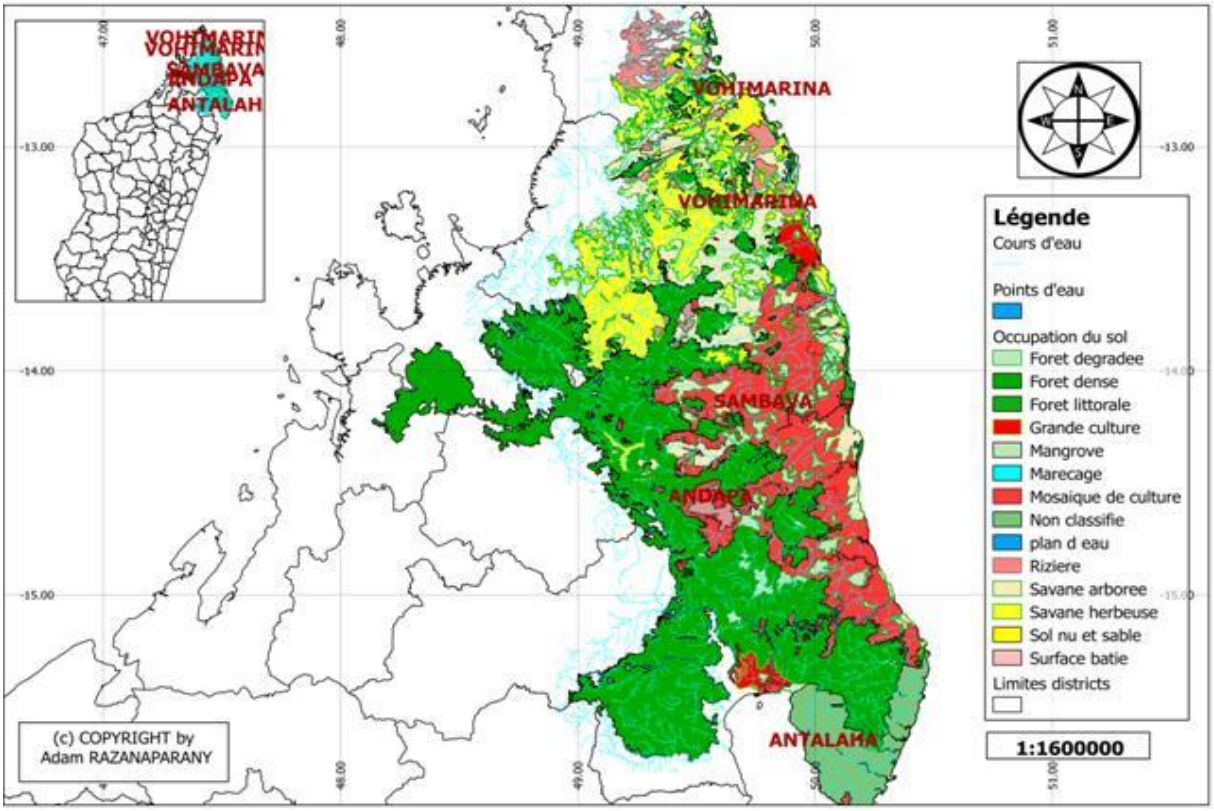
Three major clusters of waterways form the basis for the region's hydrographic network.

North to south:

- Manambato, Fanambana and Manambery.
- Bemarivo, Androranga, Lokoho, Mahanara, Sambava and Ankatoka.
- Ankavanana, Ankavia, Ankaviahely, Sahafihitra and Onive.

In general, the rivers are navigable only in the section crossing the coastal plain, over a distance rarely longer than 15 km.

The Bemarivo basin is the largest, covering an area of 5,400 km^2. (Min. of Agriculture, 2003)



Map 6: Ground coverage and hydrographic network of the Sava Region

IV.1.3.1- Lake Antenabe

Lake Antenabe is one of the large coastal lakes of the Sava Region, covering an area of 3 km^2. Its depth may reach 10 metres. Its shores are clear, with shrubby strata in which grasses of the genus *Hyparrhenia* predominate. Unlike most of the lakes in Madagascar, no planting or crop-growing has been observed on the banks of Lake Antenabe. That is the result of the somewhat uneven surface of the land surrounding the lake, and also of its salinity. Density of human activity on the lake is 1 HA/km.

IV.1.3.2- Lake Ambidara

Lake Ambidara is a brackish lake linked to the Indian Ocean. It is of varying depth; according to people living along it, this varies between 1 m and 30 m. The water surfaces have been primarily colonized by *Alocasia macrorhizos* and *Ravenala madagascariensis,* which has made a large proportion of the shores inaccessible for purposes of observing traces. The banks of the lake are generally not clear, having arboreal strata with trees of heights reaching 10 to 15 m. No human activity was recorded along the transects surveyed. This is undoubtedly due to its brackishness, with a salt concentration higher than that of freshwater. Density of human activity is thus 0 HA/km.

Lake Antenabe seen from a hill

Shores covered with *Hyparrhenia*

Photo 3: Type of habitat at Lake Antenabe

Map 7: Lake Ambidara (Google Earth, 2013)

IV.1.3.3- Manambato river

The Manambato is a river flowing into the Indian Ocean. The channel of the section surveyed is a maximum of 100 m wide, and the depth does not exceed 20 cm during the low water season. Some crops were observed growing on the “baiboho”, but these are scattered.

The meanders surveyed are temporary tributaries of the Manambato. These narrow and shallow meanders rather resemble continuous crevasses varying between 2 and 10 m wide. Anthropogenic activities primarily comprise pathways and some crop-growing areas, with a density of such activities amounting to 1.2 HA/km.

Alocasia Macrorhizos along Lake Ambidara

Alocasia Macrorhizos and *Ravenala madagascariensis* along Lake Ambidara

Photo 4: Type of habitat at Lake Ambidara

Map 8: Manambato river (Google Earth, 2013)

Tributary of the Manambato

Main channel of the river

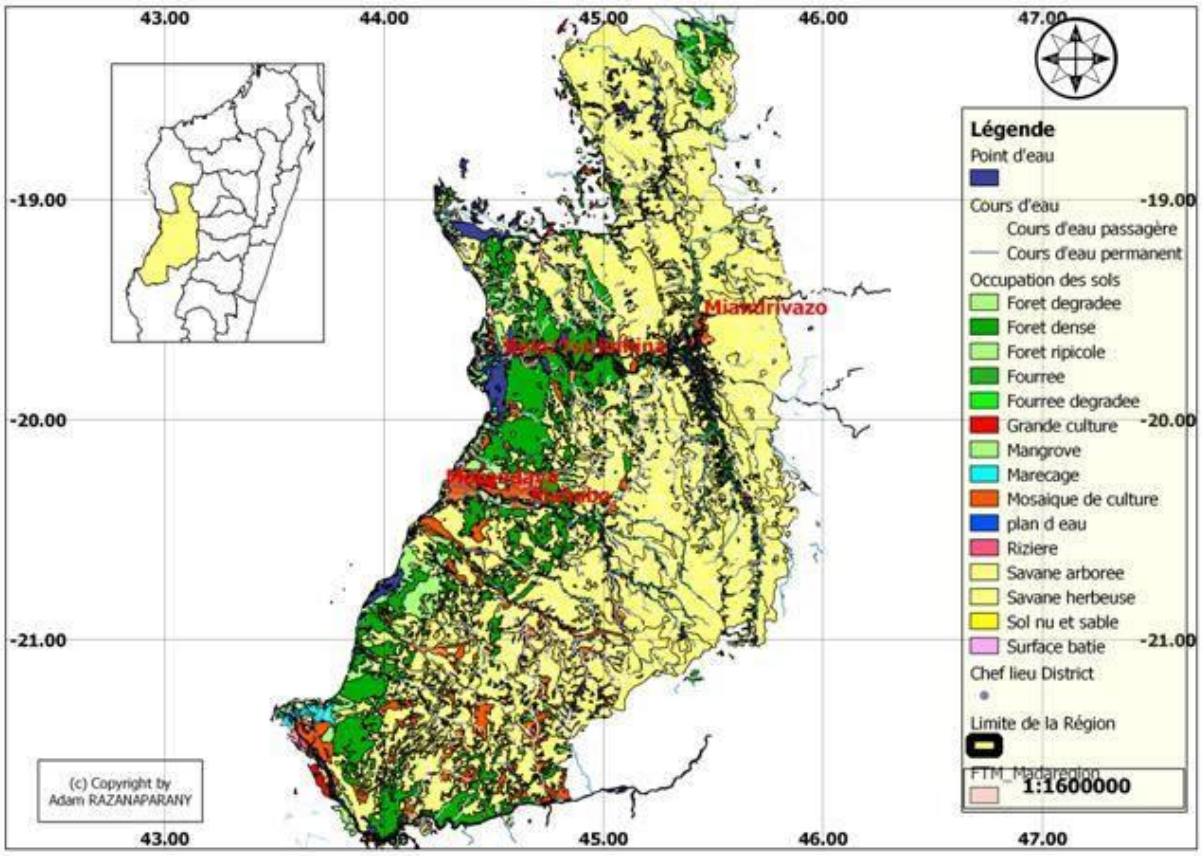
Photo 5: Type of habitat along the Manambato river

IV.1.4- Menabe Region

The Menabe Region extends over an area of over 48,860 km², or 8.4 per cent of the total area of the country. The region has an enormous potential for water supply, comprising both surface and underground water. Numerous major bodies of water are located on the northern and eastern part of the region (lakes, ponds and dewponds); in addition, rivers, some of them large, cross the various plains in the form of meanders, leaving rich alluvial deposits which promote the growing of food crops in the region.

The main rivers of the region are the Manambolo, Tsiribihina and Morondava, Andrangory and Mahaniso (Mandabe), Laompolo, Maintitapaka and Tsianihy, Ianandrano and Mangoky.

The principal lakes are located at Betsiriry and along the Tsiribihina river: Lakes Betsiaky (Anosimena), Ankotrevo, Asonjo (Anosimanitsy, Ankotrofotsy), Andranomena (Ankalalobe), Andranomena (Begidro), Hima (Amboloandro), Kinahomby (Andranomandeha, Ambohibary), Iboboka and Sariaka (Masoarivo). (Min. of Agriculture, 2003)



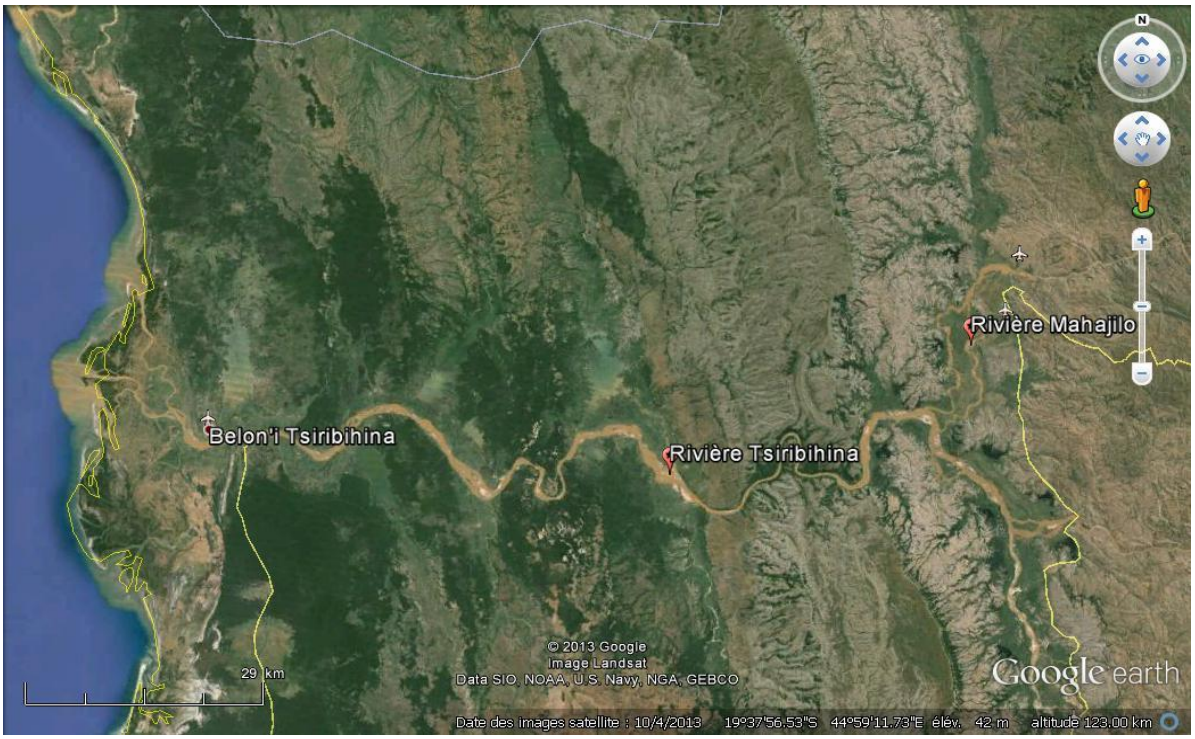
Map 9: Ground coverage and hydrographic network of the Menabe Region (BD 500)

IV.1.4.1- Mahajilo river

The Mahajilo river is a tributary of the Tsiribihina. Rising on the Bongolava massif, it passes through the commune of Miandrivazo and fertilizes a very rich plain, highly suited to growing legumes such as beans. The banks of the Mahajilo comprise a succession of human activities, at a density of 11 HA/km. These comprise villages, plantations of legumes and herbaceous plants such as *Saccharum sp.* for grazing of zebu. The shores are either clear or covered with grasses of the genus *Phragmites*. In some localities the channel is over 100 m wide, with the sand deposits being so large that it is necessary to pull the boat out of the water and continue on foot.

Banks and shores of the Mahajilo river One of the types of human activity observed

Photo 6: Types of habitat and activities on the Mahajilo river



Map 10: Mahajilo and Tsiribihina rivers (Google Earth, 2013)

IV.1.4.2- Tsiribihina river

Although the Tsiribihina river is subject to erosion, its effects are less severe and the landscape is more diversified than that on the Mahajilo. Indeed, grasses of the genus *Phragmites* are always present, as are plantations, but other formations such as canyons and remains of primary forests may also be observed.

The two rivers are frequently travelled by canoes, as well as small motorboats moving from Miandrivazo and Masekapy to Belo on the Tsiribihina. The site may be classified as disturbed, with a human activity density of 10 HA/km.

Type of shore at the Tsiribihina gorge

Section of the river where the channel may reach a width of over 100 m

Photo 7: Type of habitat and channel of the Tsiribihina

IV.1.4.3- Lake Ankepo

Ankepo is one of the major lakes of the Menabe Region, with an area of 5 km^2. It may reach a depth of 10 to 15 metres. Its shores are half clear, with herbaceous and shrubby strata in which grasses such as Kisozi (bozaka) and *Phragmites sp.* predominate. Unlike the majority of lakes in Madagascar, no pastureland for zebu was observed on the banks but many fishing families have settled all around it. Some sections of the bank feature growths of food crops. Human activity density is 10 HA/km.

Banks of Lake Ankepo

Shore of Lake Ankepo covered with *Phragmites*

Photo 8: Type of habitat at Lake Ankepo

IV.1.4.4- Lake Ambala

Lake Ambala is the largest of the Ankavandra region, having a surface area of 20 km^2. The depth varies between 0.5 and 30 m, according to those living on its banks. The shores are primarily covered by a herbaceous stratum of the type Kisozi (bozaka), a shrubby stratum of the genus *Phragmites* and an arboreal stratum comprising *Ravenala madagascariensis* and mango trees. No activity in the form of agriculture or habitation was recorded along the transect surveyed. The only activities are fishing and grazing of zebu. Human activity density is 4.8 HA/km

Shore of Lake Ambala

View of Lake Ambala

Photo 9: Type of habitat at Lake Ambala

IV.1.4.5- Manambolo river

The channel of the section surveyed is between 100 and 250 m wide, with a depth starting at 20 cm and not exceeding 100 cm. Some crops grown on “baiboho” were observed, but are scattered. The banks are colonized by secondary formations associated with jujube trees, tamarinds, mango trees and *Ravenala*. Several areas for watering zebu were also observed. Human activity density is 2.9 HA/km.

Shallowness of the Manambolo river

Channel of the Manambolo

Photo 10: Manambolo river

Map 11: Lakes Ankepo and Ambalo and the Manambolo river (Google Earth, 2013)

IV.1.5- Melaky region

The Melaky Region is located in the west central part of Madagascar. It extends over an area of 38,852 km^2, amounting to 6.6 per cent of the national territory. The Melaky Region is very well supplied with waterways. The hydrographic network is well replenished every year, making this region an invaluable source of water. The permanent availability of water has the potential to boost numerous economic activities such as river and marine transportation, water supply, fishing and agriculture.

The principal rivers of the region are the Namela, Kinazimazy, Demoka , Manomba, Manambaho, Marifolahy, Ranobe, Kingalahy, Berenty, Sahoany, Bebeka, Berano, Miaràna, Manjamo, Manambolo, Miolaky, Bondroa, Tsiazohena, Antondrolo, Manambaho, Bemarivo, Bekarao, Bekinamo, Mariakaboka, Maningoza, Berongony, Begoga, Bedodoka, Sambao, Kalonja and the Tsarafahay.

In addition to the rivers and streams characteristic of the region, there are also numerous lakes and ponds which also offer far from negligible economic potential, including for fishing, tourism and so on (Min. of Agriculture, 2003).

IV.1.5.1- Andolonomby

The Andolonomby river is one of the waterways feeding into Lake Trangahy. During the low-water season, completely dried-up sections alternate with those still containing water. Where the river is not dried up, the surfaces are colonized by *Eichornia crassipens* while the shore and banks support grasses of the genus *Phragmites* and remains of primary forests as well as large trees of the genus *Tamarindus indica.* No human activity was recorded along the transect surveyed, except for hoof-marks of zebu which sometimes come to graze along the edges of the river. Human activity density is 1.8 HA/km.

Surface of the Andolonomby river covered by *Eichornia crassipens*

Phragmites on the bank of the river

Photo 11: Type of habitat along the river Andolonomby

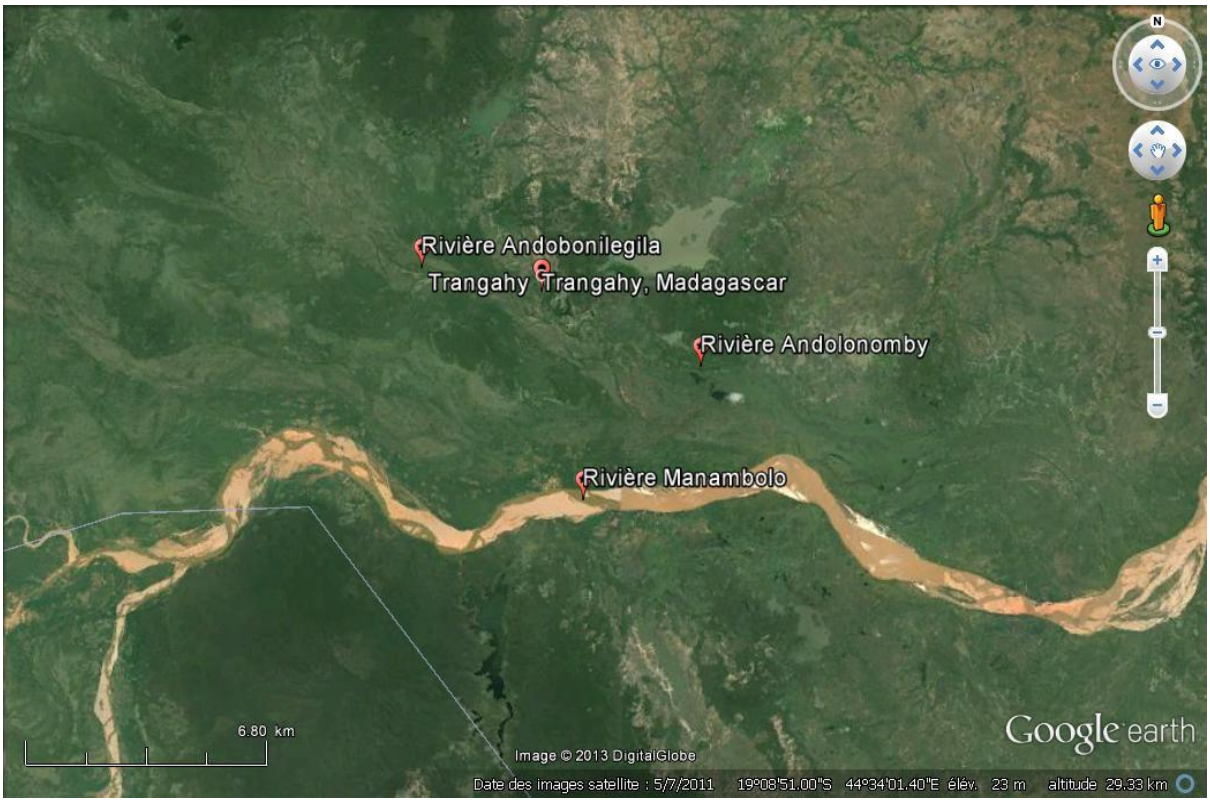
IV.1.5.2- Andobonilegila

With a channel alternating between full of water and completely dried up, the Andobonilegila river presents the appearance of a temporary river during the dry season. At certain points, the channel is converted into a rice plantation by the people living along the banks. In fact, it is only at times of heavy rain that the river refills, owing to overflow from the Manambolo river with which the Andobonilegila is connected. At certain points, the water depth exceeds 1 m while at others the channel is completely dry. The shores of the river are colonized for the most part by grasses of the genus *Phragmites* and the water surfaces by the invasive *Eichornia crassipens.* The banks of the Andobonilegila are formed of shrubby savannas, a type of vegetation that is very characteristic of the west of the island.

Surface of the Andobonilegila river covered with *Eichornia crassipens*

Phragmites on the riverbanks

Photo 12: Type of habitat and invasive plant species around the Andolonilegila river



Map 12: Area of Trangahy (Google Earth, 2013)

IV.2- Diurnal and nocturnal survey

IV.2.1- Nocturnal survey

Two rivers were surveyed, with a total transect length of 11.5 km.

On the Mahajilo river, a transect 2 km long was surveyed, with a specimen 60 cm long being observed. Following calculation, a relative abundance index of 0.5 specimen/km was established, with a minimum approach distance of 25 m.

In the case of the Tsiribihina river, the team carried out a nocturnal survey over 9.5 km, in which 10 specimens were observed, giving an index of 1.05 specimen/km for the Tsiribihina river, where there is detectable anthropic pressure. The average minimum approach distance was 18.7 m and 69 per cent of specimens observed were classified as "ES": in other words their size could not be estimated. Specimens' submerging before it is possible to estimate their size is due to several factors, such as anthropic pressure, the method used by the boatmen to approach the crocodiles or also shallow water depth (Ottley *et al.* 2008). However, the section surveyed in this case is easy for boats to travel on, which means that the crocodiles' rapid submerging was due to the anthropic pressures on the crocodile population (10 HA/km).

Region	Waterway	Transect	Babies	Juv.	Sub.	Ad.	ES	Total	Abundance index
Menabe	Mahajilo river	2 km	1	0	0	0	0	1	0.5 spec./km
	Tsiribihina river	9.5	1	0	1	1	7	10	1.05 spec./km

Table 3: Result of the nocturnal survey of the Tsiribihina river and its tributary

IV.2.2- Diurnal survey

IV.2.2.1- Direct observations and hind footprints

In all, four lakes and nine rivers were surveyed, for a total transect length of 196.07 km. A total of 23 crocodiles were observed directly during the daytime visits, while a further 22 specimens of varying sizes were estimated to be present, on the basis of hind footprints. Subtracting the number of specimens of the same size observed both in direct and in indirect observations, a total of 40 specimens was obtained.

Region	Body of water	Transect	H.	Juv.	Sub.	Ad.	ES	**Tot.**	n	S	**AI2**	**HA**
Boeny	Kotomay	3.67 km	0	0	0	1	0	**1**	0	2	**0.54**	**4.6**
			0	0	0	1	0	**1**				
	Mahavavy	28 km	1	0	0	0	0	**1**	1	3	**0.1**	**5**
			1	1	1	0	0	**3**				
Sofia	Tsinjomorona	15 km	0	0	0	0	0	**0**	0	3	**0.2**	**4**
			1	1	0	1	0	**3**				
Sava	Lake Antenabe	2 km	0	0	0	0	0	**0**	0	0	**0**	**1**
			0	0	0	0	0	**0**				
	Lake Ambidara	3.5 km	0	0	0	0	0	**0**	0	0	**0**	**0**
			0	0	0	0	0	**0**				
	Manambato	3.5 km	1	1	0	1	0	**3**	1	3	**0.85**	**1.4**
			0	0	0	1	0	**1**				
Menabe	Mahajilo	27.4 km	0	3	0	0	0	**3**	0	3	**0.1**	**11**
			0	0	0	0	0	**0**				
	Tsiribihina	85 km	2	1	0	1	0	**4**	1	7	**0.08**	**10**
			0	0	0	4	0	**4**				
	Lake Ankepo	5 km	0	0	0	2	0	**2**	1	2	**0.4**	**10**
			0	0	0	1	0	**1**				
	Lake Ambala	7.5 km	0	2	0	2	0	**4**	0	8	**1.07**	**4.8**
			0	0	2	2	0	**4**				
	Manambolo	10 km	0	3	0	1	0	**4**	0	4	**0.4**	**2.9**
			0	0	0	0	0	**0**				
Melaky	Andolonomby	1.1 km	0	0	0	0	0	**0**	0	3	**2.72**	**1.8**
			0	0	0	3	0	**3**				
	Andobonilegila	4.4 km	0	0	0	1	0	**1**	1	2	**0.45**	**2.04**
			0	0	0	2	0	**2**				

Table 4: Compilation of the results of the direct and indirect observations

The cells marked in grey show the number of specimens obtained after the hind footprints had been subjected to Hutton's calculation.

- H: Hatchling
- Juv.: Juvenile
- Sub.: Subadult
- Ad.: Adult
- Total: Total number of specimens observed directly or indirectly
- n: Number of specimens observed directly and indirectly
- S: Number of actual specimens at a site
- AI2: Diurnal abundance index (specimen/km)

The daytime visits made it possible to obtain abundance indices by relating the number of specimens observed and present to the transect length surveyed. The index obtained by this method varies with the site. In some cases, such as those of Lake Antenabe and Lake Ambidara, there may be an abundance index of 0, with neither specimens nor hind footprints being observed. On the other hand, for some bodies of water, such as the Andobonilegila river and Lake Ambala, the abundance indices are as high as 2.72 specimen/km and 1.07 specimen/km respectively.

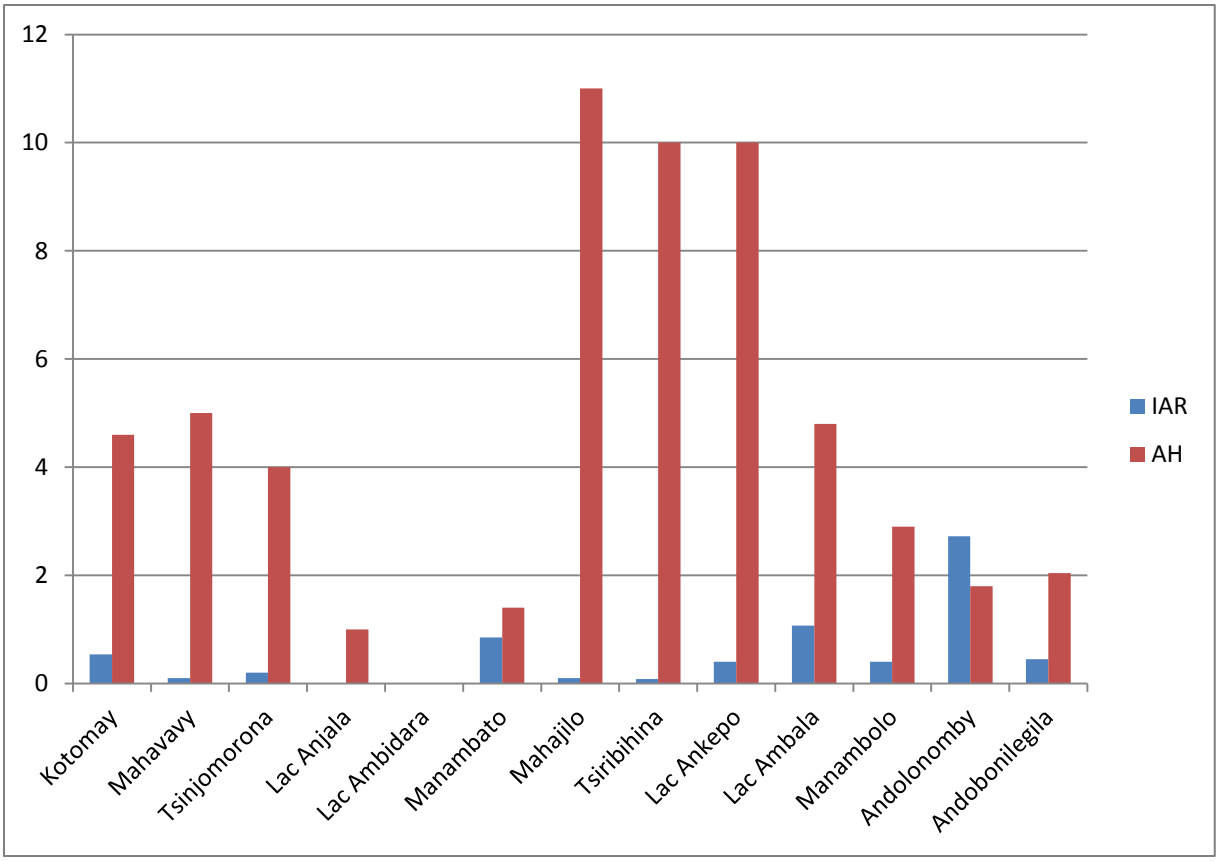


Figure 1: Graphic illustration of human activity and crocodile indices

This result shows no correlation between the number of human activities and the number of crocodiles observed directly and indirectly. (r = -0.374). This index is therefore used to determine the minimum abundance index of a population at a given site.

IV.2.2.2- Other traces of activity

Body of water	Transect (km)	Baby	Juvenile and subadult	Adult	***Total***
Kotomay river	3.67	0	1	9	***10***
Mahavavy river	28	18	15	28	***61***
Tsinjomorona river	15	0	4	13	***17***
Lake Antenabe	5	O	0	9	***9***
Lake Ambidara	7	0	1	2	***3***
Manambato river	2.5	0	0	2	***2***
Mahajilo river	27.4	0	0	0	***0***
Tsiribihina river	85	0	2	10	***12***
Andolonomby river	1.1	0	0	5	***5***
Andobonilegila river	4.4	0	0	4	***4***
Lake Ankepo	5	0	0	2	***2***
Lake Ambala	7.5	0	1	0	***1***
Manambolo river	10	0	0	1	***1***

Table 5: Indicator of the presence of crocodiles at the sites studied

Body of water	Transect (km)	Egglaying sites	Old nests	Burrows
Kotomay river	3.67	1	1	0
Mahavavy river	28	8	4	0
Tsinjomorona river	15	2	2	0
Lake Antenabe	5	1	6	0
Lake Ambidara	7	2	3	1
Manambato river	2.5	2	2	7
Mahajilo river	27.4	0	0	0
Tsiribihina river	85	3	1	1
Andolonomby river	1.1	-	-	-
Andobonilegila river	4.4	-	1	-
Lake Ankepo	5	3	1	0
Lake Ambala	7.5	1	0	9
Manambolo river	10	1	0	2

Table 6: Crocodile egglaying sites, old nests and burrows around selected bodies of water

Any traces other than hind footprints supply only qualitative information on the state of the crocodiles at the site, such as the age groups present in the population and the population dynamics. Where traces of specimens of all age groups are detected as well as egglaying sites and nests from the previous year, it is more likely that the population renews easily, since these traces indicate the presence of reproductive females, types of habitat used as well as the extent of the range of each population.

For example, in the case of Lakes Antenabe and Ambidara where the abundance index is 0, it was nevertheless possible to observe nests from the previous year and also some traces giving an impression of their habitat preferences.

Such, traces, however, do not make it possible to calculate the density or the abundance index, which are the tools used to assess the stability of the population.

The traces of crocodile movement (traces of tail, vegetation pushed apart or crushed), of emergence from the water or of basking only allow the conclusion to be drawn that crocodiles have been present in the area under study, even if not seen in direct observations. Analysis of the data obtained by means of the direct and indirect surveys does allow an assessment of the viability of the population.

Droppings and trace of tail

Trace of basking

Photo 13: Examples of indication of crocodile presence at the Ankavandra and Tsiribihina rivers

Since the traditional tracking method is scheduled for the winter, when the water level is low and crocodile activity reduced, after determination of the different age groups active in the areas under study it may be asserted that the Malagasy crocodile population is viable. Indeed, on the basis of these results, the inference may be drawn that a certain degree of regeneration of the wild population is already assured every year. Furthermore, the persistence of man-crocodile conflicts in many of the areas surveyed makes it possible to predict that there will still be an abundance of crocodiles in these locations.

IV.2.2.3- Summary of data obtained since 2008

Bodies of water	Transect	2008	2009	2013
Andobonilegila (Trangahy)	4.4 km	-	-	0.45 spec./km
Andolonomby (Trangahy)	1.1 km	-	-	2.72 spec./km
Ankarana (Ambilobe)	4.5 km	-	1.3 spec./km	-
Bemarivo (Andramy)	7.1 km	-	1.1 spec./km	-
Betsiboka (Ambato Boeny)	13.0 km	0.2 spec./km	-	-
Betsiboka (Embouchure)	26.2 km	0.0	-	-
Betsiboka (Maroala)	18.0 km	0.3 spec./km	-	-
Ikopa (Maevatanana)	8.2 km	0.5 spec./km	-	-
Kamoro (Ambondromamy)	4.0 km	0.3 spec./km	-	-
Lake Ambala (Ankavandra)	7.5 km	-	-	1.07 spec./km
Lake Ambidara (Sambava)	3.5 km	-	-	0 spec./km
Lake Ankepo (Ankavandra)	5 km	-	-	0.4 spec./km
Lake Antenabe (Sambava)	2 km	-	-	0 spec./km
Thenirano-Ambavarano (Fort-Dauphin)	19 km	0.7 spec./km	-	-
Mahajilo (Miandrivazo)	27.3 km	0.4 spec./km	-	0.5 spec./km
Mahavavy (Ambinany)	9.7 km	0.4 spec./km	-	-
Mahavavy (Anaborengy)	28 km	-	-	0.1 spec./km
Mahavavy (Bekipay)	11.8 km	1.2 spec./km	-	0.54 spec/km
Mahavavy (mouth)	17.1 km	0.5 spec./km	-	-
Mahavavy (Namakia)	17.1 km	0.9 spec./km	-	-
Manambaho (Ampasindava)	7.4 km	-	5.5 spec./km	-
Manambaho (Morafenobe)	2.1 km	-	4.8 spec./km	-
Manambato (Vohémar)	3.5 km	-	-	0.85 spec/km
Manambolo (Ankavandra)	10 km	-	-	0.1 spec./km
Manambolo (Ankavandra)	10 km	-	-	0.4 spec./km
Manambolo (Bekopaka)	3 km	-	2.0 spec./km	-
Mananjeba (Ambilobe)	2.1 km	-	2.9 spec./km	-
Soahany (Antsalova)	6.9 km	-	4.2 spec./km	-
Soahany (Bemamba)	4.7 km	-	2.1 spec./km	-
Tsinjomorona (Antsohihy)	15 km	-	-	0.2 spec./km
Tsiribihina (Berevo)	85 km			

Table 7: Summary and comparison of the results of 2008, 2009 and 2013 surveys

IV.2.3- Nesting study

Crocodiles always lay their eggs in the same place every year (Bolton *et al.*, 1990) unless the place has been severely degraded. Study of nests yields information on crocodile reproduction.

For ranching purposes, a standing partnership programme has been established with the local population for detecting laying sites. This partnership has significant impacts on the region since in addition to the commissions that the locality is paid, the local population also obtains an annual income. The amount of the latter varies with the number of nests found and the quantity of eggs collected from each nest. As an indication, the price of an egg on site in 2008 is 800.00 ariary for the REPTEL ranch. This income is primarily used as investment capital for rural activities (purchase of inputs, livestock or agricultural or stockbreeding equipment, but also for the purchase of supplies to improve households). When eggs are collected by the ranches, this partnership is beneficial to the management of wild crocodiles as it ensures population regulation and also protection of laying females from hunters; and the migrations are constantly tracked by the people living on the banks.

IV.2.3.1- Egglaying sites, old nests and burrows

Surveying the characteristics of egglaying sites and old nests gives indications of the reproductive capacity and potential of the area. Recording of the GPS coordinates of these actual and potential sites will facilitate subsequent tracking of egglayings. The presence of old nests with egg residues confirms the status of the site and the existence of ideal conditions for incubation gives supporting information on its potential.

The burrows give indications of a long-term habitat or a crocodile survival area, serving primarily as shelters when conditions are precarious, as resting places or as stores for food.

The following Table shows data on nesting and on crocodiles' capacity for survival at the various sites under study.

Body of water	Transect (km)	Egglaying sites	Old nests	Burrows
Kotomay river	3.67	1	1	0
Mahavavy river	36.33	8	4	0
Tsinjomorona river	15	2	2	0
Lake Antenabe	5	1	6	0
Lake Ambidara	7	2	3	1
Manambato river	2.5	2	2	7
Mahajilo river	27.4	0	0	0
Tsiribihina river	85	3	1	1
Ambolonomby river	1.1	-	-	-
Andobonilegila river	4.4	-	1	-
Lake Ankepo	5	3	1	0
Lake Ambala	7.5	1	0	9
Manambolo river	10	1	0	2

Table 8: Crocodile egglaying sites, old nests and burrows at various bodies of water

Observation of egglaying sites and of nests from prior years made it possible to conclude that the sites surveyed do have the conditions necessary for females of reproductive age to nest. In addition, detection of old nests containing eggshell fragments, or sometimes intact eggs from the previous year, indicates that reproduction and regeneration have been ensured.

IV.2.3.2- Nests from the current year

a- Ankavandra

Ankavandra is one of the areas for egg collection recently (2008) identified by the Reptel ranch.

The following Table shows the details of the nests from the current year, 2013, that we have surveyed:

Nest	**Female size**	**Num. eggs**	**Diam. nest (cm)**	**Depth nest (cm)**	**Vert. distance (m)**	**Distance to water (m)**	**Remarks**
Nest 1	DA	80	50	45	1.00	3.50	Eggs consumed (Ambala)
Nest 2	RA	40	37	33	1.00	3.00	Eggs consumed (Ambala)
Nest 3	RA	-	35	27	1.50	5.00	Wrecked (Ambala)
Nest 4	RA	-	40	30	1.00	4.50	Wrecked (Ambala)
Nest 5	J-A	-	25	23	0.60	1.00	Wrecked (Ambala)
Nest 6	DA	80	52	50	2.75	2.00	Wrecked (Manambolo)
Nest 7	J-A	-	27	20	2.50	1.50	Wrecked (Manambolo)
Nest 8	J-A	-	20	20	2.50	1.00	Wrecked (Manambolo)
Nest 9	RA	-	34	28	2.00	1.00	Wrecked (Manambolo)

Table 9: Result of nest surveys at two different bodies of water in the Ankavandra region

The females place their nests in locations meeting the requisite conditions for incubation. If there is competition between several females, always the largest are dominant. The smaller ones look for other places within the same site.

Given that the ranches ceased collecting eggs owing to the moratorium and that people have reservations about crocodiles, those who do not subscribe to that taboo eat the eggs and the others deliberately destroy them in order to prevent proliferation.

b- Trangahy

The features of the nests selected after sampling are shown in the following Table:

Nest	Female size	Number eggs	Fertilized eggs	Viable eggs	Width (mm)	Length (mm)	Vert. distance (m)	Distance (m)
Nest 1	2.43 m (RA)	30	30	0	44	99	0.5	3
Nest 2	DA	50	0	0	50	100	1.50	1
Nest 3	OA	23	23	23	44	93	1.50	1

Table 10: Details of eggs laid in locations in Trangahy

The Table above shows that the eggs of the locality achieve a high fertilization rate (more than 90 per cent). That indicates that the region's reproductive specimens demonstrate adequate genetic quality and that the ratio between the sexes is balanced and optimal (1/10). (Kofron C.P., 1987)

However, viability is very low in some cases. The viability rate depends essentially on the ambient conditions (temperature, humidity, aeration), which are generally hard and not well controlled in the wild.

The study of the two factors of fertility and viability underpins the selection of the area for beginning the development of egg collection for ranching purposes. This high fertility is also confirmed by the outcome of a high rate of hatching following artificial incubation (higher than 70 per cent) between 2004 and 2009 (Reptel, 2009).

Region	Bodies of water	Transect	Num. of nests	Index, nests/km
Menabe	Lake Ankepo	5 km	0	0.0
	Lake Ambala	7.5 km	5	0.67
	Manambolo river	10 km	4	0.4
Melaky	Andolonomby river	1.1 km	5	3.33
	Andobonilegila river	4.4 km	5	1.13

Table 11: Abundance index of nests at each site

In the course of the study of egg potential, abundance indices were calculated for the nests at each site. In the case of Trangahy, a total of 10 nests were counted, including:

- 5 in a 1.1 km transect along the Andolonomby river,
- 5 in a 4.4 km transect along the banks of the Andobonilegila river.

In the locality of Ankavandra, nine nests were recorded, including:

- 0 in a 5 km transect at Lake Ankepo,
- 5 in 7.5 km at Lake Anjala and
- 4 in a distance of 10 km along the Manambolo river.

Data on egg collections which had taken place in previous years are not available, thus making it impossible to compare the results obtained against the true potential of the region.

In the case of the commune of Trangahy, the most recent data on the potential for eggs go back to 2005, when the egg collector from the Reptel ranch recorded 44 nests. The drop in the number of nests identified is the result of a severe reduction in sampling work. In the case of Trangahy, the transects surveyed were reduced to 1.1 km and 4.4 km, while the area intended to be covered by this study is much larger. Initially, the sites to be studied, as indicated by our resource person, extended as far as Ankevo and also to Bemamba, constituting 40 per cent of our resource person's annual egg collection (Rasolofonirina C.M; personal communication, 2013) given that the last collection data in 2009 showed that nest density was 12 nest/km (Rakotondrazafy *et al.* 2009).

During the three years of the moratorium, local harvesters no longer tracked egg-laying females, which means that no new egg-laying sites were discovered. Consequently, the inventory was limited to examination of the last nests detected in the 2009 collection.

At the Andolonomby river, nest density reaches 3.3 nest/km, a relatively high figure by comparison with that relating to the bodies of water in Ankavandra. That can be explained by the fact that there are only a few human activities on the banks of the Andolonomby river, other than primary anthropogenic activities (footpath or grazing area for livestock). The Andolonomby egg-laying site may be described as undisturbed relative to those in Ankavandra, where the sites have been converted into crop-growing or living areas. At various points along this river, nest density varies between 0.1 nest/km and 0.8 nest/km. The disturbance on the banks undoubtedly drove the egg-laying females to look for other sites which have not yet been discovered by the local guides.

The index based on the number of nests can be used to obtain the status of a population. Although the index gives indications only on the number of egg-laying females, it still does give an idea on the future state of a population. A population that includes more reproductive females has a greater chance of surviving than one with fewer (Raven, P. and Johnson, G.B, 2002). It is a basic principle of ecology that the more reproductive females there are, the more young specimens there are that will themselves become reproducing adults, on the basis of the law of natural selection.

IV.3- Study of man-crocodile conflict

IV.3.1- Study of demographic factors

Following consultation of the 2003 monographs, the following data were collected:

Region	Density	Rural population	Num. of fishermen	Density HA
Sava	50 inhab./km²	88.64%	253	1
Sofia	20 inhab./km²	90.85%	1513	3
Boeny	25 inhab./km²	67.41%	2055	4.5
Melaky	6 inhab./km²	79.09%	534	1
Menabe	50 inhab./km²	75.54%	3025	10

Table 12: Factors likely to impact conflict

Among the demographic factors collected, only the number of fishermen shows a positive correlation with the density of human activities along the rivers surveyed in each region. In recording human activities, the canoes which primarily belong to fishermen are counted with the other anthropogenic activities.

Fishermen represent one of the factors playing an role important in man-crocodile conflicts. The possibility of competition for fish resources between the fishermen and crocodiles cannot be excluded. This was the case in 1915, when a drop in the abundance of fish was observed by the

fishermen, as a consequence of which the slaughter of several crocodile specimens was permitted by the colonial administration (See history, activity B).

In addition, analysis of the crocodile industry shows that fishermen are accidental hunters of crocodiles: small-sized specimens are sometimes caught in their nets and are killed or, much less often, released.

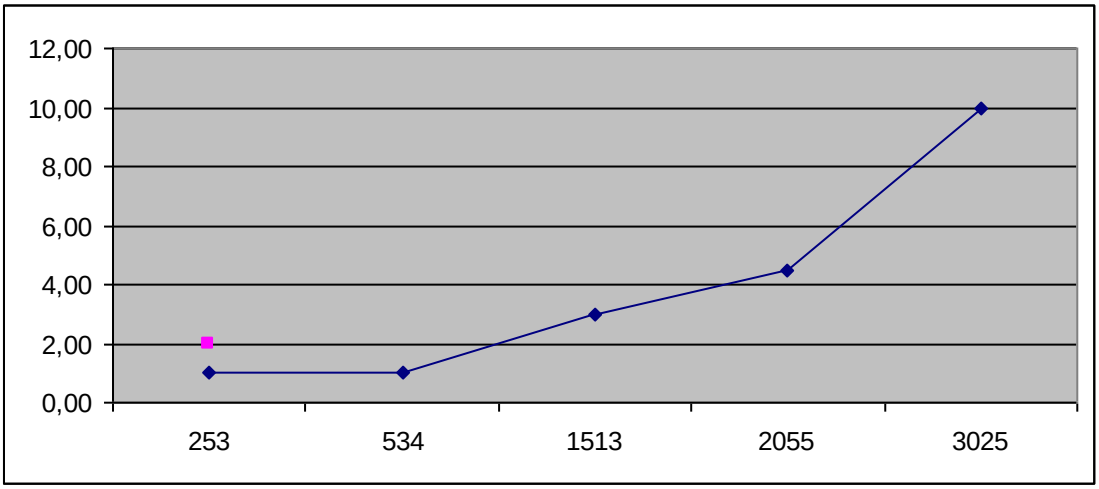


Figure 2: Graphic illustration of the positive correlation between the number of fishermen and the density of human activities (r^2=0.946; p>0.05; N=5)

IV.3.2- Effect of harvesting on wild populations

Site	Estimated annual minimum	Estimated annual maximum
Bongolava Region	130	140
Melaky Region: Antsalova	350	390
Melaky Region: Besalampy	850	950
Boeny Region	220	250
Sofia Region	250	280
Menabe Region	310	350
Sava Region	130	140
Total	**2240**	**2500**

Table 13: Estimate of the scale of hunting in each region obtained from survey of the tanneries

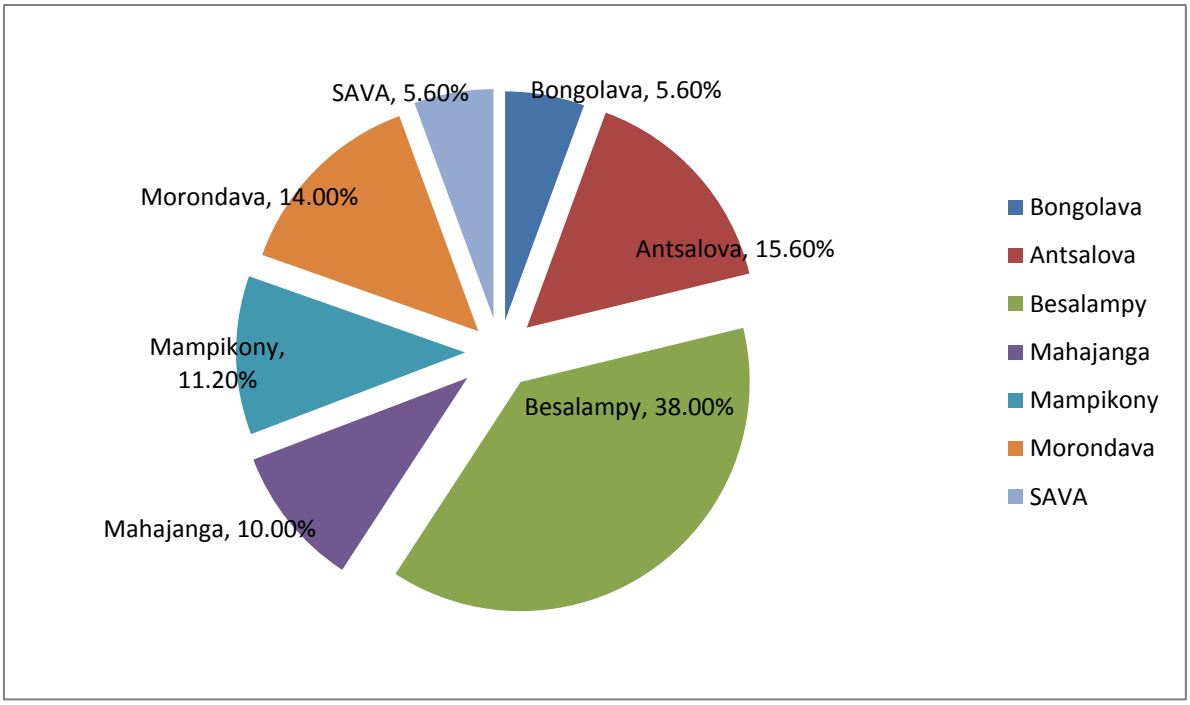


Figure 3: Proportion of hunting by locality

The data obtained from the survey of the tanners made it possible to quantify the number of specimens collected at each site.

The locality of Besalampy is the area providing 38 per cent of the skins for supply to the local market, after which comes the locality of Antsalova, with 15.60 per cent. These areas have always been recognized for their potential for wild populations (Behra, 1988; Ramandimbison, 1998) and were selected as the main egg-collecting sites for the ranches. The maximum crocodile abundance index was recorded at Antsalova's main rivers, namely the Manambaho and the Soahany (D = 4.2 spec./km and D = 5 spec./km).

The Melaky Region is an area difficult to reach by road and has a low population density: 6 inhab./km² as compared with 50 inhab./km² for the Menabe Region.

The survey conducted among hunters revealed the information that the collecting period starts in March and ends in November, coinciding with the dry period at the hunting sites. The types of trap used are non-selective and in general the result is three successful catches per 100 traps, per month.

The abundance index at the sites surveyed, in the case of the river Tsiribihina, for example, showed an increase relative to the last survey of this river in 1997. This change may be due to the difference between the methods used or else may reflect a genuine increase in the numbers of the population, although close to 150 specimens per year are harvested from the population of this site. This may be explained by the fact of the Tsiribihina's being surrounded by more than 70 lakes (Ramandimbison *et al.*, 1998). The crocodiles in these lakes are not hunted, and may be repopulating the Tsiribihina river during the high-water period.

In the case of the sites which were last surveyed in 2009, namely the Soahany and Manambaho rivers, the hunters at these localities all stated that they had stopped hunting following the pronouncement of the moratorium in 2010. Consequently, since, the densities recorded at these rivers have not changed, any drop in the abundance index is due not to hunting but to other factors.

IV.3.3- Survey of harmful incidents

Body of water	Persons		Farming		Crocodiles killed	2010	2011	2012	2013
	Wounded	Killed	Livestock	Crops					
Kotomay	-	2	-	-	-	-	1	1	-
Mahavavy	-	-	-	1	-	-	-	-	1
Tsinjomorona	-	-	-	-	-	-	-	-	-
Lake Antenabe	-	-	1	1	-	-	1	1	-
Lake Ambidara	1	2	2	1	-	1	2	1	2
Manambato river	1		2	1	-	1	1	1	1
Mahajilo	-	-	-	-	-	-	-	-	-
Tsiribihina	-	2	1	2		-	-	1	4
Andolonomby	-	-	-	-	-	-	-	-	-
Andobonilegila	-	-	-	-	-	-	-	-	-
Lake Angelo	3	-	-	-	1	-	-	2	1
Lake Tambala		4	-	-	2	-	-	2	2
Manambolo river	2	1	5	-	2	3	1	3	1

Table 14: Survey of harmful incidents since 2010

These figures show that highest number of crocodile attacks occurred at various points on the Menabe river. In total, 18 attacks were reported during the past four years, 15 of them in the locality of Ankavandra and three on the Tsiribihina river. According to the studies made, the banks of the bodies of water of the Menabe Region harbour the highest number of anthropogenic activities and traditional fishermen.

The Sava Region takes second place, with nine attacks occurring. However, the human activities recorded around this region's lakes and rivers are low by comparison with other sites. The explanations for the attacks are primarily based on the concept of ordeal by crocodile: the persons killed or injured are considered to have done something bad. This made it impossible to obtain logical explanations for the reasons for the attacks.

At the locality of Trangahy, no figure was obtained for crocodile attacks but the villagers asserted that in every high-water period, several persons and farm animals were killed or injured.

V- Discussion

V.1- Difficulties encountered

V.1.1- Problems related to insecurity

The Mahajilo and Tsiribihina rivers were the only ones that could be surveyed at night. The timing planned for surveying the other sites (Tsinjomorona, Manambolo, Mahavavy and Kotomay) coincided with periods of heightened insecurity in the Sofia, Menabe and Melaky regions, which made the local guides reluctant to venture onto the water at night. The transects were severely curtailed, as in the case of the Mahajilo river, of which only 2 km were surveyed.

In the locations where insecurity is prevalent, it is impossible to carry out night-time surveys in places where the local authorities have introduced curfews. However, in such areas a relatively high index has always been found, owing to the fact that only a few human activities have been recorded: as an example, the Andolonomby and Andobonilegila rivers, or the Manambaho and Soahany, which are located in red zones with a high level of insecurity and which nevertheless have a potential for wild specimens.

V.1.2- Navigability

This is not the first time that the problem of navigability of the rivers has been encountered in surveying crocodiles. Most of the surveys were carried out on foot, owing to shallow water depths or surfaces completely covered with vegetation.

In addition, the boats available for deep waters such as the lakes were small fishermen's canoes with only 3 to 5 cm of freeboard, entailing an imminent danger of sinking and thus limiting the distance covered.

V.1.3- Timing

In the case of the bodies of water of the Sava Region, the survey was carried out in July. According to the hunters acting as our guides, crocodiles are not very active at this time and the likelihood of observing any was minimal. That made the guides highly reluctant to carry out a nocturnal survey.

Furthermore, the 15 November ending date also restricted the size of the areas to be surveyed, as well as the timing. In fact surveys carried out in the rainy season, which begins in November, would be productive given that crocodile attacks are more frequent at this time and such studies would have been able to contribute additional data on man-crocodile conflicts through study of the changes at the bodies of water and also on the quantity and quality of the human activities on the shores and banks.

V.2- Discussion on methodology

Adding other surveying methods made it possible to obtain abundance indices for the sites at which it was impossible to carry out nocturnal surveys. Among the 13 bodies of water surveyed, only two rivers were studied at night. The other nine sites were only surveyed in the daytime, with direct and indirect observations being made. However, diurnal surveys also have their limits: both direct and indirect observation may give zero results. Indeed, since crocodiles are active only at night, the likelihood of observing them in full daylight is very low, tending to distort the results obtained.

As for the surveying of traces, only hind footprints may be taken into account in calculating the abundance index.

Calculating the total size of a specimen from the hind footprints made it possible to identify specimens which had not been observed directly. Although it was possible to observe several hind footprints, they generally belonged to a maximum of three or four specimens. In order to determine the abundance index on the basis of indirect observations, prints which are the same size are considered to belong to the same specimen.

As for the other traces, they only give an indication of the state of the population. However, if traces of a specimen in some age group are not detected at a particular site, that does not mean that no such specimen is present.

Observation of the hind footprints depends above all on the nature on the substrate over which a specimen has passed or on which it has rested. For example, it will be impossible to detect hind footprints at a site at which the banks comprise rocks or compacted soil, such as Lake Anjala and Lake Ambidara, or the gorges of the Tsiribihina. By contrast, the bodies of water with banks consisting of sand or alluvial deposits will be easier to observe (as in the case of a river).

The advantage of inventorying reproductive females is that the surveys do not have to be done at night, but rather involve only counting of the nests or alternatively accompanying and monitoring the collection of eggs by ranch workers.

This method is one of the most reliable, because it gives information on the number of females playing a role in population dynamics and in the future state of the population.

V.3- Man-crocodile conflicts

Although the figures obtained give a general idea of the intensity of man-crocodile conflicts, they are usually underestimated. In fact, it was only possible to interview the villagers in the places easy to reach, which meant that other, inaccessible, sites where crocodile density is surely higher were ignored.

Part 2: Establishment of the local committee

The local crocodile management committees are a response to the recommendations of a study carried out in 2009, together with WWF, by scientists who were crocodile specialists, in the areas of Soahany, Manambaho (Melaky) and Mahavavy (Boeny) to track the industry-related activities in the sites with potential for hunting, egg collection and man-crocodile conflicts.

The objectives are:

- to coordinate activities in the sites with potential with the local Forestry Administration, to have the local community join in sustainable crocodile management, though initiating and pursuing activities to trace the wild skins;
- to apply fair trade so that the human population also gains some benefit from the conservation of the species;
- to create local committees for on-site tracking of industry-related activities.

Thus, the purpose of the committee is to join in sustainable management of the wild crocodile population at local level, by means of the following activities:

- Raising awareness in the river-bank population;
- Ensuring follow-up by the community with assistance from scientists;
- Following up on satisfactory operation of the coordinated traceability system;
- Ensuring application of the “Dina” (customary laws established by a social contract) and the relevant laws;
- Cooperating with the local authorities (forest ranger service, decentralized territorial collective entity);
- Combating illicit exploitation of wild crocodiles.

At each survey carried out jointly with the Scientific Authority (Animals), Crocodiles section, a team was given the task of establishing a pilot local committee in the places where crocodiles are hunted or eggs collected. To that end, a meeting is held in the localities that are nearby and/or directly involved in hunting and egg collection.

The objective of each meeting relates to raising awareness in the local communities on the importance of crocodiles as a resource, and management thereof to allow utilization for the long term. In that connection, the following points were discussed and adopted:

- The standard for minimum and maximum size of specimens for hunting, in accordance with relevant legislation in force, is from 20 to 50 cm pour for the belly skin and from 27 to 70 cm for the back skin;
- Hunting and egg collection are subject to possession of a hunting or collecting permit, issued by the Forest Administration;
- Only authorized hunters and harvesters may carry out those crocodile-related activities;

- A commission will be paid for hunting and/or collection of skins and eggs;
- A coordinated traceability system shall be established;
- In the event of injury following a crocodile attack, the community with the assistance of the "Fokontany" (the smallest territorial entity) shall inform the decentralized Forest Administration so that the latter may issue a hunting permit in the area where the attack took place (hunting of five crocodiles will be authorized if the injury is to a person, three if the injury is to livestock);
- The laws in force shall be applied whatever problems are caused by crocodiles even in the localities where hunting is prohibited because of "fady" (local taboos).

A copy of the minutes of each meeting is deposited with the forest ranger service and the "Fokontany" which are directly responsible for the localities where hunting and egg collection are carried out.

I- Situation in the Mitsinjo district (Boeny Region)

There is hunting around the Kotomay and Mahavavy rivers.
A meeting with the local population was held by the side of the Kotomay river, which is a tributary of the Mahavavy river connecting it with Lake Kinkony. The Mahavavy - Kinkony complex is currently a new protected area in Madagascar with governance of Category V according to the IUCN classification "Protected landscape/seascape". The primary objective of this category is "To protect and sustain important landscapes/seascapes and the associated nature conservation and other values created by interactions with humans through traditional management practices".

The MMZ association shares responsibility for the management of the protected area of the Mahavavy - Kinkony with the promoter of the site, namely ASITY Madagascar. The protected area covers the seven communes of the district. The representatives of the Management Authority and the local Forest Administration invited the members of the association to join the local committee for the Mitsinjo district to provide joint resource utilization management.

In attendance at the meeting were:

- 40 local communities
- The mayor of the Mitsinjo commune
- Three representatives of the MMZ association
- One representative and discussion leader from the association ASITY Madagascar
- Three representatives of the Management Authority/Directorate-General for Forests
- The Head of the forest ranger service covering the environment and forests of Mitsinjo
- The Head of the "Fokontany" of Bemahazaka

II- Situation in the Antsohihy district (Sofia Region)

The Antsohihy district in the Sofia Region is known as the supplier of skins to the artisans in Antananarivo. Most of the skins in Antananarivo come from this locality, which made it essential to set up the local management committee.

The decisions at the meeting in the "Fokontany" of Antafiandakana, a rural commune in Ankerika, were approved by

- 38 local communities of Antafiandakana
- The mayor of the commune of Ankerika
- Three representatives of the Management Authority/Directorate-General for Forests

- The Head of the forest ranger service covering the environment and forests of Antsohihy
- The Head of the "Fokontany" of Antafiandakana
- The Head of the village of Antafiandakana

III- Situation in the Sambava district (Sava Region)

According to enquiries made of the tanners, a considerable quantity of skins come from the Sava Region. It was also reported in the locality that there had been a proliferation of the crocodile population in this region. Consequently it was decided to carry out a survey, through setting up the local committee for resource management in this region. In this district, at least one person or one farm animal per year was reported injured or killed from a crocodile attack.

A meeting was held in the "Fokontany" of Anjala, commune of Tanambao Sud.

The decisions taken at the meeting were adopted by:

- 39 local communities of Anjala
- The Head of the "Fokontany" of Anjala
- The Deputy Head of the "Fokontany" of Anjala
- The secretary of the "Fokontany" of Anjala
- Two civilian security guards
- Three representatives of the Management Authority/Directorate-General for Forests.

In the same district, a meeting was also organized in a sector of Bedara, with participation by 23 local communities.

IV- Situation in the Antsalova district (Melaky Region)

A visit was made to the mayor of Antsalova. In this district, the fees for outgoing products are fixed but those crocodiles and eggs not yet. The bodies with primary responsibility for these usable resources carried out an awareness-raising exercise in order to be able to monitor and track closely the management of the crocodile trade and establish patterns of sustainable utilization for it.

In the same district, the commune of Trangahy is also one of the places in the Melaky Region where eggs are collected and the sale of crocodile skins is more active beyond the Soahany river. A meeting was organized in this commune to make the populations aware of the value of the rich resources available to them, as well as the measures that they need to take for the tracking and sustainable management of these riches. As a result, the local committee was established and primary responsibility for tracking the movement of crocodile-derived products was assigned to the forest ranger service in Bekopaka (because between Morondava and Antsalova, a forest administration body is found only in Bekopaka) and the "Fokontany" of Trangahy. The rate of fees for crocodile skins and eggs is not yet fixed but this will be done at a later communal meeting.

In attendance at the meeting were:

- 21 members of the local community
- The Head of the "Fokontany" of Trangahy
- The president of the communal councillors of Trangahy
- Two representatives of the Management Authority/Directorate-General for Forests.

V- Situation in the Miandrivazo district (Menabe Region)

The commune of Ankavandra is known as a location for crocodile hunting and, for the past two years, as a new place for egg collection. It has been reported that at least one person or one farm animal per year has been injured or killed in a crocodile attack. A meeting was also held in the "Fokontany" of Ambilorano, commune of Ankavandra, in order to set up a local committee for tracking and sustainable management of crocodile resources.

The decisions taken following the meeting were adopted by:

- The mayor of Ankavandra
- 26 members of the local community
- The Head of the "Fokontany" of Ambilorano
- One representative of the Management Authority/Directorate-General for Forests.

VI- Situation in the Vohémar district (Sava Region)

Hunting takes place in some localities of this district. It was not possible to have a meeting with the hunters, because they did not come to the appointment.

Consequently a trip was organized to the "Fokontany" of Bobatsirevo, commune of Nosibe. In this locality, crocodiles still take a major place in the cultural sphere. The local communities do not allow any hunting. Nevertheless, a meeting was held to set up the local committee. The role of this committee is to conserve the crocodile population. In the event of injury or death caused by crocodiles, the nearest forest administration must be informed by the "Fokontany" so that it can authorize hunting of the problem specimens (five crocodiles may be hunted in the event of an attack on a person and three if the attack is on livestock). The animals killed in these circumstances will not be utilized. The goal of the hunting is thus regulation of the population in order to avoid overpopulation.

The decisions taken at the meeting were adopted by:

- 34 members of the local community
- The Head of the "Fokontany" of Bobatsirevo
- The Deputy Head of the "Fokontany"
- The Secretary of the "Fokontany"
- Three representatives of the Management Authority/Directorate-General for Forests.

Chapter II: Analysis of the industry

Part 1: The artisanal market

I- Introduction

Starting in 1987 and 1988, studies were carried out by Behra, O and Hutton, J. M., in an attempt to quantify the use by the domestic market of crocodile products. These studies were supported and financially assisted by the Governments of France and Switzerland and by the CITES Secretariat. They demonstrated that the total number of skins used for the local market was close to 3,500 in 1986, at least 4,000 in 1987 and 6,000 in 1988. In 1998, another study was made to estimate the volume of products coming onto Madagascar's domestic market. It was estimated that the local market used approximately 6,000 skins (Ramandimbison *et al.*, 1998). The corresponding figure in 1990 was approximately 12,000 skins (Final Report, GTZ-financed project, 2008). In 2009, another study was carried out with financing from WWF to support Madagascar in the implementation of the action plan (2007 – 2010) for crocodile management which had been decided on in 2007. In the summary report (WWF-financed project), it was noted in November 2009 that 460 skins had been physically tallied (Rakotondrazafy, report, January 2010).

The results of these studies showed that a considerable volume of skin-based products comes onto Madagascar's domestic market. This was caused by several factors, including overproduction following the allocation of quotas to the ranches in the 1990s and the processing capacity for these products in the Malagasy artisanal industry. The Malagasy artisanal industry has a reputation for the quality of its handmade products, which has opened up a small-scale market at both national and international level, under the impact of tourism.

The problems in crocodile management in Madagascar include the lack of data on the state of the population in the wild, together with difficulty in monitoring the market. There was not any way to determine whether or not egg collection or hunting has an impact on the survival of the species. The outcome was that the estimates made within the context of these studies and reports caused the CITES Standing Committee to issue recommendations at SC58 (SC58 Doc. 20) and SC59 in Doha, Qatar (SC60 summary record) (Qatar, 25 March 2010) for implementation by Madagascar so as to monitor and take control of the artisanal industry and crocodile management in general. A working group on ranches in Madagascar, created at the 58th meeting in 2008, tracked the progress of the implementation of these activities, which finally resulted in a six-month moratorium on the international crocodile trade. Madagascar was able to initiate activities to comply with those recommendations, such as audit and training in the monitoring of ranches (February 2010) with financial assistance from CITES France and technical support from the Crocodile Specialist Group, but the political crisis which began in 2009 made it impossible to carry out the majority of the recommendations. Starting in 2010, despite the financial difficulties with which Madagascar's Management Authority had to deal, the other recommendations were partially implemented, but the working group observed that the progress made was still far from sufficient (SC62 Com. 5, Switzerland 23 – 27 July 2012). With regard to the latter document, the working group drew particular attention to recommendations 4 and 5 specifically dealing with the artisanal industry. These recommendations included quantifying the numbers of artisanal and conventional retail outlets and tanneries (particularly in the provinces); ensuring their registration/licensing, carrying out related stock inventories, monitoring their registers and carrying out regular, random or unannounced inspections; and ensuring that products not complying with established size limits were seized and destroyed and offenders prosecuted.

Madagascar's CITES Management Authority/Forestry Administration took the initiative of making attempts to track and monitor the domestic market, but owing to a lack of resources, tracking took place only in the area around Antananarivo.

The artisanal industry in crocodile products is a mainstay of Madagascar's economy. It brings financial income from the source to the sale of the finished product and represents directly or indirectly the primary revenue of numerous households. Crocodile-skin articles are luxury products, which increases their value. But the economic benefits resulting from the utilization of these products are not always equitably divided. Furthermore, most of the activities within this industry were still of an informal type, because the regulations in force did not permit full benefits to be drawn from the utilization of these products. As a result, the sourcing and utilization of the products often took place under the guise of an outcome of a man-crocodile conflict. But studies made since that time have demonstrated that the products used by this artisanal market were certainly not the outcome of conflict. In addition, the representatives of the Administration at national, regional and local level were not capable of verifying and properly monitoring the data on the circulation of crocodile-derived products (skins, eggs, oils etc.) Furthermore, there were several factors that hindered attempts to establish the scale of the industry. These included a lack of resources to carry out exhaustive surveys and censuses of the actors involved, starting from the hunting or collection stage; a lack of information on the sites where crocodiles or their eggs were taken or on the hunters themselves, and the accessibility of the hunting sites; a lack of awareness on the utilization of the resource; and the fact that most of the activities were carried out informally. The lack of communication and information among the relevant sector ministries also did not facilitate tracking.

II- Methodological approach

The methodology proposed takes place in three stages:

II.1- Literature analysis

The first part consists of the collection and analysis of the available documentation (reports, publications, personal communications, etc.) to identify the actors and understand the situation in the industry. The data and information on the actors were obtained from a call for expressions of interest, followed by interviews of key sources and examination of their documents (Ministry for Promotion of Artisanal Industry, Ministry of Trade, Ministry of the Environment and Forests, Ministry of the Interior, Statistical Office and so on).

II.2- The focus group method

The focus group approach is a method of rapid qualitative enquiry based on group dynamics. It is primarily used to provide an opportunity for stakeholders to share their points of view, their understanding and their ideas on a given subject. It makes it possible to assess the needs, expectations, and desires, or to improve understanding of opinions, motivations or behaviours. It also serves to test or bring out new ideas, or to identify the main problems needing further study, the aim here being to determine the response of the group in relation to the application of the regulations in force as well as proposals for improvement.

Focus groups selected:

Thus, the second part comprises the collection of information from the focus group, and an open or semi-structured interview with the actors identified. An analysis of the stakeholders and a review of relevant documentation made it possible to identify the types and number of focus groups. A stakeholder or interest group is any individual or group of individuals who may impact or be

impacted directly or indirectly by the existing or future application of the legal and regulatory framework.

The focus groups identified are those who work in the processing of the skins, those who turn them into finished products and the sector ministries responsible for monitoring and tracking.

II.3- Data analysis

The last part consists of the actual analysis for the reorganization of the industry and for an appropriate application of the regulations in force. On the basis of the analysis of the value chains, the data analysis methods are based on the SWOT method (Strength, Weakness, Opportunity, Threat).

III- Results and interpretations

III.1- Literature analysis

A literature analysis is important for understanding the industry and related aspects.

III.1.1- Man-crocodile relations

III.1.1.1- Beliefs

In their history, the Madagascans in their pagan beliefs accorded crucial importance to the crocodile. Certain tribes considered crocodiles to be sacred, and they were blessed every year (O. Behra and Dr J. Hutton, 1990; Ramandimbison *et al.*, 1998). The judicial ordeal formed a significant part of the Malagasy juridical customs, and use thereof did cause some deaths (Alfred Grandidier, 1869 in Zehrer, 2013). Ordeal by crocodile was practised in almost all the regions of the island except in Imerina and in the depths of the south, since there are no crocodiles in the dry and thorny forests, in which lakes and large rivers are rare. For at least 400 years, crocodiles were entrusted with the role of judge when there was a need to identify a guilty party; ordeal by crocodile was widespread in the coastal parts of Madagascar. Through that period, and until the end of the 19th century, the population believed that crocodiles never devoured anyone who was innocent. Furthermore, an analysis based on folk tales and proverbs clearly demonstrates the relationships that there were between man and the crocodile. Zehrer has shown elements of the Malagasy folk wisdom and the relations that existed with the crocodile in the proverbs and folk tales, based on his own observation. In fact, the Madagascans use the word “crocodile” to transmit messages, to make words more plausible, more explanatory, to give more weight to them, since no animal is superior to the crocodile (Zehrer, Le crocodile malgache, vu à travers de contes and proverbes, 2013).

Since the arrival of western civilization and colonization, this belief has lost potency. The prospect of profits from utilization of crocodile-derived products has had an impact in some localities on Madagascar’s culture of the crocodile.

Despite the fact that the tradition has been progressively abandoned in various regions of Madagascar, life in the rural areas is as a general rule influenced by numerous taboos, known as “fady”, varying from one region to another. Currently, as has been found by enquiries made under the present project, the culture of the crocodile still exists in various regions visited. Within the Sava Region: Loky Manambato, Green Lake (Vohemar). In the Diana region: Lake Anivorano; in the Boeny Region: Mahavavy river, Lake Ravelobe; in the Menabe Region: Tsiribihina river.

III.1.1.2- Hunting

There are limits on the hunting of crocodiles, because, as the inhabitants of Loky Manambato, Sava Region, explained to the crocodile team during a visit in 2013, there are sacred animals in which resides the spirit of an ancestor. Crocodiles are respected in some localities. According to a hunter in Sambava (2013 enquiry), the hunters know very well in what part of a river or lake they can watch for crocodiles and which other parts should be avoided as they may be the territory of the sacred crocodiles.

Traditionally crocodiles are not hunted for their meat, since crocodiles eat men, and to eat a crocodile that might have already devoured a man would be considered as a form of cannibalism (O. Behra, 1990). Similarly, there are places where the spirits of the dead have found refuge in a crocodile, which has thus become a blood relation.

The development of hunting expanded after 1915, at which time the colonial administration issued a law covering capture.

III.1.2- Historical review of the situation of the crocodile

III.1.2.1- Biology and ecology of the species

Crocodylus niloticus is an apex predator, a carnivorous animal that is at the top of the food chain. It has a massive body and a long triangular snout. Its skin as a general rule is grey, shading slightly towards greenish, black or brown. Its eyes, ears and nostrils are located on the top of its head, which allows it to see, hear and breathe while submerged. Its principal hunting technique is to lie immobile in the water, with only the top of its head and its nostrils showing, and then to seize its prey ferociously, drag it under the water and drown it.

According to researchers, during the 1990s, the number of wild crocodiles in Madagascar appeared to have increased, thanks to effective protection of them. Subsequently, Madagascar allowed hunting of them because of safety concerns resulting from man-crocodile conflicts.

Knowledge of crocodile biology, ecology and of its role in the ecosystem facilitates improved integration of the management strategy for the species.

III.1.2.2- History of hunting in Madagascar

Hunting of the crocodile, known as traditional hunting, had probably always existed in Madagascar, although for differing reasons. It is a part of the customs of the population of certain ethnicities and has never posed a serious threat to the survival of the species (Zehrer, in press, 2013). In fact, the first reports of crocodile hunting in Madagascar date back to 1602 and 1608.

Commercial hunting really expanded on the main island starting in 1920, when crocodile skin became prized in the United States and a world market rapidly developed. The first attempt at commercial exploitation was in 1922 by the "Société Anonyme des Peausseries de Madagascar" located in Mahajanga. In its first year it handled 4,000 skins, in the second, 10,000. It seems certain that they came from Lake Kinkony. This hunting and exporting company continued in operation until 1939, with lower sales figures than at the beginning. According to Decary, R. (1950), 80 tons of salted skins were exported in 1930.

Towards the 1960s, the pressure from hunting was of considerable magnitude, as exports had dropped dramatically and as a result the demand for crocodile skin was greater than Madagascar could supply (sources: O. Behra and J. Hutton; Ramandimbison, I. Games, C. Lippai). Exports from Madagascar of crocodile skins originating from hunting officially stopped after the ratification of the Washington Convention in November 1975. The introduction, under CITES, of protection of the

species at national and international level had the anticipated results. Indeed, an increase in Madagascar's crocodile population in the wild was observed, and hunting resumed towards the end of the 1990s, primarily to obtain skins, oil extracted from the liver and from the fat which accumulates in the tail and which is highly prized (O. Behra, 1990; Zehrer, in press, 2013).

III.1.3- Artisanal industry in Madagascar

Generally speaking, artisanal products are not yet of the quality needed to meet consumer needs. By contrast with manufactured products, production in the craft sphere is still at a fairly informal stage, causing problems in selling such products.

III.1.3.1- Product quality

The craft products are not made to a standardized pattern. Indeed, owing to a lack of adequate training or professional qualification, the artisans are not always capable of producing high-quality articles. Under such conditions, the desire to make money often takes precedence over any effort to improve the products. There are frequently situations in which two different prices are asked for the same product. Underlying this situation are the ways in which such products are made and offered for sale. As a result of inadequate information and insufficient exchanges among the various actors (individual artisans, associations and bodies responsible for sub-sectors), prices are set in accordance with pricing systems adopted by the producers depending on their own constraints and needs.

III.1.3.2- Product standardization

The primary objective that artisanal production seeks to achieve is for the products to be exported. Here, observance of standards is an important factor. The products must be in line with the tastes and needs of the customers. Also important are the originality of the products and their particular features. Equally important are specific aspects relating to the country of origin, which need to be reproduced in the articles made. The objective here is to be able to export products of good quality at competitive prices (MPA[3], 2013).

III.2- Features of the actors

Based on an analysis of the interest groups, the actors directly in the utilization of crocodile-derived products may be classified as follows:

- Hunter: a hunter is considered to be any person carrying out hunting of wild crocodiles, provided that they are pursuing their trade in the localities specified by the relevant criteria and in observance of the standards regarding the size of skins to be marketed.
- Harvester: a harvester is considered to be any person, company and/or enterprise pursuing the trade of harvesting skins and crocodile-derived products, in the localities specified by the relevant criteria and in observance of the standards regarding the size of skins to be marketed.
- Tanner: a tanner is considered to be any person, company and/or enterprise having a tanning facility for conversion of rawhide into tanned skins, for use in making leather goods.
- Leather-goods maker: a leather-goods maker is considered to be any person, company or enterprise making crocodile-derived articles and having a production facility, registered with the sector ministries having jurisdiction.
- Seller: a seller is considered to be any person, company or enterprise offering crocodile-derived articles for sale, having one or more points of sale, registered with the sector ministries having jurisdiction.

[3] Ministry for Promotion of Artisanal Industry

In addition, many people work indirectly on crocodiles, such as local communities, employees in the facilities for tanning or leather-goods making and in the points of sale for finished articles.

With each actor in the industry having a specific way of drawing benefit from the product, it is advisable to analyze the role played by each type of activity.

III.2.1- Hunting

The three leading causes of crocodile deaths in Madagascar are:

- Hunting for commercial purposes,
- Killing out of safety concerns,
- Accidental capture in fishing nets.

The survey performed indicates that there are three types of hunter:

- Professional hunter, hunting every year. This type of hunter has a certain gift for capturing crocodiles, and as a general rule, it is this type who works with harvesters, as well as with the local community in places where there is a man-crocodile conflict
- Local community: on occasion, the local population turns to hunting, if there has been an encounter with a crocodile either in the fields or at the edge of the river
- Fishermen: fishermen become hunters as a result of accidental capture

III.2.1.1- Hunting for commercial purposes

In Madagascar, crocodile hunting is a genuine profession that is handed down from father to son. According to the local population (2013 survey), the crocodile hunters have a specific gift for capturing crocodiles that others lack.

Hunting is carried out in the favourable timeframe, which is from April to December, varying with the different regions. Local hunters work closely with the harvesters since on their own they lack the resources to make a hunting trip. Thus they seek financing and logistical support from harvesters before undertaking a trip, which will be of varying durations but at least 15 days in the hunting zones.

III.2.1.2- Killing out of safety concerns

The situation is particularly problematic when man and crocodile live in close proximity. The problems are much greater than in the case of boars, tortoises, lemurs or other Malagasy species. In the mindset of the Madagascans, the man-eating crocodile, that lives below the ground and at the same time dominates the waters, is an animal difficult to understand; it has a certain power, but an undefined one, and consequently, it is difficult to live beside it (Zehrer, 2013).

Following the population explosion, which is more significant in the southern hemisphere than in the north, the countries of Africa have seen their populations increase tenfold. The increase is sevenfold for Madagascar. Intensification of agriculture and stockbreeding has not increased at the same rate as industrialization and is still rooted in tradition. According to the latest statistics, more than 80 per cent of Madagascans are peasant farmers. In consequence, ever more areas have to be turned over to crop-growing, and the forests are being changed into grazing land (Zehrer, in press, 2013).

Man and crocodile live in the same habitats closely related to water: lakes, rivers, marshes, flooded areas.

III.2.1.3- Accidental capture in fishing nets

Unlike the Nile crocodile population in Africa, where the prey is different, crocodiles in Madagascar feed principally on fish. In the lakes and rivers, the crocodiles compete for the fish with the fishermen. This competition has become acute owing to population growth and the migration of the populations of the south and south-east to the west and north-west. The more intensive the fishing, the greater the effects on the crocodiles.

In addition, as a result of the use of small-mesh nets, there is a reduction in biomass (source: Ministry of Fisheries). This has been exacerbated as a by-product of the anti-malaria campaigns in which mosquito nets were distributed to the rural population around the turn of the millennium. These nets, initially used against mosquitos, were then used for fishing. Owing to the small mesh, this has the effect of stripping the lakes bare. They also serve as traps for young crocodiles and other aquatic reptiles. Currently, it is forbidden to use such nets for fishing.

III.2.1.4- Distribution of the hunting zones

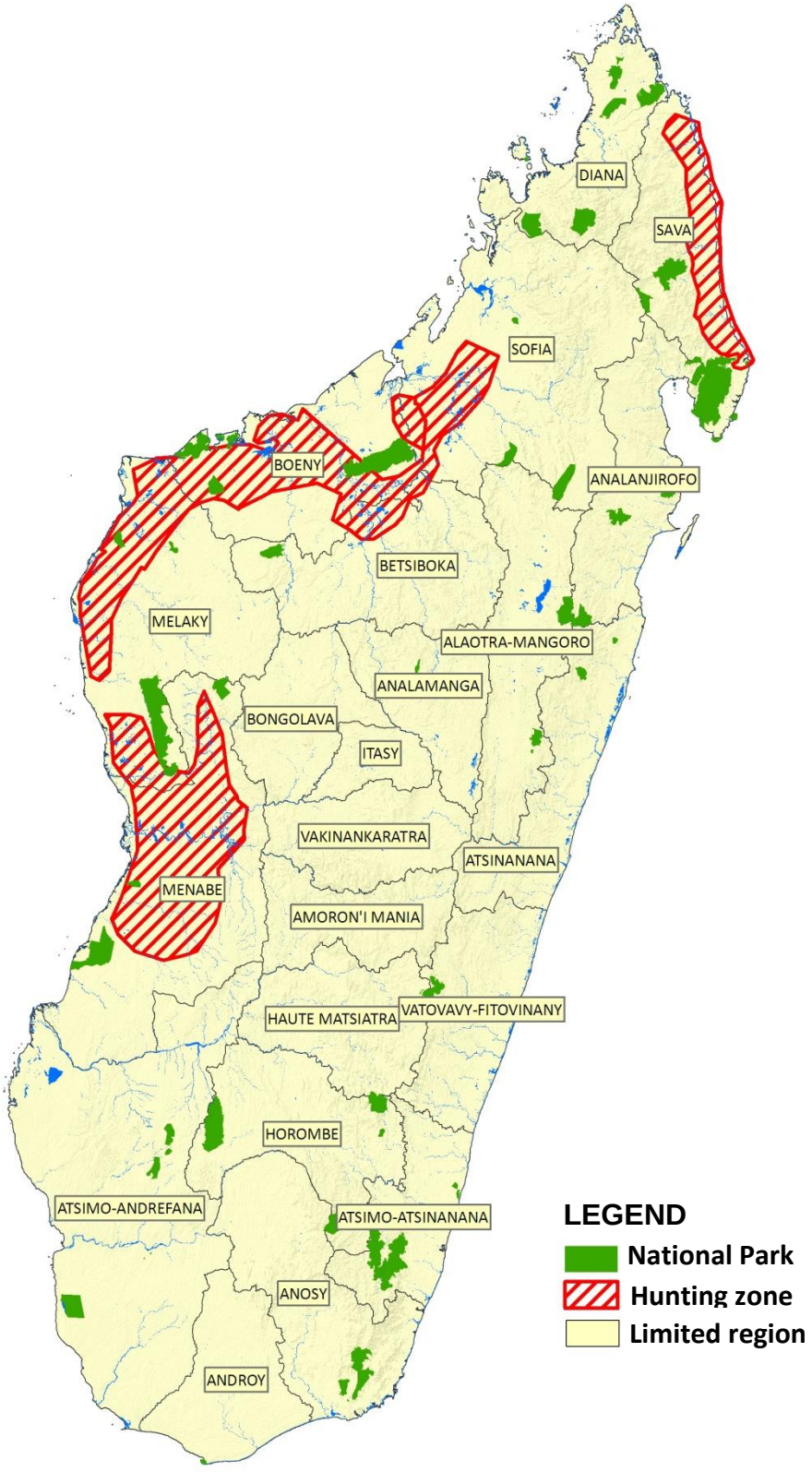
According to enquiries made of the actors who work with the skins (tanners, harvesters, hunters) the source areas for the products are:

Northern, north-western and western areas:

- Sava Region (Sambava, Antalaha, Ambotralalana)
- Boeny Region (Mahavavy-Kinkony, Sitampika, Andranomavo, Soalala, Mahajamba, Tsinjomorona, Manerinerina, Ambatoboeny)
- Bongolava Region (Ambohitromby, Ikopa, Fenoarivo-Be)
- Melaky Region (Besalampy, Antsalova, Tambohorano)
- Analamanga (Kiangara)
- Alaotra Mangoro

Southern and south-western areas

- Menabe Region (Miandrivazo - Mahajilo river, Lakes Ankilizato and Mahabo, Tsiribihina river)
- Vakinakaratra Region (Mandoto)
- Atsimo-Andrefana Region (Beroroha, Morombe)



Map 13: Hunting zones identified from enquiries of harvesters and hunters

III.2.1.5- Hunting equipment and methods

Photo 14: Hook for catching crocodiles

There are two hunting methods. One, non-selective, makes use of iron hooks and the other, which is selective, uses metal cables.

Hunting is generally at nightfall, when the crocodiles emerge from their lairs. The hunters use flashlights or flaming torches in order to get close to them.

III.2.1.6- Catch estimates

According to enquiries made of the hunters (Sava, Boeny, Sofia, Menabe, Melaky, Vakinankaratra and Bongolava regions):

Approximately 3 - 10 catches per 100 traps per month, depending on the region.

III.2.1.7- Processing and products

Several parts of the crocodile (teeth, skulls, oil, meat, skin, etc.) are highly prized in the market for their ornamental and therapeutic benefits. However, the eggs and the skin remain the most utilized products in Madagascar.

- Meat and liver are used as a source of protein for nutrition. Crocodile meat is eaten by the villagers living around the hunting sites, or else salted and dried for nearby towns;
- Oil: used as a medicine having therapeutic virtues in the treatment of asthma, cancer, scars and so on;
- Hide: the removal of the skin from the remainder of the body is done immediately upon capture, while curing with salt is done back in the village. Several kilos of salt are needed to achieve best conservation of the skin. After this treatment, the skins are sent to the tanners, to the holders of export quotas and to the leather-goods makers, all of whom are primarily in Antananarivo,
- The eggs are sent for ranch breeding at two farms in Antananarivo

Two types of skin are obtained from hunting:

- belly, easier to remove, between 20 cm and 45 or 50 cm
- back, or hornback, more resistant to removal, from 30 cm to 55 cm as a maximum

It should be noted that when skins are sold, the measurements in centimetres are taken at the location of the first buttons.

There is not yet a correlation between what is supplied and the types of skin needed on the market. As a general rule, it is the hunter who decides on the type of skin to be produced, depending on the size of the specimens captured.

III.2.2- Collection

Skins are generally accumulated in the nearby large towns. The harvester gathers the skins which have come from the various hunting regions before sending them on to Antananarivo. This is done in order to amortize the investment made in the hunters.

According to enquiries made, there are various types of skin harvesters:

- Professional harvester supplying skins to the tanners
- Seasonal harvester: person who only collects to supplement other activities such as work in the vanilla trade or similar (example of a harvester from Sava)
- Occasional harvester: person who has money, such as a seller of fabrics, and purchases skins from hunters or the local population on market days (example of a harvester from Miandrivazo)

The products are transported over land.

As an approximation, the selling price per centimetre of rawhide is as shown below:

Type of skin	Measurement	Price in ariary per cm	USD*
Belly	20 cm	600 ar/cm	0.3 USD/cm
	50 cm	1400 ar/cm	0.7 USD/cm
Back	27 cm	1000 ar/cm	0.5 USD/cm
	50 to 70 cm	1200 ar/cm	0.6 USD/cm

*1 USD = 2000 ar

Table 15: Indicative price of rawhide at the harvesters

III.2.2.1- Harvesting sites

From the results of enquiries made, the principal harvesting sites are the regions which are easy to access and where there is a means of transport to take the products away as rapidly as possible:

- In the Sava Region: Antalaha, Sambava, Vohemar
- In the Boeny Region: Mahajanga, Mahajamba, Manerinerina
- In the Sofia Region: Mampikony, Port Berger
- In the Betsiboka region: Maevatanana
- In the Vakinankaratra region: Mandoto
- In the Menabe Region: Akavandra, Miandrivazo, Mahabo, Ankilizato, Morondava, Belo on the Tsiribihina
- In the Melaky Region: Antsalova, Besalampy
- In the Atsimo-Andrefana region: Beroroha

The products are placed in plastic bags to be sent on to Antananarivo.

Where crocodile products have not been authorized or issued with transportation clearance, they are placed in large plastic bags in the guise of dried and salted fish products, to avoid being discovered in vehicle searches by the traffic police or other enforcement personnel.

III.2.2.2- System of conservation of the skins

In the hands of the harvesters, preparation of the skin consists of curing with salt to maintain the quality, followed by bagging. A plastic bag can contain up to 20 skins.

III.2.3- Tanning

Tanning is the process of transforming rawhide into tanned skins. In Madagascar, only tanning using plant products is practised. This type of processing has existed for generations and gives Malagasy craft work its reputation.

Most tanning facilities also process other skins, such as those of zebu, sheep or snakes, but those of the crocodile remain the most highly prized.

III.2.3.1- Tanning locations

Most of the facilities for tanning crocodile skins are in Antananarivo, except for one in Miandrivazo.

III.2.3.2- Skin transformation process using craft methods

The tanning system is artisanal. Tanners use no other products than bark containing the tannins of various specific plants.

Measuring and checking the skin before work starts

Containers for the tanning process

Fleshing

Skin after fleshing

Monitoring by the Administration of the tanned skins ready for drying

Drying system

Photo 15: Processing skins in a tanning facility

Processing time for the products is generally between 19 and 29 days, depending on market demand

Each tanning facility has its own system for processing the skins

Processing steps	**Duration**
Desalting	3 to 7 days
Descaling (removal of the scales using a lime solution)	7 to 10 days
Fleshing (removal of remaining meat)	1 day
- Tanning with bark - Completion of tanning with chemical products	7 to 10 days
Drying	1 to 2 days
TOTAL	**19 to 29 days**

Table 16: Duration of processing at the tanning facility

Emerging from the tannery, the tanned skins are a natural colour.

Each tanning facility employs artisans specializing in the processing of the skins (indirect actors). As a general rule, a tannery employs two to four people.

As an approximation, the selling prices per centimetre of tanned skin are:

Type of skin	**Measurement**	**Price in ariary per cm**	**USD***
Belly	20 cm	800 to 1200 ar/cm	0.4 to 0.6 USD/cm
	50 cm	1 600 to 1800 ar/cm	0.8 to 0.9 USD/cm
Dos	27 cm	1000 to 1300 ar/cm	0.5 to 0.65 USD/cm
	50 cm	1400 Argentina	0.7 USD/cm

* 1 USD = 2000 ar

Table 17: Indicative price of skins at the tanning facility

III.2.4- Leather-goods-making

The leather-goods-making facility uses the tanned skins, turning them into finished products. Every centimetre of skin is indispensable to the creation of a finished product. The left-over pieces of skin not used for the actual product being made are gathered to be used in making a product in the patchwork or offcuts style.

The leather-goods-making facilities do not specialize only in working with crocodile skins, but also use other types of skin available on the market, as well as fabrics. As a result of the moratorium, the leather-goods makers have turned to working with zebu skin, to make up for the shortages.

Enquiries made of the leather-goods makers allow them to be categorized into different types:

- Leather-goods maker (sub-contractor) who works on the skins on behalf of the owners of points of sale;
- Leather-goods maker who purchases skins from the tanners and sells the finished products through the points of sale;
- Leather-goods maker who has a tanning facility, produces his own articles on his own account and resells the finished products to other points of sale

III.2.4.1- Types of skin used by the leather-goods makers

The types of skin used by the leather-goods makers depend on market demand and on what product is being made. The leather-goods makers use fashion magazines to make product samples or to

create other versions of them. Market competition compels the leather-goods makers to be creative in making their products.

Sometimes, the tanned skins need slight retouching in order to be usable for leather-goods-making, either through the addition of coloured dye or by fine-tuning the tanning. The leather-goods-making facilities do not have the industrial machines needed to upgrade the osteoderms (scales formed from ossified dermal layers, buttons), but utilize a simple procedure.

Preparation of offcuts to make patchwork

Polishing and glazing by hand

Increasing skin suppleness

Preparation of a lady's handbag

Preparation of the lining (of zebu skin)

Other products made

Other fabric products

Machine for fine-tuning the skin

Craftsmen employed in the leather-goods-making facility

Photo 16: Process of turning the tanned skins into finished products

Time needed for the preparation of the products

Category	Duration
Preparation of pattern or model	2 – 5 days
Small product (wallet, belt, etc.)	1 – 2 days
Medium-sized product (strap, satchel, etc.)	2 days
Large product (lady's handbag, travelling bag, etc.)	5 days

Table 18: Time for turning tanned skins into finished products

The skins used for making the articles are:

- Back skins between 27 and 45 cm
- Belly skins between 25 and 40 cm

According to the responses to enquiries made, the local market uses the back skins and the market for tourists uses the belly skins. The back skins are the more desirable.

Each leather-goods-making facility employs artisans specializing in turning the skins into finished articles (indirect actors). As a general rule, a tannery employs five to eight people.

III.2.4.2- Leather-goods-making sites

The principal sites for turning tanned skins into finished products are located in Antananarivo. There are no such facilities in any other regions.

The sites are:

- Manarintsoa Isotry
- Alasora
- Fenoarivo
- Ambohibao
- Betongolo

III.2.5- Sale of the products

The sellers are the final destination of the products resulting from the processing of the skins. Generally, they are sellers of Malagasy art items. The points of sale do not restrict themselves to selling crocodile-derived articles but diversify their products to attract clients.

Enquiries made of the sellers allow them to be categorized into different types:

- Sellers performing all stages of the process, up to sale
- Sellers of Malagasy art items including those made of crocodile skin. Generally speaking, these sellers obtain their supplies from the leather-goods-making facilities.

The products on the local market are of two kinds:

- Products made from belly skin, which are more sought after by foreigners
- Products made from back skin, which are of more interest to Madagascans.

The peak selling times are the holiday periods:

- April: Easter holidays in Madagascar
- October to December (long holidays and Christmas)

III.2.5.1- Points of sale

The points of sale are found in fashionable shops and those specializing in Malagasy art items

Antananarivo sites	Mahajanga sites	Tamatave site	Antsiranana sites
Digue craft village Akorondrano Pochard – Analakely Antaninarenina Andravohangy Betongolo Coum 67 Ha CENAM	Mahajanga I Mahajanga II	Bazary Be	Nosy Be Antsiranana

Table 19: Points of sale by region

Each point of sale employs several people (indirect actors), generally three to five.

III.3- Current situation of the artisanal sector

The present study started in 2010, with a call for expressions of interest in order to determine the total number of actors working in the crocodile sector. Following the moratorium, a number of people changed their line of work, turning to other products available on the market such as sheepskin, snakeskin, zebu skin or fabrics from wild silk, or alternatively turned to quite different income-producing activities.

III.3.1- Current number of actors tallied

Activity	Number of actors by activity
Hunting	17
Harvesting	24
Tanning	10
Leather-goods-making	75
Sales	169
TOTAL	**295**

Table 20: Actors by activity in the artisanal industry

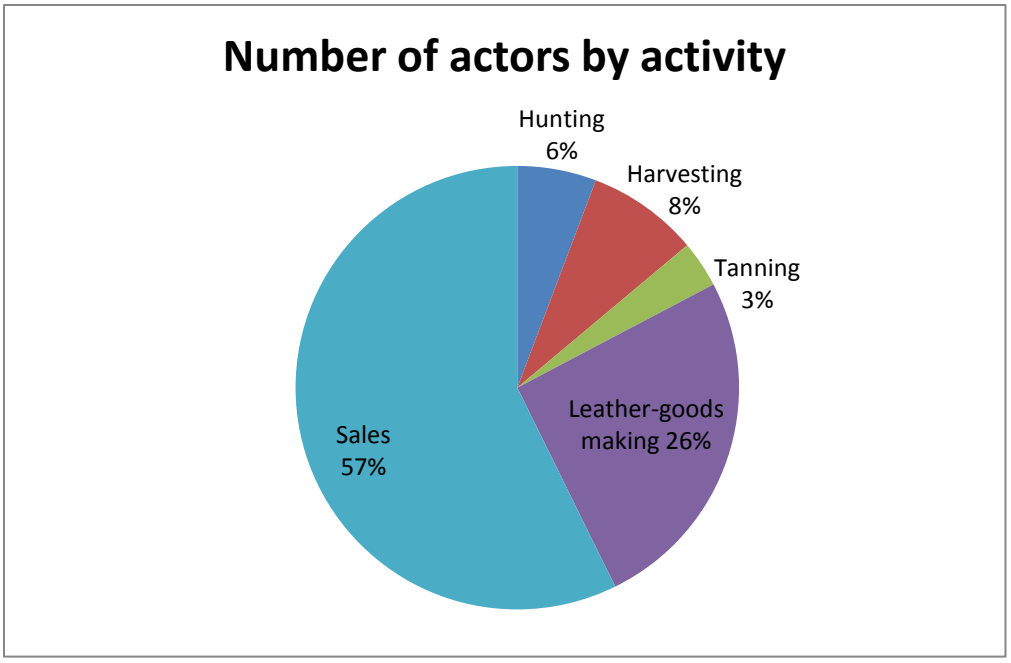


Figure 4: Proportions of actors in the industry, by activity

At the present time, 295 direct actors have been counted as working in the artisanal sector, broken down by activity, with each actor performing at least one activity. It is important to note that the final destinations of the rawhide are the tanning facilities which are primarily located in Antananarivo.

Number of tanners

Number	**Antananarivo**	**Miandrivazo**
Tanners	9	1

Table 21: Number of tanners by region

Estimate of the skins entering the tanning facilities

Name	**Annual estimate**		**Hunting area**
	min.	max.	
Tanner 1	400	450	Besalampy, Andranomavo
	200	220	Antsalova (Bemamba, Bekopaka)
	200	200	Mahajanga (Mitsinjo, Andranomavo Tambohorano)
	80	80	Ankavandra (Manambolo)
Tanner 2	100	200	Mampikony
Tanner 3	50	70	Sava (Vohemar, Antalaha, Sambava)
	50	50	Mahabo - Morondava
	120	120	Mahajanga
Tanner 4	70	80	Mahabo
	60	80	Mahajanga
	100	100	Sava
Tanner 5	200	200	Besalampy (Tambohorano, Maningoza, Amparihy, Ampako, Marovoay, Ambika)
Tanner 6	30	40	Vavaranon'i Mahajamba
Tanner 7	60	60	Ankavandra

Tanner 8	150	150	Belo on the Tsiribihina (Tsiribihina)
	60	80	Antsalova
	40	40	Belo on the Tsiribihina (Kalalobe)
Tanner 9	40	40	Mandoto
Tanner 10	30	40	Ambatoboeny
	200	200	Sitampika, Andranomavo
Total	**2240**	**2500**	

Table 22: Estimate of the skins entering the tanning facilities

Number of sellers (points of sale) by region

Number	**Antananarivo**	**Mahajanga**	**Tamatave**	**Diego**
Sellers	103	15	11	2

Table 23: Sellers by region

Relative scale of the crocodile industry as compared to other sectors (industrial stone, embroidery, Antemoro paper, other Malagasy art items)

Sites in Antananarivo	Crocodile products	103
	Other products	1500
Mahajanga site	Crocodile products	15
	Other products	60
Tamatave site	Crocodile products	11
	Other products	30
Diego site	Crocodile products	2
	Other products	30

Table 24: Relative scale of the number of points of sale for crocodile products as compared with other sectors

III.3.2- Compliance

Since they are fully-fledged economic operators, the actors in the crocodile industry are subject to the obligations established by the fiscal legislation and by that governing the raw materials that they use, issued by the Ministry of the Environment and Forests, among others. But most of the artisanal sector operates informally (Instat[4], 2012) owing to a lack of understanding of the laws in force or the scale of the fiscal burden on the value chain. Several factors explain the proliferation of this sector. In the value chain, the sellers dominate the market and therefore make the greatest profit, while those actually making the articles suffer the most under the scale of the fiscal burden. As a result, it is primarily the points of sale that have licences for sales. Most of the hunters, leather-goods makers and tanners are not in a situation of compliance with regard to the tax laws.

The Ministry of the Environment and Forests has initiated discussions among the responsible Ministries in order to study jointly a system for supporting the artisanal industries with the objective of lessening the fiscal load, taking into account the size of the artisanal enterprises (See Activity D in Annex VII).

III.3.3- Product traceability

As one of the sets of problems in determining the scale of the domestic market involves the means of verifying the products on the market, market flows, the number of skins used, the time taken until product sale, and so on, studies have given estimates of the products on the market which have

[4] National Statistical Institute, Madagascar

been extrapolated to harvesting in order to deduce the level of harvesting in the wild. That method was useful for obtaining estimates but is not reliable under present circumstances for long-term resource management.

On the basis of surveys carried out since the moratorium, the CITES Management Authority in Madagascar, the Directorate-General for Forests, has drawn up a system of product tagging in order to obtain individual references for the products on the market, over and above the stock registers.

Two types of tag have been created:

- Non-rusting aluminium tag with identifying numbers for the tanners;
- Cardboard tag with identifying numbers to give the reference for each product at the points of sale.

The numbers on each tag are recorded in each actor's stock register, with the corresponding product name. These tags make it possible to identify the products individually and to track product flows through the market.

As for the leather-goods makers, as the products only transit through their hands, the stock register shows the number of incoming skins with a reference to the supplier, the finished products made from each skin and the points of sale receiving them. Furthermore, the tags placed on the skins while at the tanners will later be recovered from them.

All of these tags are recorded in the CITES Management Authority database. This product traceability system is a first step towards regularizing the legal position of the artisans.

It should be noted that only the products meeting the required standards are tagged and recorded in the database.

Standards and references of products and articles derived from crocodiles

Categories	TYPES	DESCRIPTIONS	*MEASUREMENTS (cm)*	
			Min	*Max*
SKINS	Belly	Width between the third buttons	20	50
	Hornback	Total width at the third buttons	*27*	*70*
	Trophies	Total width at the third buttons	*27*	*70*
ARTICLES	Stuffed animal	Total length from the tip of the snout to the end of the tail	*100*	*250*
	Head	Tip of the snout to the rear of the cheeks	*15*	*40*
	Front foot	Length (sole) Width	*3* *2*	*10* *8*
ARTICLES	Hind foot	Length (sole) Width	*5* *3*	*19* *9*
	Back scales	Width at the third buttons	*10*	*28*
	Base of the tail	Width of the first row of four keratinous scales of the tail	*6*	*18*

Table 25: Standards and references of products (Source: ANDRIANJARATINA R. L., unpublished data, 2010)

III.3.3.1- Number of products on the market

Products	Tagged
Skins	1009
Finished products	15258

Table 26: Overview of products on the market (June - September 2013)

Belly skins	20 – 30	30 – 40	40 - 50	TOTAL
2013	147	222	198	567

Table 27: Census of belly skins

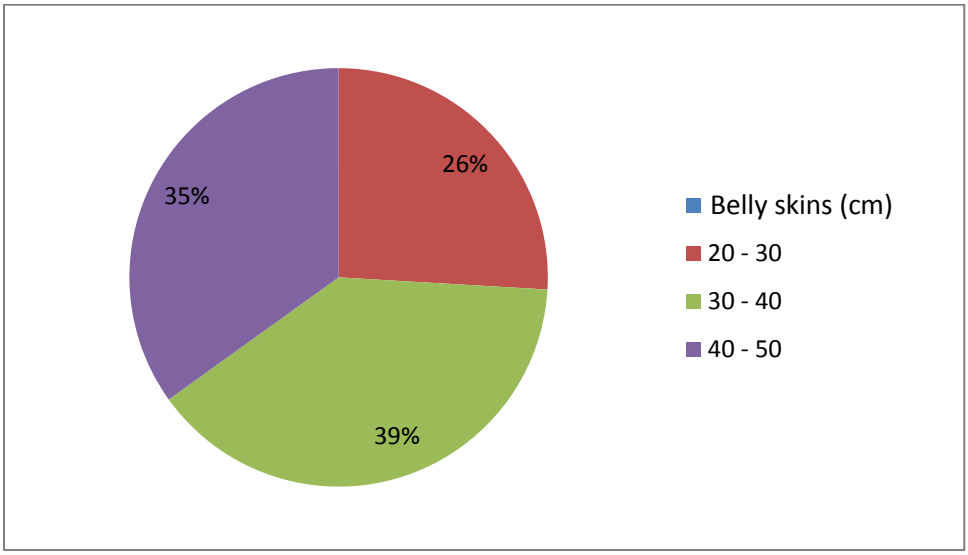


Figure 5: Relative proportions of belly skins on the market by size

Back skins	27 - 40	40 – 60	60 – 70	TOTAL
2013	237	133	72	442

Table 28: Census of back skins

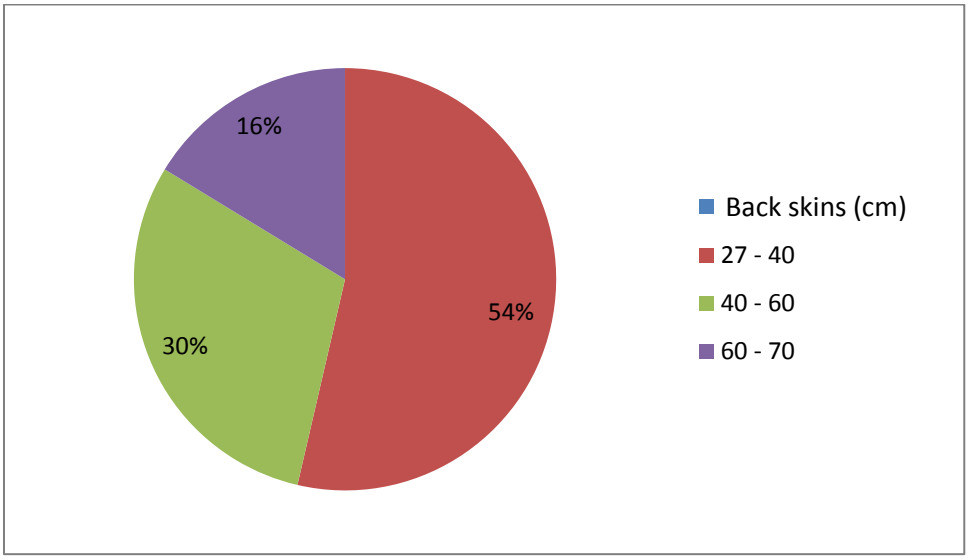


Figure 6: Relative proportions of back skins on the market by size

These products on the market refer to:

- Skins arriving at the tanneries
- Finished products at the points of sale

This tagging exercise marks the beginning of individual referencing of products, in the month of June 2013. As products arrive, the Administration verifies the standards for size and the referencing as well as counting the products sold. At the present time, on the basis of information obtained in October, the database is being updated.

III.3.3.2- Product categorization

The products on the market are of different sizes. Each product recorded has a certain percentage of crocodile skin. There are some products on which the entire exterior is crocodile skin (women's handbags, satchels) but there are also those of which only a small part is crocodile kin (women's sandals, bracelets). The following Table illustrates the relative proportions of the products on the market.

Small offcuts (patchwork)	Small	Medium-sized	Large	Stuffed animal	Trophy	Crocodile part (head, foot)
3800	8309	2333	470	24	52	272

Table 29: Product categorization

- Crocodile part: such as a head or front or hind foot
- Trophy: a tanned or mounted skin of the whole animal, including feet and head
- Stuffed animal: a mounted whole crocodile
- Large: large-scale finished products (suitcase, large bag, woman's handbag)
- Medium-sized: medium-scale products (woman's handbag, shoulder strap)
- Small: small-scale products (purse, card case, cigarette case, shoes)
- Small offcuts: skin remnants (bracelet, wallet).

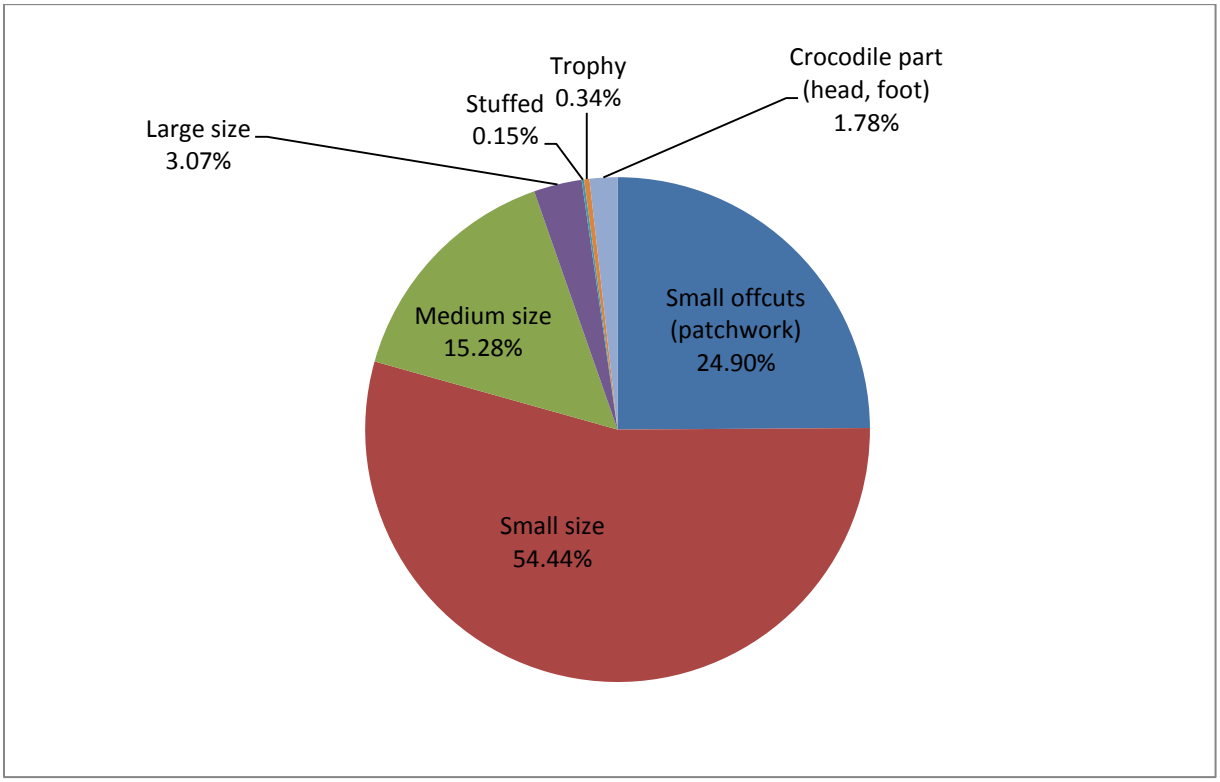


Figure 7: Relative proportions of the products on the market by size

The products on the market are of differing sizes, with small items being the most numerous, accounting for 54 per cent. These products have low percentage of crocodile skin relative to other materials, and comprise wallets, cigarette cases, sandals, belts, glasses cases, and so on.

Products made from small offcuts account for 24 per cent of the market. They are products made of offcuts or skin remnants that are salvaged.

Medium-sized products account for 16 per cent of the market. These products use a relatively limited percentage of crocodile skin relative to other materials.

Large products account for 3 per cent of the market. In such products, crocodile skin is predominant over other materials.

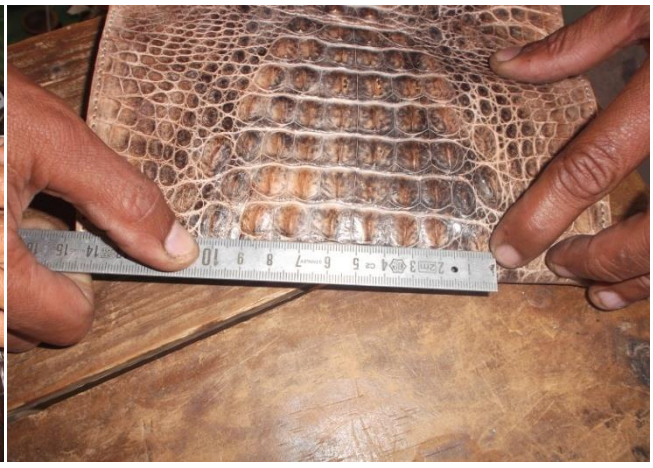
Products consisting of crocodile parts account for 2 per cent of the market. These are mounted heads or feet, used to make an artistic or decorative article.

There are some new products, but most of this category comes from stocks from prior years.

Using the tagging system which is now in operation, these products are the starting point for tracking the situation on the market.

Measuring system for verifying the products on the market

Measuring the first four rows of keratinous scales at the base of the tail



Measuring the width of the back keratinous scales at the third buttons

Referencing of a front foot

Referencing of a hind foot

Measuring the head

Verification of the finished products at the point of sale

Photo 17: Verification of the finished products at the points of sale

III.4- Supply chain and market structure

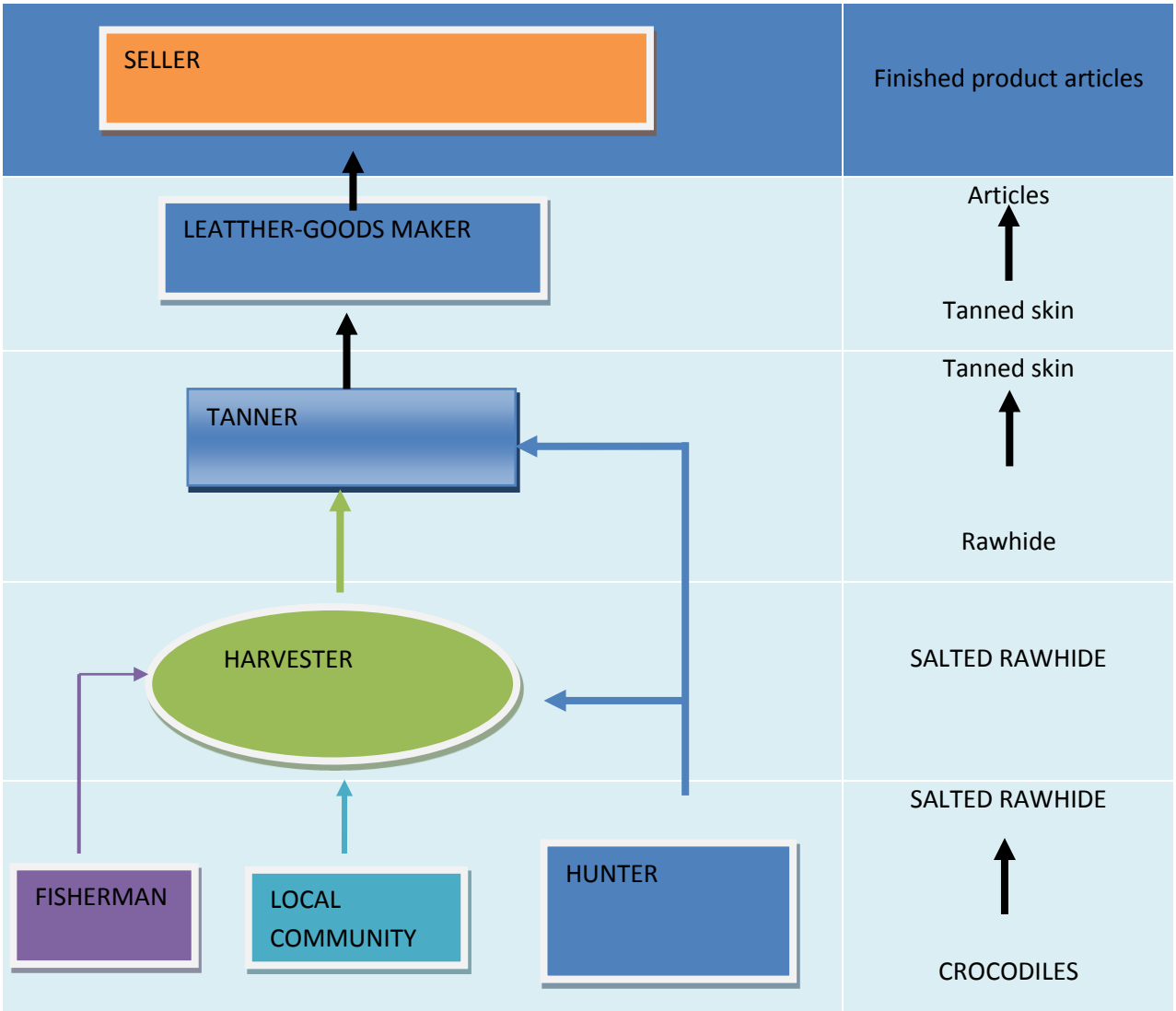


Figure 8: Value chain and market structure

An analysis made of the artisanal sector has provided understanding of the supply system and the structure of the present-day market.

Following a holding period, to allow sufficient numbers to be accumulated for dispatch, the skins gathered by the hunters are taken to the regions offering easy access, for onward transportation to the tanning facilities in Antananarivo. Whenever enough skins are accumulated and dispatched, these local actors inform the tanners accordingly.

The crocodile industry contains 16 tanners to whom skins destined for the artisanal market are sent. Each tanner either acts as the harvester himself, or employs someone else as the harvester, to obtain supplies of skins from the local actors. At present, the tanners are not in a position to place orders with the hunters for specific types of skin based on market demand. The skins arrive at the tanning facility by road, normally by bush taxi.

After tanning, the skins are moved to the leather-goods-making facilities, which are all in Antananarivo. At the present time, three tanners supply tanned skins for the artisanal market while the others process their skins themselves.

Once the skins have been turned into finished products, these come onto the market at the points of sale, which are located in Madagascar's main tourist destinations:

- Antananarivo, the national and international arrival or departure point
- Mahajanga area which is a national and international tourist destination
- Tamatave area which is a national and international tourist destination.

The finished crocodile products, with their high quality and durability, appeal not only to nationals and residents but also to the tourists as souvenirs or gifts.

III.5- Socioeconomic aspects of crocodile exploitation

The literature shows that crocodile exploitation began to expand around 1915. Subsequently, *Crocodylus niloticus* was listed in CITES Annex II in 1985 and kept in that Annex in 1997.

Uncontrolled distribution of quotas for wild crocodiles to the ranches resulted in excessive numbers of skins on the market (Behra, 1990). After the quotas had been assigned to each ranch, harvesting and hunting authorizations were also issued. As each ranch engages a harvester who, in turn, engages a hunter, the call for supplies did not stop until the quotas had been largely fulfilled. But the time needed to transmit messages relating to hunting, harvesting or transportation meant that to some extent skins continued to be supplied to the capital. The surplus was used up by the artisanal industry. The commercial value of crocodile-based products caused an increase in the number of actors in the industry.

Furthermore, hunting was not regulated on any legal basis but was justified on the grounds that it was a legitimate right for responding to crocodile attacks. After the development of the industry, although relevant laws were in existence, the restrictions on the size for killing were not observed, under the pretext of such conflicts. As a result, several skins used by artisans were of less than 35 cm or indeed were entire small skins (Ramandibison *et al.*, 1998).

Some groups of people have been processing crocodile skins for very many years, with the knowledge and skills being handed down from one generation to the next, but there are also other and new actors attracted by the prospects of profit.

III.6- Regulation of hunting, harvesting and trade

Order 60–126 lays down the rules on hunting, fishing and protection of wild animals in Madagascar. Commercial hunting is authorized only upon payment of a fee and only during the open season.

Act 2005-018 covers the documents and describes the procedures for international trade. The monitoring structures are developed in the implementing decree to this law, Decree 2006-097.

Decree 2006–400 covers the classification of national animal species into three categories:

- Category I: Protected species. These are further subdivided into two classes: those enjoying absolute protection and those that may be hunted and caught in conformity with the relevant regulatory instruments, including CITES
- Category II: Game that may be hunted at any time
- Category III: Wild species that may be hunted and caught provided that a licence has been issued and subject to the stipulated hunting seasons.

Crocodiles are among the animals that are protected at the present time (Category I, Class II). A hunting authorization is required before specimens may be taken, and the open and closed seasons must be observed.

But crocodiles are considered to be dangerous animals and living in proximity to them is not always easy. Therefore, even if the animal is protected, since people have the right to kill them in order to protect their own life or that of others, (Order 60–126), this conflict provided an opening for exploiting the species and to that end a quota was issued to supply skins for export.

III.7- Monitoring of activities

This is in accordance with recommendation 5 of the CITES Standing Committee, "ensuring that products not complying with established size limits were seized and destroyed and offenders prosecuted".

As was stated in the introduction, since 2009 Madagascar has been in the grip of a political crisis which has caused various companies to close down and people to lose their jobs. This has resulted in an unprecedented social and economic crisis. According to data from the World Bank, this crisis has impoverished more than 90 per cent of the population. In addition, the moratorium planned to last six months has been extended, with the Forestry Administration focusing on raising awareness among the relevant actors in order to compel them to come into a state of compliance. The aspect of monitoring and penalties is discussed in greater detail in Chapter III.

Part 2: Tracking ranching

I- Current situation

Following the 2010 closure of the Saint Christophe ranch in Mahajanga, there are now only two ranches in Madagascar, Crocfarm and Crocoranching II.

I.1- Crocfarm

I.1.1- Antananarivo site

Pursuant to the moratorium in 2010, the Forestry Administration has not issued any permit for collecting eggs to supply ranching activities.

Consequently, the ranch has only carried out farming and the current situation is as follows:

- FARM-SOURCED

Population numbers

Type	Batch	Age	Stock
Reproductive animals			208
Hatchings	No. 12	0 to 1 year	1590
Year 1	No. 11	1 to 2 years	269

Table 30: Crocodile population numbers at Crocfarm

Egg collection (September 2013)

Site	Number of nests	Eggs collected	Eggs/nest	Eggs incubated
Crocfarm	81	3912	48	3497

Table 31: Egg collection for farming, 2013

On the administrative front, the Reptel company responsible for managing the Crocfarm was transferred in 2012 to the company SERCA Sàrl.

I.1.2- Secondary site in Maevatanana

The Maevatanana site was closed in 2010 and the animals transferred to Antananarivo to be slaughtered.

I.1.3- Release

A release request was submitted by Crocfarm in 2011 for a transfer of baby crocodiles from the 2010 clutch to Vohemar. A total of 865 specimens were transferred by air from Antananarivo to the site. The transfer was attended by a representative of the Directorate-General in Antananarivo at the departure stage and by a representative of the forest ranger service in Vohemar.

The holding pool in the Floribis enclosure

The dried-up crocodile holding pool in the Floribis enclosure

The nearby Green Lake

Photo 18: Floribis release sites in Vohemar

There are 20 specimens in the holding pool within the Floribis site. According to the person in charge of the site, some specimens were transferred into the Green Lake for repopulation.

A total of 106 crocodiles have been released for repopulation into Lake Amparihibe which is fed by the Betsiboka river at Maevatanana.

I.2- Crocoranching II

Following the mission of the Crocodile Specialist Group to Madagascar in September 2007, CITES imposed for 2008 a zero export quota for R-sourced products on Crocoranching II (SC55 Doc. 13). A follow-up visit was made by the Scientific Authority in 2008 to examine ways of helping the ranch to improve its breeding system. Recommendations were made, but to date the ranch has not obtained an egg collection quota.

I.2.1- Antananarivo site

The ranch exclusively pursues breeding by ranching methods. There are currently some animals at the ranch that probably originated from remains of old quotas.

The visit revealed that the ranch needs a plan and some time to restart its activities, because the existing infrastructures do not immediately allow it to develop its ranching system.

I.2.2- Secondary farm in Miandrivazo

The Miandrivazo site was closed in 2012

II- Monitoring and tracking system for the future

II.1- Tagging system

Tags are assigned to farms and ranches only after an evaluation of the potential for production and export of either wild-taken skins or farm-sourced skins.

II.2- Monitoring of slaughter

Slaughtering will be attended by the department in charge of monitoring, together with a representative of the Management Authority within the Forestry Administration. This requirement is incorporated in the new decree on crocodile management in Madagascar and the schedule of requirements (Chapter III, Annex IV).

II.3- Marking system

The marking system developed in the training given by the members of the Crocodile Specialist Group should be revised to allow for tracking. A monitoring system like that in the Sitatunga Valley in southern Benin could also be developed in Madagascar. A ranch such as Crocfarm might be suitable for a marking system based on implantation of transponders to allow individual identification of the animals. It would be worth developing that system in Madagascar.

II.4- Growth tracking

In the future tracking system for ranch animals, a quarterly or half-yearly tracking of growth will be performed, including measurement of overall length, head and tail, and weighing of a representative sampling by age group or size class.

Part 3: Discussion

I- Analysis of the situation

The export quota for wild crocodile skins resulting from man-crocodile conflict does not reflect the total quantity harvested in Madagascar. The results of the estimate of the products used by Madagascar's domestic market reveal harvesting of quantities of skins considerably higher than the export quota. These do not comply with the size standard laid down in accordance with Decree 94–700, under which the size should not exceed 45 cm of belly skin at the third buttons. That being the case, the estimate of the annual harvesting since at least 1990 tells us that this has been stable and has been able to maintain supplies to the market. But if attention is to be paid to sustainable management of the resource, it is important to review the process in this market in detail.

Furthermore, it is important to note that in 2012, surveys performed by the National Statistical Institute with support from UNDP covering employment and the informal sector have shown that almost all the non-agricultural individual production units, including the artisanal sector, are classified as informal. A total of 41 per cent of the individual production units surveyed are willing to register their establishments with the administration and 61 per cent are ready to pay their taxes.

Analysis of this situation gives a better understanding of the type of organization to be set up in order to bring in the various stakeholders.

II- Restructuring of the industry and governance

The results of the surveys carried out have shown that there is a real potential for exploitation of crocodile-based products. But this resource has been exploited in a disorganized manner, which has led both CITES and groups specializing in conservation to recommend that the management system in Madagascar should be reviewed. If this does not happened, it would be proposed that the species be listed in Annex I. Taking note of these shortcomings, the Management Authority/Forestry Administration is in the process of reorganizing the governance of this resource. It is essential to apply a conservation strategy, by way of a national management plan which brings in sustainable management strategies and involves the various stakeholders.

Such restructuring will have to take account of the following aspects:

- **Killing of wild specimens**

The killing of crocodiles has to take account of the man-crocodile conflict existing in Madagascar. The studies performed to date give information on interactions between man and crocodile that are not necessarily actual crocodile attacks.

In the interest of coexistence, hostile encounters should be prevented on a precautionary basis, because each such incident is a setback to the already precarious coexistence between men and crocodiles, to the detriment of the latter. However, it is clear that it will not be possible to protect crocodiles without taking the interests of the local population into consideration.

Hunting for reasons of safety will be done under the surveillance of the local community. Crocodiles that have made their homes close to ford or a village will be killed, with observance of the authorized killing size except where a very grave conflict has been observed. However, in this latter case, the Administration will seize the resultant skins and will decide by ministerial decree what is to be done with them (see Annex IV).

It is important to set up a system to prevent harmful incidents and not simply be satisfied with reacting after they have occurred. Two systems are envisaged:

- regulation of crocodile populations in areas with chronic problems,
- killing of nuisance crocodile specimens

Thus, the killing of crocodiles will take into consideration the following types of conflict zone:

- In the zones with high or medium human population density, it is important to limit the crocodile population by quotas
- In the zones with low human population density, programmes of extensive breeding in cooperation with the local community must be developed.

Conservation zones

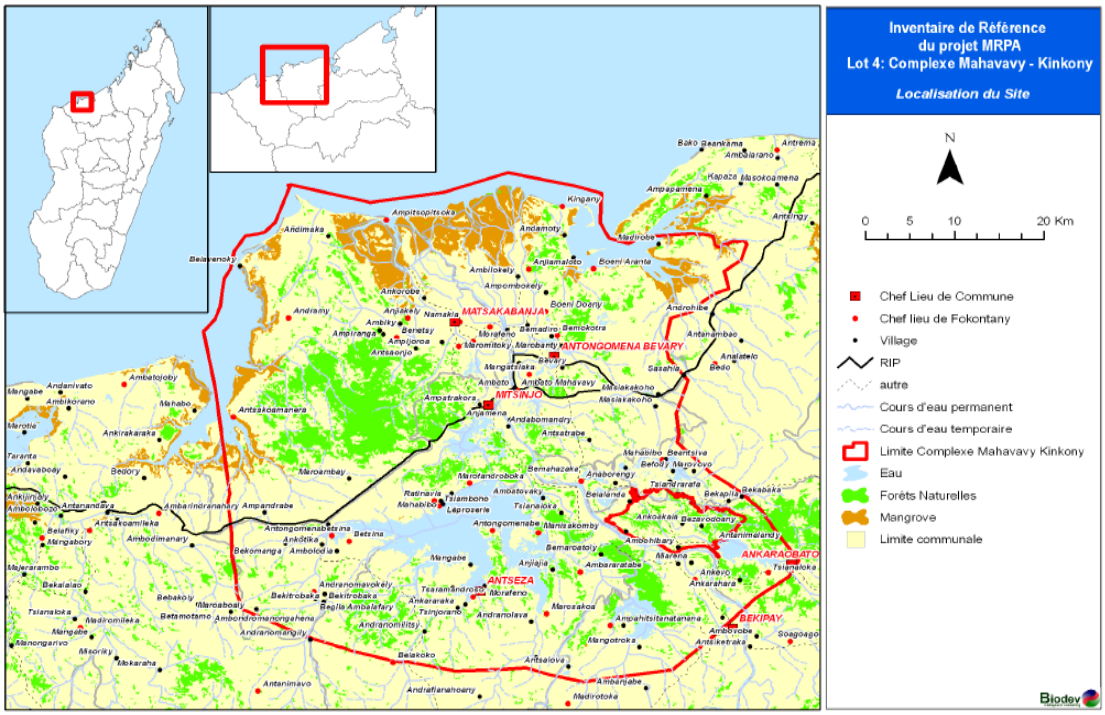
❖ Integration of management at local level with the promoters of conservation sites

In the system of new protected areas developed by Madagascar, there are zones for sustainable utilization. Some such zones are currently known, while others are being developed and there are NGOs who are working on promotion of them.

➢ Mahavavy-Kinkony complex (area: 301,700.717 ha, SAPM (*Madagascan Protected Areas System*) data); governance system Category VI (See Annex I)

The creation of the protected area in the Mahavavy-Kinkony wetlands complex was proposed in 2006 and a temporary statute was granted by the SAPM in 2007. The protected area comprises a mixture of ecological habitats, ranging from wetlands such as lakes, rivers, marshlands, coastal areas and the sea to the dense dry forest of western Madagascar. It is located on the sedimentary basin of western Madagascar and has a fairly constant altitude of between 0 and 150 m. It is one of Madagascar's richest protected areas for species and habitats and is recognized as one of the most important hotspots in the world. Over and above Lake Kinkony, which is the second-largest lake in Madagascar, the fauna and flora comprise a completely exceptional variety of birds, bats, lemurs, reptiles and fish, many of the species being endemic and endangered.

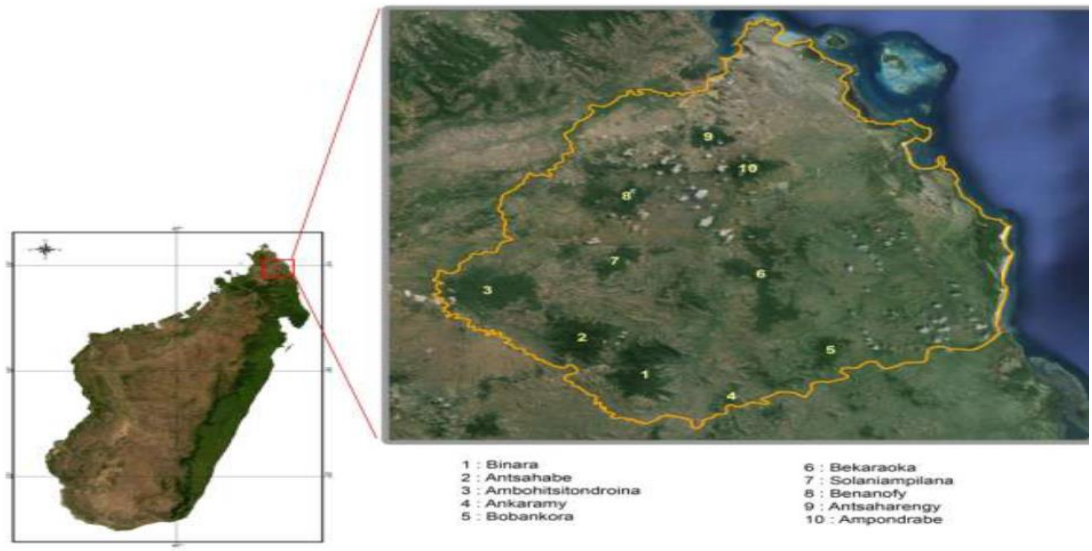
In this protected area complex, a certain zone could be set aside for hunting. Historically, the Mahavavy–Kinkony areas have had a crocodile population and have been hunting zones. Currently, the Land Usage and Management Plan is being revised, with incorporation of crocodile management.



Map 14: Mahavavy-Kinkony complex

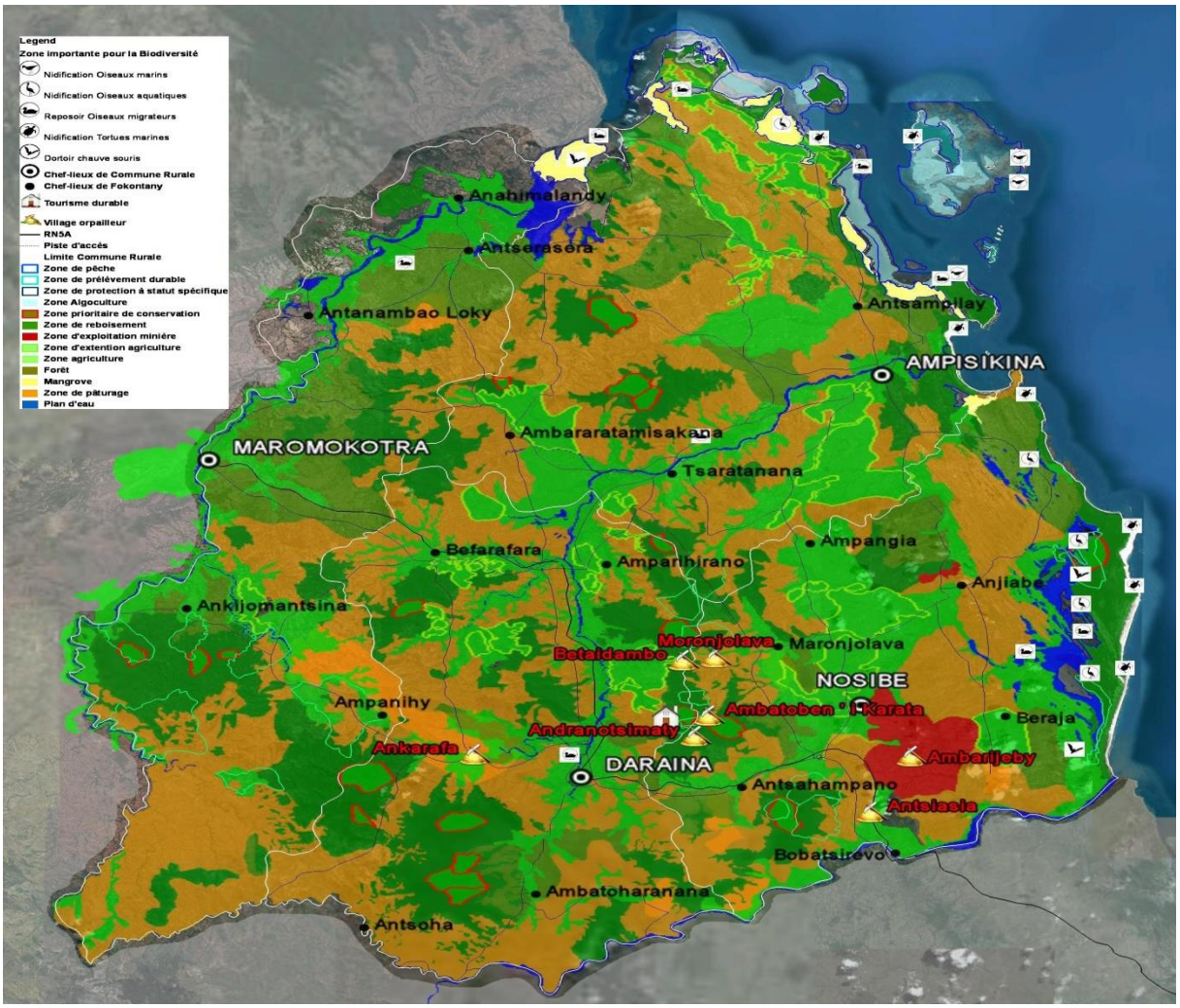
- Loky Manambato (area: 248,425.183 ha, source SAPM[5])

A public consultation procedure on the adoption of a plan for the development and management of the site was carried out in June 2013, with discussion of the options for sustainable utilization and conservation of crocodiles. There are in fact sites where hunting can be pursued, but there also sites where the crocodile is considered sacred. The Development and Management Plan is currently being approved, including crocodile management.



Map 15: Location of the Loky Manambato protected area

[5] Madagascan Protected Areas System



Map 16: Planned development of the new Loky Manambato protected area (Category VI)

There are also protected areas where various types of conservation are practised, whether for scientific purposes or to protect wild resources (Cat. I), or with the aim of protecting ecosystems and also for recreational purposes (Cat. II), or with the aim of preserving specific natural features (areas of biodiversity-related cultural value, Cat. III), or with the purpose of conservation of habitats and species (Cat. IV).

These include the Analamerana Park (24,750 ha) and Ankara Special Reserve (18,025 ha) in the Diana region; the Ankarafantsika park (130,026 ha) in the Boeny Region; the Bemaraha Park (66,630 ha) in the Menabe Region; and the Marotandrano Park (42,200 ha) in the Sofia Region.

- **Reorganization and regulation of the market**

Controlling the crocodile industry fundamentally entails regulating the flow of skins coming onto the market. The finale destinations of the skins are the tanners located in Antananarivo. It is therefore important to examine the following contexts:

- **Market in products derived from wild skins**

The products derived from harvesting in the wild take account of the limits on sustainable harvesting. A national catch quota will be adopted to supply the conversion into finished products. This quota for finished products is important in that it makes it possible to maintain activities related to

Madagascar's craft trade. The conversion of the resources before export will make it possible to create local value added and thereby to offer possibilities for employment.

In the new type of market that Madagascar intends to develop, there will be two aspects to the industry:

- The local market
- The export market

Thus, the actors in the industry are divided into two different categories, depending on the type of market.

- **The local market**

This is dedicated to the sale of products on a national scale and is only concerned with sales of up to 4 articles (CITES Resolution Conf. 13.7 (Rev. CoP16)) as personal effects for tourists. This type of activity is identified by a signboard at the point of sale. Every sale of items as personal effects for tourists will be accompanied by an authorizing invoice which will be checked at the border.

- **Export market**

This type of market will serve those who are concerned with the international market. Exports will be divided into two categories on the basis of a market analysis, namely:

- Export of wild skins, which will be authorized for the breeding facilities;
- Finished products

These quotas will have to take account of hunting and the market. The actors who are concerned with this international market will be obliged to observe the regulations in force under the relevant sector ministries.

- **Ranched products**

The number of products to be exported will take account of the potential of the ranch. Currently, a system for monitoring activities is set up to provided traceability of products and estimates of their numbers.

- **Stock tracking system**

A very strict system for tracking crocodile stocks is set up covering the ranches, and this is verified by the Scientific Authority and open to checking by outside experts.

Egg clutches are tracked separately until hatching, to provide precise information on the specific survival rate as impacted by the origin of the eggs. As the Administration has not issued any egg collection permits since 2009, only the Crocfarm–Reptel facility is farm-raising crocodiles. The Crocoranching II ranch is not pursuing farming.

After the raising of the moratorium, the hatchlings from ranching and farming will be kept separate in order for growth trends to be monitored.

- **Determination of export quotas**

- **Wild products**

The quota relating to wild-sourced skins will take account of the Non-Detriment Finding that the Scientific Authority will develop. This quota will take account of sustainable catch limits, of the zones identified, and of man-crocodile conflicts.

- **Quota per farm/ranch**

The ranched skins quota will be set on the basis of an assessment of stocks.

- **Involvement of outside experts in the monitoring system**

In addition to the provision of information on operations by the Management and Scientific Authorities, the Management Authority has agreed that the national CITES committee shall be authorized to check the exports of skins and stocks at breeding facilities and to host the experts of the Crocodile Specialist Group or those mandated by CITES under the same conditions.

These outside experts will be invited, at their own expense, to carry out a check on the export data by comparison with the stocks at the breeding facilities.

- **Support to artisans**

The starting point is to improve the environment in which the artisans work. The objective of opening up the crocodile trade in Madagascar's artisanal sector arises from a recognition that the resources are still sufficient to allow its development. But for sustainable management, this development will need to be controlled, in order not to waste resources, in order to maximize income from exploiting it. Thus, it is important to set up a framework in which the roles of the different actors involved are clearly defined (improvement of the professional training; restructuring of administrative procedures; technical support to improve the quality of the products both artistically and economically, while observing the standards; further improvement of technological skills; anticipation of regional, national and international market demands, and so on).

From this point of view, diversifying the products and keeping the customers require the establishment of an adaptable strategy able to respond to the demands of the international market.

Part 4: Impact of the moratorium on the industry

The moratorium has had an impact on several aspects of social and economic life in Madagascar. Furthermore, the moratorium occurred at a crucial moment, given the political crisis in Madagascar since 2009. One of the sectors most affected was the artisanal trade, on which tens of thousands of Madagascans depend.

- **On species**

The internationally imposed moratorium level had two types of impact:

- positive, in the sense of the halting of export quotas for wild-taken specimens
- negative, because harvesting due to man-crocodile conflict did not stop at national level, and the eggs that were not collected were destroyed by the local community (as in Ankavandra and Antsalova)

- **On communities**

The halt to egg collecting by the local communities resulted in the destruction of crocodile nests to lessen conflict. Pursuant to the moratorium, the Directorate-General for Forests has not authorized

any egg collection or hunting, which meant that the ranches have had difficulty in keeping up their activities.

- **On the artisanal sector**

Several direct actors in the industry changed activities. Indirect actors lost their employment as there was now no market. But in addition, the moratorium did not make it possible to regularize the informal sector of the industry.

- **On ranches**

The halt of exports of ranched products caused losses on investments. As a result, the owners had to lay off several of their employees. Ranching went into standby mode starting in 2010, since the ranches were no longer allowed to collect eggs in the wild.

- **On the Administration**

The Administration was not capable of observing the illicit trade network. In fact there had been hunting at national level to supply the domestic market.

- **On the economy**

The crocodile industry is one of the mainstays of Madagascar's economy. Within the Ministry of Environment and Forests, the fees arising from crocodile products constitute the greatest part of the National Forestry Fund. There was also a loss of the foreign currency which used to come from exporting.

On breeding facilities:

- more than 70 per cent of overall turnover, accounted for by the export of skins, was lost, equivalent to 150,000 euros per year.
- 72 workers were dismissed and became unemployed
- activity in the leather goods trade ceased

At local community level, a loss of around 2,000 euros per year from egg collection.

But the moratorium was a necessary evil to restructure the industry and restart it on a better footing. The industry had reached the point at which internal restructuring was necessary. Many actors in the industry worked on an informal basis and the Ministry of the Environment, and the relevant sector ministries, used the moratorium as an opportunity to rectify the situation.

Chapter III: Progress report on activity to do with updating the legislation covering crocodiles in Madagascar

I- Introduction

The fundamental basis for restructuring the industry consisted of revision of the regulations governing the protection of the Nile crocodile in Madagascar and establishment of a more rigorous monitoring system within the context of the trade in crocodiles and products derived from them. Furthermore, the setting up of a system to provide traceability through the establishment of a tagging system identifying the sources of the skins processed by the actors in the industry, including the tanners and the artisans making the finished products, represents the primary innovation in the regulatory framework. Equally important is the strengthening of the monitoring procedure covering the movements of and trading in crocodile specimens among the tanneries and the artisans making the finished products. From now on, all the actors operating in the processing or selling of crocodile-derived products have to be in possession of licences or professional identification in support of their status, issued by the government departments in charge of their respective spheres of activity, before approval is issued by the Forestry Administration. This measure has been taken with an eye to facilitating inventory procedures and the performance of regular or unannounced inspection visits related to the management of the industry and to put an end to the propagation of informal activities in the sector.

It should also be noted that the setting of legally binding size limits for crocodiles to be killed is treated in a more technically detailed way than was the case with the former Decree 94-700 regulating the management of the Nile crocodile, and now explicitly reflects not only measurement of belly width but also includes a minimum and maximum length of the species in order to protect those capable of reproducing.

One other significant aspect of the management of the industry, namely the promulgation of the regulatory instruments intended to deal with the issue of man-crocodile conflicts, is also covered in the new Decree. This new provision will act as a guiding tool for the creation of long-term and relevant databases and will go a long way towards preventing the killing of crocodiles in non-compliance with the legal provisions in force. It should then be possible to eradicate the laundering of skins originating in illicit exploitation through infiltration into the formal trade and conversion operations, which has the possibility of endangering the species and progressively aggravating the threat of its extinction.

Furthermore, the control system at the ranches and farms is reinforced by the obligation on the breeders to be monitored by the Administration so as to ascertain the origin of the specimens coming from the suppliers, in a register drawn up expressly for this purpose.

All of these new elements underlying the management of Madagascar's Nile crocodiles will make it possible to ensure observance by the industry of the legal stipulations and to prosecute all offenders, using the schedules of offences which will form part of the new instrument.

II- Monitoring and penalties

In accordance with recommendation 5 of document SC62 Com. 5, the Republic of Madagascar must ensure that products not complying with established size limits are seized and destroyed and offenders prosecuted. Furthermore, infringements of the rules on hunting and protection of wild animals, including unauthorized hunting and killing, including of crocodilian species, is treated as wrongdoing according to the laws in force in Madagascar. Consequently, there would be no difficulty in initiating legal proceedings for prosecution of such offenders before the courts, as this falls within

the prerogative of the Malagasy justice system. However, the implementation of recommendation 5 of SC62 Com. 5, in particular with regard to the destruction of products not complying with established size limits, is made difficult, or even unfeasible, given that neither the legal instruments in force in Madagascar on the protection of wild animals, nor the law on international trade in species of wild fauna and flora, nor the law on the procedure applicable to the curbing of offences against the legislation covering forests, hunting, fishing and protection of nature, provide for a penalty under which such articles are to be destroyed. The only possibility is to auction off the products seized in the manner and within the timeframe prescribed by law. In addition, the measures taken in this sphere, which were considered insufficient by the meeting of the Standing Committee, are beyond our control given the lack of provisions under the law, an obstacle that is insurmountable for us. However, the search, in cooperation with the actors concerned including the national Government, for a solution to this issue is still in progress.

III- Background to the new regulatory framework

The reasons underlying the adoption of the new regulatory framework are on the one hand the obsolescence of the content of Decree 94-700 of 8 November 1994 on the technical and administrative aspects. The extension of breeding along the lines of ranching and farming to artisanal breeding, strictly observing the technical standards to which farming and ranching are subject, will bring about socioeconomic impacts that are beneficial to the local population so that it may also benefit from the resources arising from the exploitation of the industry and contribute in a sustainable way to the conservation of the species. However, as was indicated earlier, the objectives of the reform are not in conflict with the main recommendation issued by the meeting of the Standing Committee. Of extreme importance are the most significant provisions of the reforms included in the new Decree:

- Implementation of a provision to deal with the issue of man-crocodile conflict so that the latter may not create an opening for laundering of skins, while at the same time making allowance for measures intended to ensure the safety of people's lives and possessions;
- Setting of legally binding size limits that are technically more detailed relating to the killing and capture of crocodiles in order to protect reproductive livestock;
- Captive breeding which must observe the technical stipulations set forth in the schedules of requirements;
- Ranching operations must provide the origin of the specimens coming from the suppliers, in a record drawn up specifically for the purpose;
- If the ranch has a tannery, the information on the skins processed and turned into products must be provided whenever monitored;
- Tanneries must provide all relevant evidence that the crocodile-derived products processed in the tannery do not come from wild-taken crocodiles;
- The existence of procedures stipulating that all the actors in the industry must compulsorily be in possession of professional identification before issue of approval, in order to avoid the proliferation of informal sectors rendering difficult the performance of checking or monitoring operations. The actors in the industry, such as the artisanal leather-goods makers or the tanners, must also ensure that the skins and derived products present on the national market are in compliance with the size limits in accordance with the relevant regulations in force.

It should be stressed that the draft Decree appended to the present report is not yet an official version, since it still has to be examined and adopted by the Council of Government before it becomes legally binding. The adoption procedure will be undertaken very soon. Furthermore, the order establishing the schedules of requirements which stipulate the obligations on the actors will

also be adopted following the official adoption of the new Decree, given that it forms a reference text for it.

Chapter IV: Crocodile Commission

I- Introduction

The crocodile industry is a mainstay of Madagascar's economy. Its importance has social, economic and environmental aspects. It entails responsibilities for several sector ministries, including:

I.1- Bodies responsible for management of the activities related to the industry

- Ministry of Environment and Forests, primarily responsible for the resource;
- Ministry for Promotion of Artisanal Industry, responsible for the activities involved in conversion of crocodile skins, such as tanning and leather-goods-making;
- Ministry of Trade, for trade-related activities (Directorate-General of Taxation for tax matters and domestic trade, Directorate for Foreign Trade for promoting the Malagasy brand;
- The decentralized territorial entities: communes and "Fokontany"; local head of urban planning for management of the locality.

I.2- Bodies responsible for monitoring and checks

- Law enforcement, responsible for checks on the main roads and at the frontiers;
- Customs, responsible at the frontiers.

II- Objectives

Every institution involved in the industry has an important part to play in regularization and management, but so far they have only operated in their respective sectors. This has resulted in disorganized management. In the course of this project, the CITES Management Authority has compiled the important elements for coordination of the activities relating to:

- application of the regulations in force concerning management of the species;
- tracking and monitoring of the market from the hunting stage to the sale of the finished products;
- establishment of provisions allowing regularization of the actors and examination of a system for reducing the tax burden depending on the size of the artisanal enterprise and its position in the value chain.

Thus, the pertinent objectives are:

- harmonization of legal texts in force having to do with management of activities including in particular hunting, sale of products, monitoring of the market, procedures relating to exports and curbing of offences;
- creation of a Crocodile Commission to coordinate the activities;
- support to the actors in the regularization of their activities, whether on the local or the export market.

III- Measures taken

A Crocodile Commission has been established involving the relevant ministries. These include:

- CITES Management Authority, primarily responsible for the resource within the Ministry of the Environment and Forests;

- Directorate for Promotion of Artisanal Activities and Directorate for Standards and Certification, responsible for managing activities related to Malagasy crafts, for the Ministry for Promotion of Artisanal Industry;
- Directorate for Promotion of Foreign Trade, which under the Ministry of Trade takes on the promotion of Malagasy products outside the country;
- Ministry for Decentralization which is responsible for decentralized administrative entities. The decentralized administrative entities near to the sites where the species is found are directly responsible, but it important that they inform the Ministry on the measures they have taken.

IV- Working approaches

Currently, each relevant ministry is aware of the new provisions on the regulation in force covering the management of the species. The new implementing Decree has been circulated for examination.

The ministries have been informed of the numbers of actors recorded as participating in the artisanal industry and the ranching industry.

In order to achieve improved management of the industry, the Crocodile Commission is currently studying the long-term installation of either a platform involving the actors or an industry approach. This is important for maximization of the benefits to be gained from the products on the market.

Among the actors, several meetings have been held to explain the procedures to be followed to regularize their activities. These include:

- Registration with the Ministry for Promotion of Artisanal Industry in order to be recognized as an artisan;
- Regularization of licences with the Directorate-General of Taxation;
- After obtaining the licences, regularization with the Ministry of the Environment for final approval, which is preceded by an inspection visit to their facility.

Chapter V: STRATEGY FOR SUSTAINABLE CROCODILE MANAGEMENT

I- Political background

Madagascar currently has a strategy and plan for management of crocodiles in the country, covering the years 2010 to 2015 and based primarily on regularization of the actors in the industry and integration of different conservation zones on the one hand and utilization through hunting and egg-collection on the other. It is intended that this management plan will have to evolve following the results of work on the ground and adjustments to the programme, but it provides a good reference basis for the commitments in the management area.

With the system currently developed, Madagascar can state that the harvesting system implemented is a good response to concerns about threats to the survival of the species. The sustainable utilization of the wild crocodile populations could be a tool that would be not only useful in the conservation of this species, but also able to improve the life of Madagascar's rural population which lives at the mercy of this predator.

II- Integration in Madagascar's protected area systems

Madagascar has six categories of protected area system as based on the IUCN definition (See Annex 1). These protected areas are devoted in particular to the protection and maintenance of biological diversity (ecosystems, species, genetic variability) as well as associated natural and cultural resources, effectively managed by legal or other means.

Within the zones where the crocodile is found, there are conservation sites, in line with the IUCN criteria for categories I to IV:

The Analamerana Park (24,750 ha) and Ankara Special Reserve (18,025 ha) in the Diana region; the Ankarafantsika park (130,026 ha) in the Boeny Region; the Bemaraha Park (66,630 ha) in the Menabe Region; and the Marotandrano Park (42,200 ha) in the Sofia Region.

But there are also some where sustainable utilization may be practiced, and these are in line with the criteria for categories V and VI.

Both in these new protected areas and in those already in existence, it may be stated that the survival of the species and its representativeness on the national territory are assured, given that there are also pure conservation zones. Currently there is a "Managed Resource Protected Area" (MRPA) project initiated with support from UNDP to respond to the sociocultural and economic needs, given that the protected areas in categories I to IV have certain limits, so that development of the riverbank populations may be ensured.

It is important to restate that the existence of such zones contributes to conserving the species at a stable level.

III- Development of ranching close to the natural location

Since the 1990s, the ranches have developed breeding facilities far from their natural surroundings, something that is not favourable to the development of the species. As a result, considerable financial inputs have been expended in attempts to enhance the biological and ecological well-being of the animals. These investments have an impact on the selling price of the products. Consequently the ranches have also chosen to extend their breeding system closer to their natural locations (as in Miandrivazo and Maevatanana).

The visits made by the Scientific and Management Authorities have demonstrated that there exist sites where it is possible to develop a closed-circuit breeding system. These lakes are far removed from villages, and the location, where the altitude is less than 1000 m, is favourable to the development of the animals. Currently, one ranch intends to carry out a pilot trial in a lake that is on its property. The project deals with raising hatchlings from the farm in Antananarivo, in close collaboration with the local community. The literature demonstrates that in Madagascar and in other countries, integration of the local population in the management of their resources, and assigning them responsibility for it, gives positive results.

IV- Obstacles

IV.1- Lack of data on the resource

The Nile crocodile as a general rule has a relatively low productivity and, consequently, needs attentive management and observation if it is to be used in a sustainable manner. It colonizes a wide variety of habitats such as lakes, rivers and freshwater or brackish marshlands. Although the data are still insufficient, the biology and ecology of the species allow the prediction that several parts of Madagascar are favourable zones but that the population numbers are variable. It is essential to have the system of zoning for hunting based on scientific data compiled with data from hunting.

IV.2- The social challenge

At the local level, the exploitation of crocodiles originates in direct or indirect conflict between man and crocodile. It would be indispensable to find a way to manage this conflict or to allow for man and crocodile both to live in the same place. The presence of crocodiles in the populated regions acts as a brake on development. Furthermore, the utilization of products by the Malagasy craft trade will create financial income and create value added, which in turn will create jobs. Additional efforts are also needed to improve the yield from agriculture, to adapt the intensity of stockbreeding to the productivity of the grazing lands and to control population growth. In addition, to avoid man-crocodile conflict, there are elementary rules on precautions and an awareness-raising campaign in this area should be pursued widely.

IV.3- The environmental challenge

Research data on crocodiles are still lacking for certain localities, owing to several factors including access to the sites and the ongoing lack of resources. In future researches, it would be important to analyze the role of the species in its ecosystem. Although this role is known in Africa and elsewhere, it has not yet been investigated in the research in Madagascar. Knowledge of this aspect could definitely play a role in long-term conservation.

IV.4- The economic challenge

Analysis of the importance of the utilization for the concerned part of the Malagasy population, including local communities, breeding facilities, skin exporters, artisans and so on.

Following the reorganization of the industry, the reintegration of the informal economic sector into the formal economic sector will permit an economic recovery and will also bring about an increase in the national fiscal revenues.

IV.5- The cultural and heritage challenges

In the history of Malagasy culture, the crocodile takes a major place in the culture of several ethnicities. The crocodile is still considered as sacred. Even today, in the west and north-west of the island, there are people who assert that once a person has died, his or her spirit takes up residence in

a crocodile. But this cultural and spiritual heritage is starting to disappear. It would therefore be important to integrate this aspect into the management system, by taking account of the areas where these beliefs still exist. Furthermore, there is also a need for drawing benefits from a crocodile site that can be a component of ecotourism.

IV.6- Legal and administrative aspects

There will be an emphasis on an analysis of the existence of penalty mechanisms for infringements of the rules on utilization of the resource. But numerous examples show that the protection of animals, particularly dangerous animals, by means of prohibitions and laws alone is not feasible for the long term. If laws form the foundation of a nation, they should also serve as points of reference, or guides, for every citizen. They should also serve the interests of the population in terms of safety and economic benefit. It is for this reason that the Forestry Administration has updated the Decree establishing the system for protection of *Crocodylus niloticus* in Madagascar and the conditions for selling the animal and the products derived from it. It is important that this Decree should be implemented.

V- Implementation means

V.1- A need for a partnership-based dynamic and for strong involvement of the local communities and the decentralized territorial entities

The community approach to management of the resource is important, since those are the people who are closest to it. The crocodile is an animal that is still perceived overall as dangerous by the population of Madagascar, with this perception being exacerbated by problems of immediate dangers in certain areas. But it is also a species that is a part of the heritage of Madagascar, and additionally useful from the cultural and socioeconomic points of view. In that sense, it represents major conservation challenges which should be integrated in a management programme reflecting the real problems on the ground. The study performed by WWF in 2009 shows the relevance of this local governance. In fact, Community Conservation is a concept that calls for implementation of the plan for management of the country's natural resources explicitly with involvement of the members of the local communities who are the primary protectors and beneficiaries of them.

V.2- Establishment of a system for tracking and evaluation

V.2.1- Objective

The objective of the tracking and evaluation system is to provide information flows making it possible:

- at national level, to track the global developments in management and to provide support to the regional authorities;
- at regional level, to assess and track the progress of activities in the areas for hunting, breeding, research, and so on.

In fact, the responsibility falls to the decentralized technical services and the decentralized territorial entities[6] involved to track closely the proper functioning of the management selected. The decentralized territorial entities at regional and local level constitute safeguards against uncontrolled

[6] Decentralization has resulted in an organization of the territory at the present time comprising three levels of collective entities (the region or *Faritra,* the commune or *Kaominina* and the local community or *Fokontany*). In addition there are five different administrative levels (Robsomaniitrandrasana, 2008). Decentralization is intended to improve administrative response and increase the services provided to the citizens, or in other words to promote the development of the decentralized collective entity on the basis of needs and solutions identified locally (Belvaux E., 2005).

exploitation of these resources, whereas the central departments have an overall steering role in the process at national level. Steering at central level of the process takes place through the "crocodile steering committee" that is responsible for coordinating all the activities.

V.2.2- Strengthening of the system for surveillance, monitoring and tracking

As one of the shortcomings in the monitoring and tracking of crocodile-related activities is the inadequacy of the law to deal with exploitation of the resource, the result is a proliferation of informal activities. Following the updating of the regulatory instrument on crocodile management in Madagascar, the Forestry Administration and the relevant sector ministries have implemented a system to guarantee that tracking and checking do take place in conformity with the legal instruments in force.

- ✓ **At local level**: Setting up of local tracking committees

The role of the rural populations, who often live in poverty, in the programme for crocodile management and conservation must be taken into consideration and included in this management programme. The success of crocodile management programmes in many countries around the world has primarily been based on the active participation of the local populations and on the creation of economic incentives in order to ensure conservation of the species at this level as a matter of course.

Ecological tracking could be performed by local communities. Indeed, the tracking methodology developed by Madagascar fully involves their participation. That is the best way to involve them in the protection and conservation of this species but also to prepare the implementation of Access and Benefit-Sharing. The results of enquiries during the surveys have indicated that in the absence of competition the prices paid to the communities are relatively low. There are abuses of a dominant position on the market, agreements between middle-men (harvesters) intended to compel them to accept low prices, with a harvester supplying several tanners and exploiting the community's situation of dependence to keep prices low.

- ✓ **At the regional and national level**

Integration of the relevant sector ministries and civil society for tracking the market:

- Gendarmerie and police for checks on the main roads;
- Criminal Investigation officers (Ministry of Trade, Ministry for Promotion of Artisanal Industry, Ministry of the Environment and Forests) for monitoring the market;
- The communities with NGOs for the hunting zones;
- The Ministry with responsibility for the resource;

V.2.3- Involvement of civil society

There are plenty of good initiatives to protect Madagascar's natural heritage. Numerous actors have signed on to the environmental cause, such as village-based associations or NGOs whether Malagasy, foreign or international. But in order to survive in the long term, crocodile management must be in the interests of the stakeholders, including the river-bank populations.

V.2.4- Information and communication

There have long been simple but effective strategies to avoid man-crocodile conflict, such as the one developed by Pooley (1990). Also, in ancient times the Madagascans themselves took certain precautions, such as attaching a gourd to a pole to draw water or the construction of fences along the edges of rivers (Zehrer, in press, 2013). Such strategies should be made more widely known in the Malagasy regions at risk. In addition, it is important:

- to make use of the Ministry's means of communication to send information on exploitation, conflict or any other relevant items to the national radio and television broadcasters;
- to collect information on man-crocodile conflict provided by the regional directorates and forest ranger services in order to draw up a procedure for awareness-raising to prevent risks.

VI- Making the activities permanent

After regularization, each actor will make a contribution from his or her utilization of products to keeping the activities operational. This fund, although modest, will be assigned to market checks and to the observation of at least one hunting site per year.

The national crocodile committee will also have to find funding in order to make observations of sites not yet identified. This system will make it possible to discover other zones, either for developing extensive breeding or for use as conservation zones.

CONCLUSION

As one of the reasons leading to the temporary halting of Madagascar's foreign trade was the lack of transparency in the system for managing the exploitation of crocodiles, the four activities described in this project have the objective of rebuilding the crocodile industry on a sounder basis.

The methodology used for tracking the wild population makes it possible to set up complete techniques to observe changes in species abundance. Although carried out only on certain portions of sites, the study permits deductions to be made on the current state of the overall population in Madagascar. The study of the industry responds to various questions on the volume and size of the products passing through the domestic market and on the role of each stakeholder. The new legislation takes into consideration all the activity sectors and ensures protection for those people who are operating in a legal manner. But it will not be possible to implement it without contributions from the different ministries responsible in one way or another for the management of the resource.

A prohibition on exploitation will in no way bring about better conservation of the species; only sustainable utilization of the resource, with involvement of the local population and the stakeholders, will make it possible to manage it in the long term.

Madagascar proposes to move forward under a programme that will make it possible to guarantee without any uncertainty that international trade does not endanger the survival of the Nile crocodile, while at the same time allowing CITES to proceed in the establishment of practical strategies, aligned with the circumstances of the countries of Africa.

It is on this basis that we are advocating the utilization of the non-detriment finding for a proposal for different quotas.

Non-Detriment Finding: *Crocodylus niloticus* in Madagascar

I- Rapid risk assessment

The questions in the Table of the system for assessing the information are classified by category but answered parameter by parameter. A notation is assigned to the answer chosen for each parameter (Annex, Table 1). Then, the parameters in each category are brought together in another Table and scored (CITES, 2011) (Table 3). The scores run from 1 to 5, with 1 corresponding to the least risky parameter and 5 relating to the one which represents the greatest risk to the species. The different categories considered are: the intrinsic vulnerability of the species, the general threats to the population and the potential impact of the harvesting proposed. Each category has an average score, respectively a, b and c. A coefficient is assigned to each category: 2 for the category of the intrinsic vulnerability of the species, 1 for the general threats to the population and 2 for the potential impact of the harvesting proposed. These scores then allow the weighted pre-NDF risk score to be calculated for the species in question (CITES, 2011). The following formula is used for calculating this score:

$$\frac{(a \times 2) + (b \times 1) + (c \times 2)}{5}$$

After calculation of the pre-NDF risk score, three categories, based on the risk entailed, are adopted to classify the species concerned:

- "low risk" where the score is between 0 and 2.0
- "medium risk" if the score is between 2.1 and 3.5
- "high risk" where the score is between 3.6 and 5.0

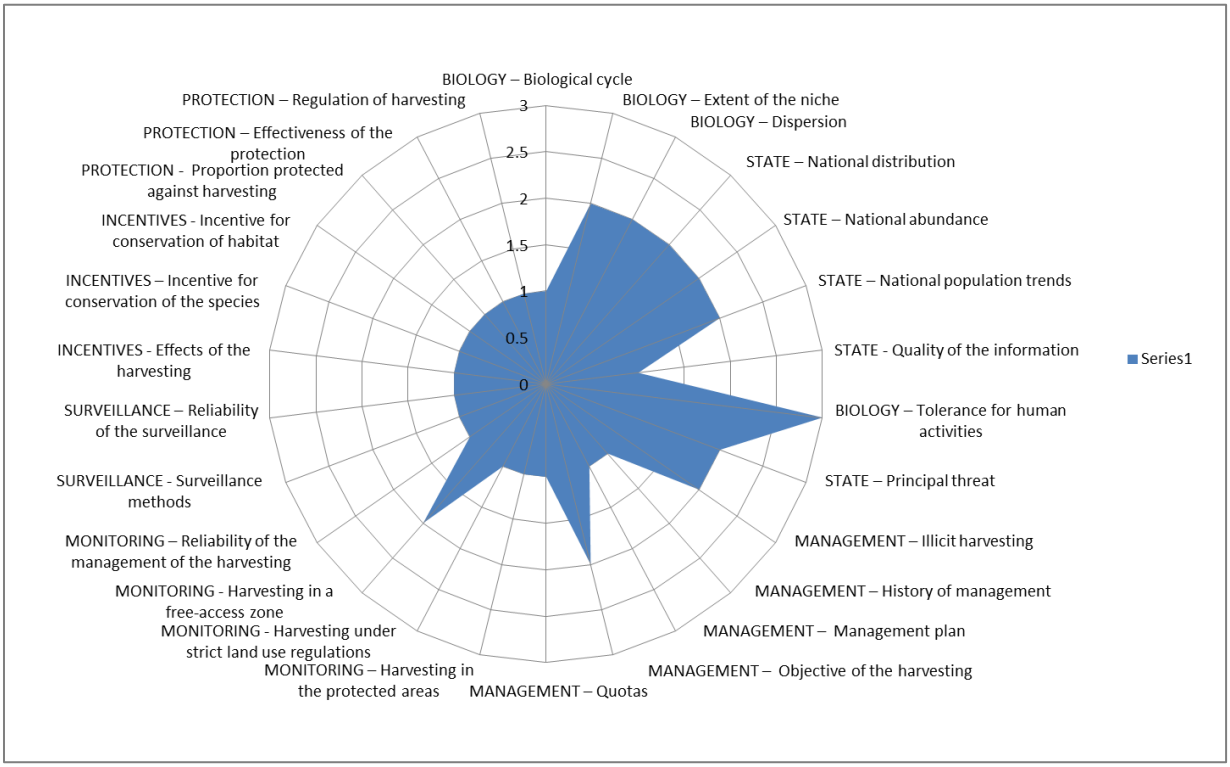
The score obtained in this manner makes it possible to classify the species by the risk that it runs in the event of harvesting and whether the harvesting may be maintained. If the pre-NDF risk score is between 0 and 2.0, the species is considered to be low-risk. Then, the NDF about it is favourable. If the score is between 2.1 and 3,5, the species is at medium risk in the event of harvesting. Then, the NDF about it is favourable only if very strict procedures are followed. These procedures are dependent on the existence of tracking at the harvesting site. Only after such procedures have been completed can the NDF on the species under consideration be completed. The procedures to be followed for medium-risk species were laid down at the workshop in Cancun, Mexico in 2008 (CITES, 2008) and were adopted by Madagascar during the training workshop in 2012. If the risk score is between 3.6 and 5.0, the species is considered to be high-risk in the event of harvesting. Consequently, the NDF is unfavourable. The step following the study in this case is an adjustment and a resubmission of the proposal.

1- For egg collection:

Table 3: Calculation of the weighted pre-NDF risk score following accumulation of the parameters and weighting of each group of variables.

Question No.	Question Category	Question	Response 1 to 5
2.1	BIOLOGY	BIOLOGY – Biological cycle	1
2.2		BIOLOGY – Extent of the niche	2
2.3		BIOLOGY – Dispersion	2
2.5	STATE	STATE – National distribution	2
2.6		STATE – National abundance	2
2.7		STATE – National population trends	2
2.8		STATE – Quality of the information	1
		a	1.714285714
2.4		BIOLOGY – Tolerance for human activities	3
2.9		STATE – Principal threat	2
2.1	MANAGEMENT	MANAGEMENT – Illicit harvesting	2
		b	2.333333333
2.11		MANAGEMENT – History of management	1
2.12		MANAGEMENT – Management plan	1
2.13		MANAGEMENT – Objective of the harvesting	2
2.14		MANAGEMENT – Quotas	1
2.15	MONITORING	MONITORING – Harvesting in the protected areas	1
2.16		MONITORING – Harvesting under strict land use regulations	1
2.17		MONITORING – Harvesting in a free-access zone	2
2.18		MONITORING – Reliability of the management of the harvesting	1
2.19	SURVEILLANCE	SURVEILLANCE - Surveillance methods	1
2.2		SURVEILLANCE – Reliability of the surveillance	1
2.21	INCENTIVES	INCENTIVES - Effects of harvesting	1
2.22		INCENTIVES – Incentive for conservation of the species	1
2.23		INCENTIVES - Incentive for conservation of the habitat	1
2.24	PROTECTION	PROTECTION - Proportion protected against harvesting	1
2.25		PROTECTION – Effectiveness of the protection	1
2.26		PROTECTION - Regulation of harvesting	1

		c	1.125
		Weighted pre-NDF risk score	**1.602380952**
		Risk level	**Low**

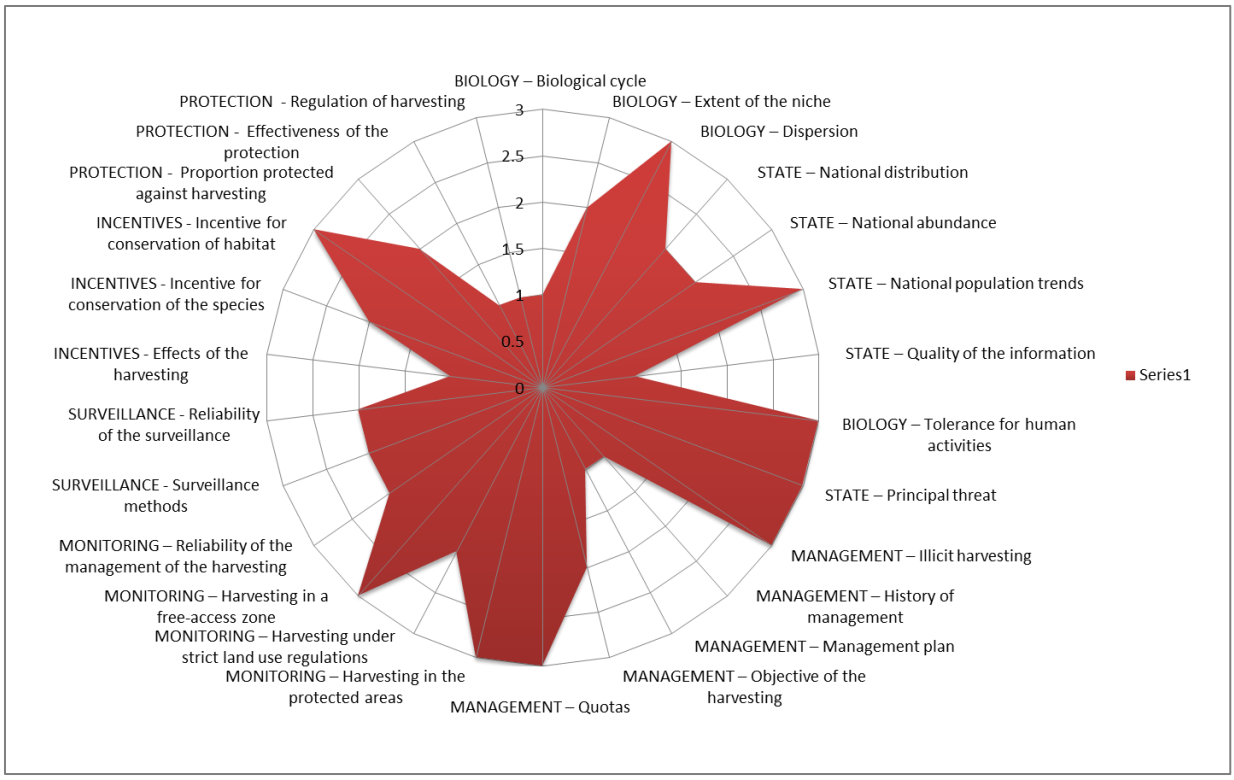


2- For harvesting of wild animals:

Table 3: Calculation of the weighted pre-NDF risk score following gathering of the parameters and weighting of each group of variables.

	Question No.	Question Category	Question	Response 1 to 5
Intrinsic vulnerability of the species (Coefficient=2)	2.1	BIOLOGY	BIOLOGY –Biological cycle	1
	2.2		BIOLOGY – Extent of the niche	2
	2.3		BIOLOGY – Dispersion	3
	2.5	STATE	STATE – National distribution	2
	2.6		STATE – National abundance	2
	2.7		STATE – National population trends	3
	2.8		STATE - Quality of the information	1
			a	2
General threats to the population (Coefficient=1)	2.4		BIOLOGY – Tolerance for human activities	3
	2.9		STATE – Principal threat	3
	2.1	MANAGEMENT	MANAGEMENT – Illicit harvesting	3
			b	3
Potential impact of the harvesting	2.11		MANAGEMENT – History of management	1
	2.12		MANAGEMENT – Management plan	1

proposed (Coefficient=2)	2.13		MANAGEMENT – Objective of the harvesting	2
	2.14		MANAGEMENT – Quotas	3
	2.15	MONITORING	MONITORING – Harvesting in the protected areas	3
	2.16		MONITORING - Harvesting under strict land use regulations	2
	2.17		MONITORING - Harvesting in a free-access zone	3
	2.18		MONITORING – Reliability of the management of the harvesting	2
	2.19	SURVEILLANCE	SURVEILLANCE - Surveillance methods	2
	2.2		SURVEILLANCE – Reliability of the surveillance	2
	2.21	INCENTIVES	INCENTIVES - Effects of the harvesting	1
	2.22		INCENTIVES – Incentive for conservation of the species	2
	2.23		INCENTIVES - Incentive for conservation of habitat	3
	2.24	PROTECTION	PROTECTION - Proportion protected against harvesting	2
	2.25		PROTECTION – Effectiveness of the protection	1
	2.26		PROTECTION - Regulation of harvesting	1
			c	1.9375
			Weighted pre-NDF risk score	**2.175**
			Risk level	**Medium**



The harvesting of wild animals presents medium risk, which makes it necessary to establish monitoring taking into account the data on density and distribution and the data on harvesting.

II- Quota proposal

For the reopening of trade in and export of skins and products derived from *Crocodylus niloticus,* Madagascar proposes a quota for harvesting of wild specimens that takes into account the estimated size of the population in the wild and prevention of the risk of man-crocodile conflict and allows for maintenance of the density of certain populations at a stable level.

1- Formula

The formula used in this calculation is that developed by the Scientific Authority for Malagasy fauna and validated by the experts in 2006 in order to estimate the quota for harvesting of reptiles, using an objective methodology.

The criteria considered are: the range, also known as the zone of occurrence, the fragmentation of the range, the type of habitat and the abundance.

These criteria will then be quantified and integrated into a formula such that they will have a direct effect on the quota to be calculated.

The Quota = S. F. H. A. c,

where:

- **S**: represents the range in km²,
- **F:** represents the fragmentation of the range,
- **H:** represents the type of habitat,
- **A**: represents the abundance by family,
- **c:** represents the constant (to have sustainable harvesting).

2- Range

The range allows for the fact that there has to be a correlation between the area of the range and the quota for each species. Thus, a species A having a range five times larger than that of a species B will have a quota five times higher.

The range is derived directly from the area occupied by the species. With Madagascar having an area of approximately 585,000 km², the range of each species is derived from an approximation of the area that it could occupy, and is expressed in km².

With regard to *Crocodylus niloticus*, the range used for this calculation results from the studies made by Ramandibison, Games and Lippai, 1998.

Rivers of the Montagne d'Ambre and the Tsaratanana	20,000	km^2	Approximately 20 rivers including the Mahahavy (160 km), Maevarano (203) km, Sambirano (124 km) and Bemarivo (140 km).
Sofia	27,315	km^2	Drains towards the west for 350 km. The principal tributary is the Bemarivo. There are approximately 30 lakes along the course of the river.
Mahajamba	14,500	km^2	Empties into the Betsiboka.
Betsiboka	49,000	km^2	Major river of the west of the country, flowing as fast as 12,000 m^3/s between January and March. The lowest part is fringed by approximately 150 small lakes (80 km^2).
Mahavavy	16,475	km^2	Major gorges crossing the escarpment of the Bemaraha.
Besalampy	6,040	km^2	Maningoza, Sambao, Mamambaho rivers and numerous lakes
Manambolo	13,970	km^2	
Tsiribihina	49,500	km^2	Three main tributaries; Mahajilo, Mania and Sakeny. Approximately 70 lakes along the course of the river.
Morondava		km^2	Periodically dried up
Mangoky	55,750	km^2	The most significant basin in Madagascar
Onilahy	32,000	km^2	
Total	**284,550**	**km^2**	

This range estimate by Games *et al.* covers the principal waterways in the west of the island, which are all outside the protected areas of categories I to IV totally devoted to conservation (2,816.31 km^2).

These protected areas refer to:

- Diana Region
- Analamerana Park (247.50 km^2)
- Ankarana Special Reserve (180.25 km^2);

- Boeny Region
- Ankarafantsika Park (1,300.26 km^2);

- Melaky Region
- Bemaraha Park (666.30 km^2);

- Sofia Region
- Marotandrano Park (422.00 km^2)

The catchment basins of the east and south-east of the country are all also important, with most of them harbouring crocodiles, but the data are not yet sufficient to determine the area of these zones. The same applies to the lakes, small bodies of water and streams

3- Range fragmentation

The fragmentation of the habitat or even of the range must be allowed for, because a species having a wide range but also being part of a fragmented population will be as fragile as a species with a small range or a specific habitat.

This criterion has been divided into two categories: Fragmented and Non-fragmented. The calculation gives the two categories the values of 0.25 and 1 respectively. Thus a species having a fragmented distribution will have a quota a quarter of the size of one with a non-fragmented distribution.

- Fragmented habitat = 0.25
- Non-fragmented habitat = 1

Crocodile habitat is considered to be fragmented given that the waterways are discontinuous and the timing of the high-water periods means that there is not a permanent communication between them.

4- Type of habitat

The habitat takes into consideration all types of occupation of the ground. There are three categories: primary habitat, secondary habitat and anthropogenic habitat. Primary habitat comprises primary formations, while secondary habitat covers formations that are degraded to some degree. Anthropogenic habitat comprises related formations more affected by human activities, such as towns, rice paddies or other features of that type. These three categories are home to specific species. Thus, the proposed calculation is that the quota of a species related to primary formation is reduced by a quarter relative to the quota of a species related to anthropogenic habitat. The quota for a species related to a secondary formation is thus reduced by half.

Thus the values are as follows:

- Primary habitat = 0.25
- Secondary habitat = 0.5
- Anthropogenic habitat = 1

With regard to crocodiles, the habitat is considered to be anthropogenic because crocodiles do not have any preference as to habitat, being able to settle down in any kind of habitat.

5- Abundance

This criterion is very difficult to handle correctly because not all the data are available. The criterion will thus need a large quantity of population studies in order to obtain usable data. But it is possible to quantify the abundance on a general basis. Thus, the quantification was used at the level of the family. Of the six families of reptiles, the Colubridae are the least abundant. Field work can substantiate this assertion. Similarly, in ecology, the trophic level of this family provides evidence to verify the relative abundance of these animals relative to other families.

The calculation thus gives a value of 0.1 for the abundance of the Colubridae and 1 for the other families. In other words the quota for snakes is only a tenth of that for the other families.

- Colubridae = 0.1
- Cameleonidae = 1
- Opluridae = 1

- Gekkonidae = 1
- Gerrhosauridae = 1
- Scincidae =1

As for crocodiles, they were not considered at this workshop owing to a lack of data on wild populations. But studies have been carried out since that time. The Crocodylidae may be classified as abundant families, on the basis of their biology and ecology. In fact, *Crocodylus niloticus* is a common species in Madagascar, inhabiting all of its bodies of water. Consequently the abundance coefficient of the Crocodylidae was set at 1.

- Crocodylidae: 1

6- Constant

In order to align the former quota with the correlation between these various criteria, a constant is used. This constant has a value of 0.1. For alignment purposes, the constant was calculated from the former quota for *Brookesia superciliaris* and the correlation between its various criteria referred to above.

This constant is in line with the percentage that may be harvested in the wild, namely around 10 per cent of the total population size.

7- Verification of the formula

The quota formula for each species is thus presented in this form:

Quota calculated = S. F. H. A. c

Surface area	Fragmentation	Habitat	Abundance	Constant	Quota calculated
284,550 km^2	0.25	1	1	0.1	7113.75

III- Explanatory support for non-detrimental harvesting

1- Estimate of the quantity harvested by the harvesters/tanners (See bibliography)

Behra 1986	**Behra 1987**	**Behra 1988**	**Behra, Ramandimbison 1990**	**Ramandibison 2004**
3,500	4,000	6,000	12,000	8,000

These figures show that the harvesting of skins to supply the local market was reasonably stable over these years. The wild crocodile population was able to provide specimens for harvesting.

2- Estimate following survey among the tanners (2013)

The tanners are the final destinations of raw crocodile skins intended for conversion into tanned skins. The survey carried out among the tanners made it possible to match the estimates for numbers of skins coming onto the market every year with the harvesting sites and the harvesters. This estimate gave a figure of 2,000 – 2,500 skins in the artisanal sector, together with some 200 – 500 skins resulting from conflict (between 1997 and 2008). The estimated quota based on hunting overall is thus between 2,200 and 3,000 skins/year.

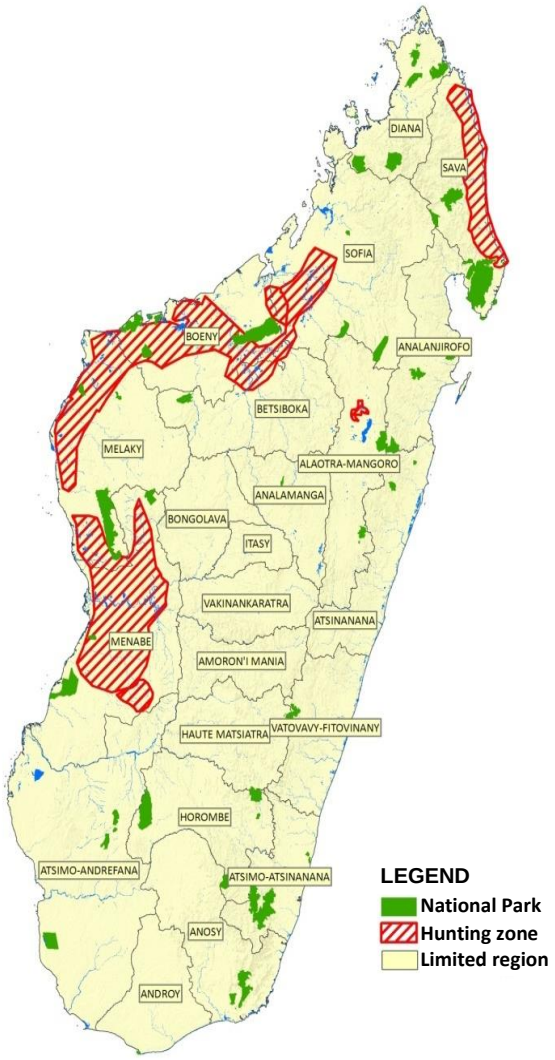
3- Distribution of the hunting zones

According to the results of enquiries made of the actors who work with the skins (tanners, harvesters, hunters) the zones where the products are sourced are:

- North, north-west, west
- Sava Region (Sambava, Antalaha, Ambotralalana, etc.)

- Boeny Region (Mahavavy-Kinkony, Sitampika, Andranomavo, Soalala, Mahajamba, Tsinjomorona, Manerinerina, Ambatoboeny, etc.)
- Bongolava region (Ambohitromby, Ikopa, Fenoarivo be)
- Melaky Region (Besalampy , Antsalova, Tambohorano, etc.)
- Analamanga (Kiangara)
- Alaotra Mangoro

➢ South, south-west
- Menabe Region (Miandrivazo - Mahajilo river, Lakes Ankilizato and Mahabo, Tsiribihina river)
- Vakinakaratra region (Mandoto)
- Atsimo Andrefana region (Beroroha, Morombe, etc.)



Map showing the hunting zones

These results show us that the actual numbers harvested in the wild are considerably lower than the calculated quota. In addition, the limit on killing size imposed by the Scientific Authority indicates that the large reproductive specimens and the juveniles will be protected from harvesting.

The case of *Crocodylus niloticus* parallels the case of the study of *Furcifer oustaleti* (Scientific Authority, 2006). Both of them are common species and the calculated quota is significantly higher than the recorded actual numbers harvested on the basis of international trade in the species.

This brings us to the conclusion that the harvesting quota will not jeopardize the survival of the species.

IV- QUOTA PROPOSAL

1- Wild-sourced quota

Thus, for the years 2014 and 2015, based on a proposal by the Scientific Authority, confirmed by the Management Authority (Forestry Administration), Madagascar will propose:

A quota for wild-taken crocodiles for export, to restart ranching, of 1,000 skins

A national harvesting quota to supply the local artisanal market not exceeding the estimated 2,500 skins. This national quota of skins will be turned into finished products, including 3,500 for export (based on the former quota of finished products for the artisans) so as to permit the artisans to work sustainably, with the remainder going to the local market. This export quota will be shared with the exporting operators able to justify a market and subject to their observing the regulations in force covering exports from Madagascar.

This proposed wild-sourced quota will take into account identified zones of man-crocodile conflicts in order to prevent risks and keep the density of certain populations at a stable level.

2- Ranched quota

The quota for ranching takes account of the assessment of stocks. For the years 2014 and 2015, a plan for recovery and restart is being prepared.

V- Monitoring of activities

These harvesting quotas will be evaluated in 2015.

A yearly workplan will be submitted starting in 2014 in order to track these proposed activities.

Bibliography

Andrianjaratina R.L (2010). Etude technico-économique de la production de *Crocodylus niloticus* à Madagascar, Unpublished thesis, Ecole Supérieure des Sciences Agronomiques – Université d'Antananarivo.

Bayliss, P. (1987). Survey methods and monitoring within crocodile management programmes. Pp. 157-175. In: Webb, G. J.W., S. C. Manolis, and P. J. Whitehead (eds) Wildlife Management: Crocodiles and Alligators. Surrey Beatty and Sons, Chipping Norton, NSW.

Behra, O. and J. M. Hutton (1990). Rapport sur l'état et la conservation des populations de crocodiles de Madagascar. The CITES Nile Crocodile Project. Publication of the CITES Secretariat.

Behra, O. and J. M. Hutton, 1992, Analyse du marché intérieur des peaux de crocodiles et des produits dérivés à Madagascar. In: The CITES Nile Crocodile Project, UNEP, Lausanne, Switzerland, pp. 105-114.

Behra, O. and Ramandimbison, (1992). The involvement of rural communities in the crocodile ranching programme in Madagascar. *Proceedings of the 11th Working Meeting of the IUCN SSC Crocodile Specialist Group , Victoria Falls, Zimbabwe. pp. 43-52.*

Behra, O.N.P. and J.M. Hutton, (1990). Etude du marché intérieur des peaux de crocodiles et dérivés à Madagascar.

Bolton, M., (1990). Développement de l'élevage de crocodiles à Madagascar. United Nations FAO. Rapport TCP/MAG/8954. August 1990.

Botha, P.J. (2005). The ecology and population dynamics of the Nile crocodile*, Crocodylus niloticus,* in the Flag Boshielo Dam, Mpumalanga Province, South Africa.

Decary, R. (1949), Le Crocodile Malgache: Ses mœurs et ses rôles dans la vie des indigènes. In: Journal de la Société des Africanistes 19:195-207

Decary, R., (1939). La chasse et piégeage chez les indigènes de Madagascar. In : Journal de la société des Africanistes, tome IX, p. 3_42,

Decary, R., (1950). La faune malgache. Son rôle dans les croyances et les usages indigènes. Paris, 26 pp.

Games, I., Ramandimbison and C. Lippai (1998). Air survey of crocodiles in Madagascar. Report to CITES and the Government of Madagascar.

Grandidier, A. Souvenir de voyage 1865 – 1870 (from his 1916 unpublished manuscript). Documents anciens de Madagascar. N° VI, 1916.

Hutton, J.M. 1987a. Morphometrics and field estimation of the size of the Nile crocodile. *Afr. J. Ecol*. 25, 225-230.

INSTAT, (2012). In Journal midi Madagascar du 20 Septembre 2013, le secteur informel à la rescousse de l'économie transitoire; source given Institut National de la Statistique, 2012, with support from UNDP and the International Labour Office.

Kofron C. P., (1987). Reproduction and ecology of the Nile crocodile, *crocodylus niloticus*, in a seasonal river in southeastern Zimbabwe, Submitted manuscript.

Kuchling, G., C. Lippai and O. Behra, 2003, Crocodylidae: *Crocodylus niloticus*, Nile Crocodile, Voay, Mamba: In The natural history of Madagascar, S. Goodman and J. P. Benstead (eds), The University of Chicago Press, pp. 1005-1008.

Leslie, A.J. (1997). The ecology and physiology of the Nile crocodile, *Crocodylus niloticus*, in Lake St Lucia, Kwazulu Natal, South Africa. PhD thesis. Drexel University, Philadelphia.

Magnusson, W. E. 1982. Techniques of surveying for crocodilians. pp. 389-403. In: Crocodiles: Proceedings of the 5th Annual Working Meeting of the Crocodile Specialist Group of the Species Survival Commission of IUCN-The World Conservation Union, Gland, Switzerland.

Ministère de l'Agriculture, de l'Elevage et de la Pêche, (2003), Monographie de la région Boeny, Ministère de l'Agriculture, de l'Elevage et de la Pêche, Antananarivo, 109 pp

Ministère de l'Agriculture, de l'Elevage et de la Pêche, (2003), Monographie de la région Melaky, Ministère de l'Agriculture, de l'Elevage et de la Pêche, Antananarivo, 109 pp

Ministère de l'Agriculture, de l'Elevage et de la Pêche, (2003), Monographie de la région Menabe, Ministère de l'Agriculture, de l'Elevage et de la Pêche, Antananarivo, 109 pp

Ministère de l'Agriculture, de l'Elevage et de la Pêche, (2003), Monographie de la région Sava, Ministère de l'Agriculture, de l'Elevage et de la Pêche, Antananarivo, 109 pp

Ministère de l'Agriculture, de l'Elevage et de la Pêche, (2003), Monographie de la région Sofia, Ministère de l'Agriculture, de l'Elevage et de la Pêche, Antananarivo, 109 pp

Nichols, J.D. (1987). Population models and crocodile management. In: Wildlife management: crocodiles and alligators. Edited by G.J.W Webb, S.C. Manolis and P.J. Whitehead. Surrey Beatty and Sons, Chipping Norton.

Ottley, B., C. Lippai and A. M. N. A. Rakotondrazafy (2008), Surveys of wild crocodile populations in Madagascar, Programme Germano-Malagasy pour l'Environnement, GTZ, 77 pp.

Petit, G. Les crocodiles malgaches. In: Revue de l'histoire naturale appliquée; pp 236-250, (1925)

Platt, S.G. (2000). An expedition into central Rakhine State, Myanmar. Report to Wildlife Conservation Society, Bronx, New York.

Pooley, A.C.T, (1990), T.C. Hines and J. Shield (1990). Les attaques de crocodiles. In: Crocodiles, alligators et caïmans. Encyclopédie visuelle. Bordas, Paris.

Pooley, A.C.T, Alimentation. In: Crocodiles, alligators et caïmans. Encyclopédie visuelle. Bordas, Paris, 1990.

Projet WWF mg 0874.02, (2010). Développement de systèmes durables de gestion locale, régionale et nationale sur le crocodile à Madagascar

Rakotondrazafy, A. M. N. A., R. Andrianasolo and H. Ramamonjisoa (2008b), Inventaire de crocodiles dans la rivière de Mahavavy-Sud, Etudes biologiques, écologiques et socioéconomiques sur les crocodiles dans le complexe Mahavavy-Kinkony, WWF, 35 pp.

Rakotondrazafy, A. M. N. A., Rapport de synthèse sur les études de *Crocodylus niloticus* à Madagascar (2009), Ministère de L'Environnement et des Forêts, Département de Biologie Animale, Faculté des Sciences, Université d'Antananarivo, 38 pp.

Ramandimbison, I. Games and C. Lippai (1998). Madagascar Crocodiles. Report to CITES.

Raven, P. and G. B. Johnson, 2002. *Biology – Sixth Edition.* McGraw-Hill, Dubuque, 1238 pp.

Raxworthy, C. J., 2003, Introduction to the Reptiles. In: The Natural History of Madagascar: S.M. Goodman and J.P. Benstead (Eds.), The University of Chicago Press, Chicago and London: pp. 934-961.

Robsomanitrandrasana, E. (2008) Bonne gouvernance et transfert de gestion des resources naturelles à Madagascar, Enjeux et enseignements tirés.

Zehrer, W., (2013). Homme et Crocodile: de la confrontation à la cohabitation*, in press*.

Zehrer, W., (2013). Le crocodile malgache, vu à travers des proverbes et contes, Edition Tsipika.

Annexes

Annex I: Madagascar's system of protected areas

I- Definition of a protected area

A protected area as defined by IUCN[7] is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

Under the new COAP Act, a protected area is understood to be a stipulated territory, terrestrial, marine, coastal or aquatic components of which present a particular value, notably biological, natural, aesthetic, morphological, historical, archaeological, religious or cultural, and which needs, in the general interest, a multifaceted preservation; it is managed with a view to the protection and maintenance of biological diversity, the conservation of the special values of the natural and cultural heritage and the sustainable utilization of natural resources contributing to poverty reduction.

All the protected areas in Madagascar are governed by **Act 028/2008 of 29 October 2008 reformulating the Code of Management of the Protected areas** and its implementing Decrees.

II- Definition of a system of protected areas

A system of protected areas is a representative cluster of protected areas which comprises:

- all the major habitats (for example, of a country or a region);
- habitats of a sufficient size to be capable of sustaining viable populations of flora and fauna;
- closely connected habitats, in order to allow the genetic exchanges necessary to the stability of species.

III- Madagascar's system of protected areas

1- Specific Malagasy features

Madagascar's system of protected areas is composed of the national parks network and the new protected areas. These new protected areas have the objective of supplementing the representativeness and ensuring the sustainability of Malagasy biodiversity as well as maximizing the other natural and cultural values associated therewith.

Madagascar's system of protected areas will include several management categories and several types of governance.

The specific Malagasy features to be taken into account in the establishment of the system of protected areas are:

- **Biological aspects:** Exceptional biodiversity richness (megadiversity), regional ecological diversity and endemicity and global priority (hotspot) owing to the threats of species disappearance;
- **Sociocultural aspects**: Universal presence of traditional structures, consideration for social and traditional values, important role of natural features and ecosystems in religious rites and for Madagascar's cultural identity;
- **Economic aspects:** High degree of poverty, strong dependence on natural resources and ecological services (particularly water).

[7] International Union for Conservation of Nature

2- Opportunities offered by a system of protected areas in Madagascar

The establishment of a system of protected areas for Madagascar will make it possible to:

- extend the overall coverage of the protected areas in the country;
- improve the representativeness of the protected ecosystems;
- improve biological connectivity both on land and in the water;
- strengthen the positive linkages between terrestrial and marine conservation;
- involve and obtain the support of society as a whole for conservation;
- increase the flexibility of the approaches to management;
- establish for the long term the concept of conservation in the country;
- increase the capacity of ecosystems to respond to large-scale disturbances (such as climate change);
- offer long-term economic opportunities for national and regional development.

Generally, Madagascar's system of protected areas will be intended to reinforce the sustainability of conservation and the links between the Malagasy people and nature.

3- Objectives of Madagascar's system of protected areas

- To conserver the entirety of Madagascar's unique biodiversity, in particular ecosystems, species and genetic variability;
- To draw value from the natural and cultural heritage, education and recreation of citizens and visitors;
- To draw value from biodiversity through research;
- To maintain ecological services and sustainable utilization of natural resources for poverty reduction and development;
- To conserve and highlight the cultural heritage of Madagascar;
- To promote ecotourism;
- To distribute equitably the benefits generated by natural resources and
- To make a contribution to economic and social development in general by conservation and sustainable utilization of natural resources.

Madagascar's system of protected areas will also contribute to achieving other objectives, such as:

- Maintenance of local and global climate;
- Protection of human health;
- A more equitable distribution of the benefits generated by natural resources;
- Involvement of civil society in good governance and effective management of renewable natural resources.

4- Fundamental principles for the establishment of Madagascar's system of protected areas

- Involving the local population in the management of natural resources;
- Bringing about cooperation with all sectors and actors concerned;
- Highlighting the country's special cultural and traditional features;
- In line with the local context, making use of the entire range of types of governance and management objectives;
- Allocating responsibility to the regional and local authorities in the management of the protected areas;
- Applying the principles of good governance that are best suited to the country, such as: respect for human rights, legitimacy and freedom of speech, equity, subsidiarity, the precautionary principle, performance, transparency, responsibility for decisions and accountability;

- Integrating the protected areas into a wider territorial planning and development framework.

IV- Governance of a protected area

1- Definition

The totality of interactions among the structures, processes and traditions which determine the manner in which authority is exercised, responsibilities are distributed, decisions are taken and the citizens and other actors are engaged in a protected area.

2- Types of governance in Madagascar for each category of protected area

Each protected area can be classified according to its type of governance and management category. At international level, examples of all possible permutations can be found. In Madagascar, on the other hand, given the existing social, legal and institutional context, certain combinations seem more appropriate than others.

The type and quality of the governance of a given protected area are evaluated using a participatory approach, in line with the criteria identified by the stakeholders concerned.

- **CATEGORY I**: **TAHIRIN-JAVABOAARY** (Integral natural reserve)
  Wild nature zone; protected areas managed principally for scientific purposes or for protection of wild resources.

  - ✓ **Primary management objectives**
    Preserving the biotopes, ecosystems, gathering endangered endemic species in a very large wild space, making allowance for the area needed for the species' viability, and under conditions as little disturbed as possible;

  - ✓ **Minimum utilization rules**
  - Usufruct rights and traditional fishing authorized in line with development and zoning plan;
  - Any other commercial extractions of natural resources, or artisanal and industrial fishing, not allowed;
  - Mining operations prohibited;
  - Human occupation zones to be excluded during specification of the scope of the protected area.

  - ✓ **Specific Malagasy features**
    IUCN categories Ia and Ib are combined into a single category I in Madagascar

- **CATEGORY II: VALAN-JAVABOAARY (National Park and natural park)**
  Protected area managed primarily with the objective of protecting ecosystems and for recreational purposes.

  - ✓ **Primary management objectives**
  - Protecting natural regions and landscapes of national and international importance in a spiritual, scientific, educational, recreational and/or tourism context;
  - Taking account of the needs of riverbank populations, including utilization of resources for subsistence, to the extent that these do not negatively impact the other management objectives.

  - ✓ **Minimum utilization rules**
  - Usufruct rights and traditional fishing authorized in line with development and zoning plan

- Any other commercial extraction of natural resources, or artisanal and industrial fishing, not allowed;
- Mining operations prohibited ;
- Human occupation zones to be excluded during specification of the scope of the protected area.

✓ **Specific Malagasy features**
- Importance for the generation of income; should give consideration to sharing the benefits resulting from ecotourism with the riverbank population;
- Development of ecotourism characterized by concern for conservation of nature and by its beneficial impacts on local populations, without causing a loss of cultural identity;
- Existence of controlled activity zones (*Zones d'Occupation Contrôlée*).

➢ **CATEGORY III**: ***TAHIRIM-BAKOKA VOAJANAHARY (*Natural monument)**
Protected area primarily managed with a view to preserving specific natural features (area having cultural values associated with biodiversity).

✓ **Primary management objectives**
Preserving the biodiversity associated with cultural values, last vestige of natural forest, sacred sites ("fady"), archaeological sites (of scientific value), historical and aesthetic sites.

✓ **Secondary objectives**
Promoting the development of tourism/recreation, education and research.

✓ **Minimum utilization rules**
- Usufruct rights with the management objectives and regulated by the "fady" or authorized social norms;
- Respect by tourists and others for the "fady" and established social norms (tourism, other);
- Inhabited zones permitted, but with a prohibition on extension
- Rights of passage possible;
- Mining operations prohibited;
- Actions to transform existing ecosystems or landscapes (e.g. archaeological sites) prohibited;
- Commercial extraction of natural resources prohibited.

✓ **Specific Malagasy feature**
Other forms of protection will be created to conserve other cultural values such as cultural heritage and World Heritage Sites.

➢ **CATEGORY IV: TAHIRINJAVA-BOAHARY MANOKANA (Special reserve)**
Protected area primarily managed with the objective of conserving habitats and species.

✓ **Primary management objectives**
Guaranteeing and maintaining the habitat conditions necessary for the preservation of species, groups of species, biological communities or important physical features of the natural environment, when human intervention is needed in order to optimize management.

✓ **Secondary management objectives**
Drawing value from economic activities that are compatible with the management objectives.

✓ **Minimum utilization rules**
- Conservation, research, drawing value from the natural and cultural heritage, education and recreation of the citizens, promotion of ecotourism and contribution to sustainable economic and social development authorized;

- Usufruct rights including harvesting for non-commercial purposes for domestic, vital and/or customary needs, restricted to the authorized riverbank population;
- Mining operations prohibited;
- Hunting, killing or capture of animals (including shellfish) and harvesting of plants for commercial purposes prohibited.

✓ **Specific Malagasy features**

Drawing value from economic activities that are compatible with the management objectives of a Category IV protected area.

➢ **CATEGORY V: TONTOLO MIRINDRA VOAARO (Protected harmonious landscape)**

Protected area primarily managed with the objective of conserving habitats and species ensuring the conservation of terrestrial or marine landscapes and also for recreational purposes.

✓ **Primary management objectives**

- Maintaining a harmonious interaction between nature and culture, by protecting the terrestrial and/or marine landscape and by guaranteeing the continuation of traditional forms of natural occupation and construction, as well as the manifestation of sociocultural usages;
- Encouraging ways of life and economic activities in harmony with nature as well as the preservation of the sociocultural fabric of the communities concerned.

✓ **Secondary objectives**

- Offering advantages to the local community and contributing to its well-being in the form of natural products (from forests or fishing) and services (drinking water or income derived from sustainable forms of tourism);
- Maintaining the traditional way of life; this means that there will be restrictions. For each zone of Category V, there is a need to define the landscape features to be conserved, and the human activities compatible with these features to be maintained (for example exclusively non-mechanized agriculture).

✓ **Minimum rules**

- Harvesting of natural resources in accordance with the stipulations of authorized development plans;
- Specific minimum rules for each site;
- Traditional fishing with a schedule of requirements, and an authorized zoning system (rotation system);
- Mining operations prohibited.

✓ **Specific Malagasy features**

- Zoning: No need for a firm core area, but this may be desirable in certain cases;
- Mining operations prohibited.

➢ **CATEGORY VI: TAHIRIN - KARENA VOAJANAHARY (Natural resource reserve)**

Protected area primarily managed with the objective of sustainable utilization of natural ecosystems. Management by the supervisory Ministry.

✓ **Primary management objectives**

- Ensuring the protection and long-term maintenance of biological diversity and the other natural values of the site;
- Promoting rational management practices in order to ensure sustainable productivity;
- Contributing to regional and national development;

✓ **Secondary objectives**

- Involving the local communities in the management and tracking of resources;
- Developing economic activities that are compatible with the management objectives: harvesting of forest and fishery products authorized in line with the stipulations of the development plan (activities to be carried out by the local communities);
- Drawing value from local knowledge regarding management of natural resources.

✓ **Minimum utilization rules**

- Harvesting of forest products (wood and others) and fishery products authorized in line with the stipulations of the development plan (activities to be carried out by the local communities);
- Evaluation of availability and productivity of stocks and of the degree of biodiversity required. Clear distinction between this activity and that pursued for a site intended for production.

✓ **Minimum utilization rules:**

- Respect for traditional management rules compatible with necessary sustainability of resources;
- Maintenance of at least 2/3 of the area in a natural state, although it may contain modified ecosystems of a limited size;
- Tourism authorized subject to respect for the environment;
- Area sufficiently large to ensure the sustainable utilization of natural resources without long-term jeopardy to the natural quality of the area;
- All forms of use of fire and land-clearing prohibited;
- Mining operations prohibited.

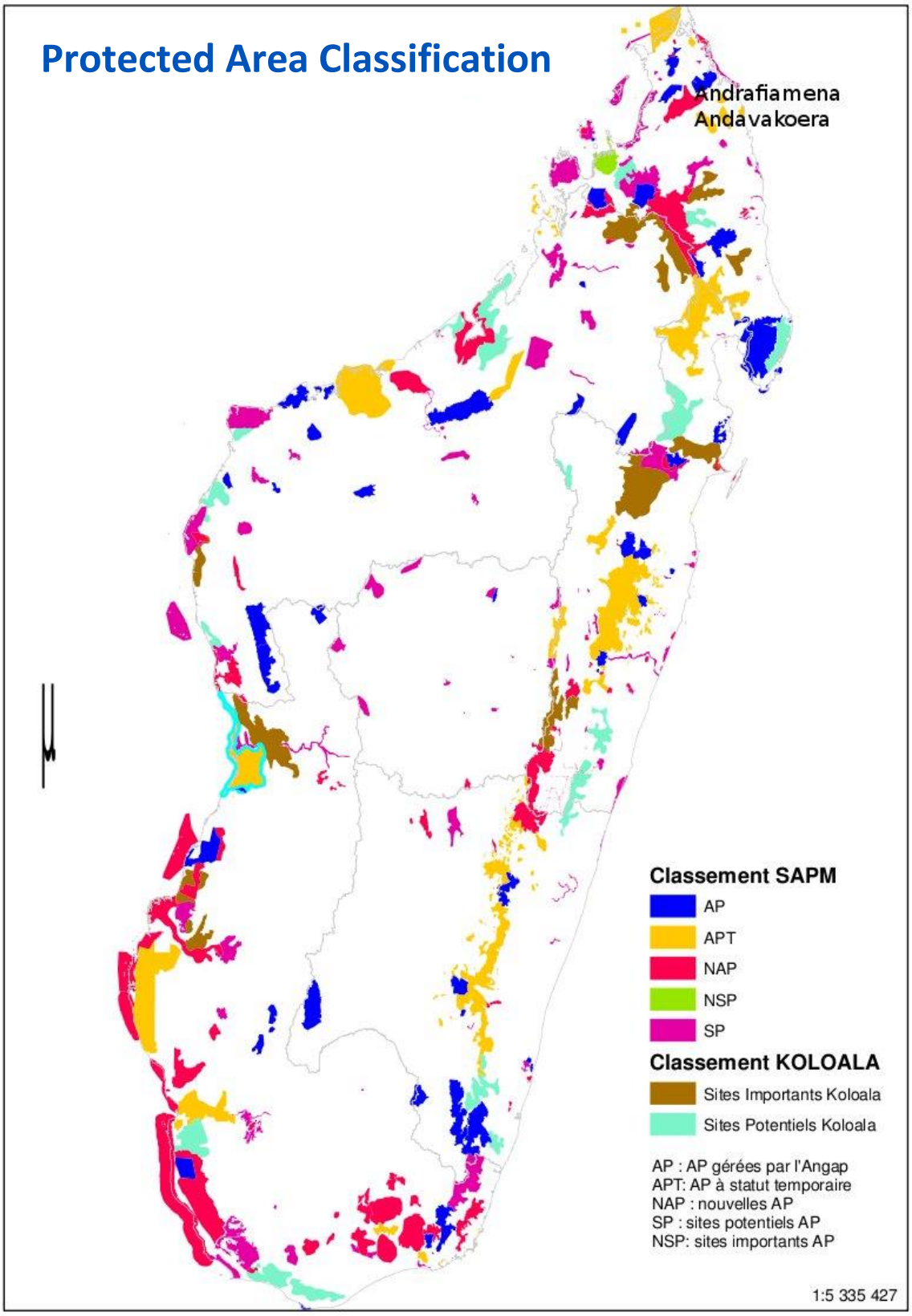
✓ **Specific Malagasy features**

- Requirement on evaluation of availability and productivity of stocks and biodiversity;
- Mining operations prohibited.

Current protected areas in Madagascar (SAPM, 2010)

Site category	***Area (ha)***	***Number of sites***	***Classification***	***Area (ha) by classification***
Existing protected areas managed by Madagascar National Parks	2,137,420	45	Protected area	6,914,805
Extension of existing protected areas	301,052	6		
Protected areas in the category Temporary Protection	2,541,557	23		
New Protected areas	1,934,776	70		
Priority sites for terrestrial protected areas	571,600	18	Priority site for biodiversity and sustainable forest management	2,523,707
Priority sites for KoloAla (sustainable forest management)	1,205,848	9		
Potential sites for terrestrial protected areas	3,938,243	1016	Potential site for biodiversity and sustainable forest management	10,471,767
Potential sites for marine protected areas	5,362,283	22		
Potential sites for KoloAla (sustainable forest management)	1,171,240	17		

Protected Area Classification



Annex II: Terms of reference for ranch tracking

1- ACTIVITY A: Tracking wild crocodile populations in Madagascar

Context

There is currently a recommendation from the Standing Committee that trade in products derived from crocodiles (*Crocodylus niloticus*) be suspended, despite the contributions it makes in terms of income to the actors in the industry and to Madagascar itself in foreign currency coming from exports. The recommendations of the Standing Committee demonstrate the necessity of rebuilding the crocodile industry on a sound basis, an undertaking that Madagascar is currently pursuing (through regularization of the artisans and other small-scale actors). The goal is to ensure that the trade should be legal, sustainable and traceable. Madagascar would then be able to give consideration to certain activities that would assist in meeting the requirements of the Standing Committee and cancelling the recommendation for suspension of the trade.

Objective

The objective of the present project is to improve the crocodile industry in Madagascar in order to establish a system of transparent management in conformity with CITES, while complying with the priority actions agreed by the Standing Committee and its Working Group (France, Germany, Japan, Madagascar, the United States, the Secretariat, the IUCN/CSG and representatives of the Japanese leather industry).

Methodology

In order to establish sustainable management of this species, it is necessary to develop a population tracking methodology appropriate to the situation in Madagascar, and to undertake studies at representative sites. Some sites surveyed years ago were considered as potential sites for hunting and egg-collection for purposes of supplying the artisans and the operators on the ranching side. Currently, these zones need to be examined to be sure that harvesting will not be detrimental to the crocodile population in the long term.

- Tracking of the wild population of *Crocodylus niloticus* in Madagascar

Preparation and establishment of a methodology that is simple, easy to implement, reliable, inexpensive and long-lasting (in other words easy to replicate at regular intervals) to track directly or indirectly the status of the wild populations of *Crocodylus niloticus*.

- The methodology selected will take into account the actors in the sector and the opinions of experts and NGOs. It must involve the local communities with, inter alia, financial benefits, so that starting right now, and then every three years, the Nile crocodile populations may be determined.
- The methodology must combine direct observations with indirect indications of abundance, such as habitat status, capture per unit of effort, clutch size, size of the specimens captured, random observations by riverbank dwellers, incidents involving crocodiles, and so on.

- Establishment of local crocodile management committees to track activities relating to the industry in the potential sites for hunting, harvesting or man-crocodile conflict

- In order to coordinate the activities in the potential sites, the establishment of a local committee provides for participation by the local community in sustainable crocodile management, through starting up and maintaining traceability of wild skins;
- Application of fair trade so that the population will draw benefits from the conservation of

the species;
- Training of the local committees in observing the activities of the industry on-site.

Tasks

The entity responsible for this activity will undertake the following tasks:

- Analyze the scientific and grey literature in order to develop an appropriate methodology. The method could be based on a combination of direct and indirect indications and present knowledge about crocodiles in Madagascar. This method will incorporate reliable, up-to-date and available information (such as: status of the bodies of water and rivers; forest coverage; human pressure; demographic changes; development indices; data on breeding and agriculture; and so on);
- Determine a clear, reliable and inexpensive method, including an implementation plan, recurrent costs, people responsible, etc.;
- Discuss the method selected with national and international experts and with the actors involved in the crocodile industry, including local populations; improve and adapt the methodology as necessary;
- Test the method selected in pilot study sites;
- Analyze the results; determine abundance from data collected on the ground;
- Consider the development of the national management plan for *Crocodylus niloticus* in Madagascar so as to provide information on non-detrimental collection and harvesting (See for example the CITES website: Non-Detriment Finding studies on Nile crocodile (*Crocodylus niloticus*): The status of and trade in the Nile crocodile In Kenya; NDF Workshop, Mexico 2008).

With the help of local entities and the Management Authority, establish local committees to:

- track industry-related activities in the potential sites for hunting, harvesting or man-crocodile conflict;
- implement the utilization of the surveying method.

Expected outcomes

- Methodology to track the wild populations of *Crocodylus niloticus*;
- The results of the implementation of the method;
- Establishment of local committees;
- Implementation of the national management plan to manage and track crocodile populations and manage harvesting and ranching.

2- ACTIVITY B: Study of the sectors covering crocodile-derived products

Context

CITES has drawn up a list of priority actions for Madagascar to take in order to reopen the trade in the Nile crocodile (*Crocodylus niloticus*). The CITES Management Authority for Madagascar has taken measures in order to fulfil the recommendations. These activities include the regularization and survey of the artisans. The crocodile industry includes a multitude of actors, but neither the volume of their activities nor the types have been estimated.

Consequently, a campaign for declarations of interest was undertaken through the media in 2010, after which the Management Authority, with assistance from the Scientific Authority for Malagasy

animals and teams of crocodile specialists, undertook verification on the ground of the stocks declared by each actor.

Objective

The objective of the present project is to improve the crocodile industry in Madagascar in order to establish a system of transparent management in conformity with CITES, while complying with the priority actions agreed by the Standing Committee and its Working Group (France, Germany, Japan, Madagascar, the United States, the Secretariat, the IUCN/CSG and representatives of the Japanese leather industry).

Tasks

- ➢ Updating by the Directorate-General for Forests/Management Authority of the data on activities in the crocodile industry
- Repeat verification of the survey of all the actors in the industry:
  - ✓ on the basis of the list of the artisans registered with the Management Authority/General Directorate for Forests, repeat the survey of all the articles derived from crocodiles skins for each person declaring, at the points of sale, in the tanning facilities, and in the leather-goods making facilities in Antananarivo and its immediate environs as well as in the major regional centres (Tamatave, Mahajanga);
  - ✓ repeat verification of the stock register for each artisan;
- Updating of the database and recording of all the articles;
- Performance of regular and random inspections.
- ➢ Approval of all the actors;
- ➢ Establishment of a system allowing for monitoring of the exploitation and the traceability of ranch-sourced products;
- Creation of tools for tracing crocodile-derived products including:
  - ✓ a study on the feasibility of internal tagging and scute-clipping on hatchlings;
  - ✓ implementation of the traceability system;
- ➢ Recording of the actors in the industry in a Microsoft Office Access database;
- Consolidation of other electronic data on the crocodile industry in databases;
- Ensuring that these databases are interactive and interlinked.

Expected outcomes

- Exhaustive list of the approved actors in the industry;
- All the products on the market in conformity with established standards;
- Any illicit products destroyed and offenders prosecuted.

3- ACTIVITY C: Updating of the legislation covering crocodiles

Context

There is currently a recommendation from the Standing Committee that trade in products derived from crocodiles (*Crocodylus niloticus*) be suspended, despite the contributions it makes in terms of income to the actors in the industry and to Madagascar itself in foreign currency coming from exports. The recommendations of the Standing Committee demonstrate the necessity of rebuilding the crocodile industry on a sound basis, an undertaking that Madagascar is currently pursuing (through regularization of the artisans and other small-scale actors). The goal is to ensure that the trade should be legal, sustainable and traceable. Madagascar would then be able to give

consideration to certain activities that would assist in meeting the requirements of the Standing Committee and cancelling the recommendation for suspension of the trade.

Objective

The objective of the present project is to improve the crocodile industry in Madagascar in order to establish a system of transparent management in conformity with CITES, while complying with the priority actions agreed by the Standing Committee and its Working Group (France, Germany, Japan, Madagascar, the United States, the Secretariat, the IUCN/CSG and representatives of the Japanese leather industry).

Tasks

Preparation of an inventory of the current legal instruments pertaining to crocodiles, and of how these legal provisions are implemented on the ground:

- Collection of data, assembling of instruments, analysis of shortcomings;
- Study and evaluation of the implementation on the ground and application in practice of the legal provisions;
- Juridical support for the prosecution of offenders;
- Drafting and adoption of new legal instruments (for example including size limits for wild-caught specimens) and regulations.

Anticipated outcomes

Identification of all the relevant measures

- Laws, decrees, implementation notes;
- Licensing conditions for hunters, leather-goods makers and tanneries on the harvesting and utilization of and trade in specimens of C*rocodylus niloticus* on Madagascar, and legislation covering crocodiles, in place and in force.

Deliverables

At the end of the mandate, a report document on the activities undertaken will be drawn up with:

- Legislation covering crocodiles in place and in force by contrast with the situation currently prevailing;
- Schedule of requirements for all actors;
- Updating of legal instruments covering crocodiles.

4- ACTIVITY D: Creation of a platform with other Ministries (Directorate-General for Forests/Management Authority, Trade, Artisanal Industry, Interior, Law Enforcement)

Context

CITES has drawn up a list of priority actions for Madagascar to take in order to reopen the trade in the Nile crocodile (*Crocodylus niloticus*). The CITES Management Authority for Madagascar has taken measures in order to fulfil the recommendations. These activities include the regularization and survey of the artisans.

Consequently, a campaign for declarations of interest was undertaken through the media in 2010, after which the Management Authority, with assistance from the Scientific Authority for Malagasy

animals and teams of crocodile specialists, undertook verification on the ground of the stocks declared by each actor.

The crocodile industry affects several sectors, thereby requiring an organization that will give better management of the resource in the long term. Consequently, there should be discussion and cooperation among the different stakeholders.

Identification of an agreed system to be established for regularization of the situation of each artisan, in line with the requirements of each relevant ministry. The Ministry of Environment and Forests has primary responsibility for management of natural resources, but the crocodile industry relates to various ministries, each with corresponding important responsibilities, from recording of artisanal activities to granting of sales licences. The purpose of this agreement would be to enable and facilitate the administrative steps to be taken and to implement a more consistent system for tracking and monitoring the state of the industry.

Objective

The objective of the present project is to improve the crocodile industry in Madagascar in order to establish a system of transparent management in conformity with CITES, while complying with the priority actions agreed by the Standing Committee and its Working Group (France, Germany, Japan, Madagascar, the United States, the Secretariat, the IUCN/CSG and representatives of the Japanese leather industry).

In order to reach this objective, the granting of approval by the Directorate-General for Forests/Management Authority in conjunction with the requirements of the other ministries involved (Artisanal Industry, Trade) is of primary importance.

Tasks

Consideration and establishment of a Crocodile Commission in collaboration with the other ministries or reconstitution of the members of the existing crocodile committee within the Ministry of Environment and Forests, with participation by the other ministries:

- Organization of working meetings with those dealing with the crocodile industry within each ministry;
- Capacity-building in the agencies, directorates and ministries having to do with monitoring the crocodile industry (for example Customs) by training and by circulation of relevant information.

Expected outcomes

- Approval of all the actors in accordance with the requirements of each ministry concerned;
- Information on the crocodile industry available and circulated;
- Commission operational.

5- IMPLEMENTATION OF THE ACTION PLAN FOR THE MANAGEMENT OF *Crocodylus niloticus,* Tracking of ranching operations

1. CONTEXT

The policy of the Government with regard to trade in wild species provides for enhancement of biodiversity by professionals in order to guarantee the sustainable management of natural resources. The overall strategy is to assign the costs and the benefits of the crocodile industry to the various

actors in order to ensure that all of the ecological and economic values will continue to exist, in a context that is acceptable to the human population.

Madagascar's crocodiles were listed in CITES Annex II in the context of crocodile management based on the effective creation of breeding facilities devoted to the development of specimens either from eggs collected in the wild or from reproductive animals within the facility.

In April 2010, the Standing Committee decided to suspend Madagascar's foreign crocodile trade owing to the only-partial fulfilment of the recommendations made by the Working Group (France, Germany, Japan, Madagascar, the United States, the Secretariat and the IUCN Crocodile Specialist Group).

Since 2010, Madagascar has undertaken activities towards implementation of the Working Group's recommendations. In its report SC62 Com. 5., the Working Group took the view that the implementation of the recommendations was still largely insufficient. This applied inter alia to recommendation 3, on creation of a system for control of ranches. This recommendation is pursuant to document SC60 summary record with a monitoring system consisting of verifying the registers, comprising the following information:

- source of incoming stock (i.e. referenced authorization of each provider of eggs and source from which skins or hatchlings were obtained);
- date and place of slaughter;
- information relating to scute-clipping of hatchlings at the time of hatching, so that captive and ranched specimens can be identified;
- identification of skins according to their origin, that is captive-bred or ranched specimens (through internal tagging system);
- captive breeding (eggs and hatchlings produced); and
- if the ranch has a tannery, information on the skins that are processed and converted into products.

The Management Authority and the Scientific Authority for Animals received financial support from CITES in order to implement several activities in response to these recommendations. Completion of those activities is of capital importance for the Management Authority, as the Authority will then be able to transmit to the CITES Secretariat the state of progress of the implementation of the Strategy and Action Plan for Management of Crocodiles (2010 – 2015) and for the reopening of the industry to exports.

With regard to control of the ranches, currently two of them are still operational, Crocfarm and Crocoranching II.

2. OBJECTIVE

The objective is to monitor ranching activities within the context of the implementation of the Strategy and Action Plan for Management of Crocodiles, covering *Crocodylus niloticus**.***

The specific objectives are:

- To carry out a general survey of the ranch, its current situation and its stock level;
- To monitor activities;
- To request proposals for restarting activities related to breeding.

3. EXPECTED OUTCOMES

- Detailed awareness of the situation of the ranches;
- Possibility of restarting activities;

- Proposal on the new strategy of the Ministry of Environment and Forests: new schedule of requirements, approval, report, etc.

4. DELIVARABLE

Mission report including expert opinions on the visits to the facilities in terms of the objectives sought and the activities to be undertaken.

Annex III: Features and strategic elements of development of artisanal industry

1- Objective

Preparation of the basis for a strategy for developing artisanal industry, comprising the following main steps:

- Drawing up a strategic diagnosis of the artisanal sector in Madagascar;
- Identifying development strategies; and
- Defining a sustainable strategy.

2- Economics of the artisanal sector

Size of the artisanal industry in Madagascar

- 1,800,000 artisans
- 250,000 other workers (5 per cent of the working population)

Categories of work:

- Artisanal production (55 per cent)
- Artisanal services (33 per cent)
- Artisanal art (12 per cent)

Economic importance of the sector

- 15 to 20 per cent of national GDP
- 5 to 10 per cent of regional GDP (Indian Ocean)
- 12 per cent of artisanal products intended for export
- 12 per cent of exports sent to Europe

3- The market and its evolution

Target clients

- Tourists
- Malagasy collectors
- Foreigners (export)

Size of the market: 15 per cent of GDP

Distribution channels

- Direct sales to consumers: through salons, art galleries, displays, exhibition openings, fairs, etc.
- Sales to wholesalers
- Sales to retailers

Structure of the market : 5 market segments

- Tourists
- Gifts
- Boutiques and galleries
- Catalogue sales
- Internet sales

Special features of the market in the artisanal sector

4- Trends in design and production activities in the artisanal sector

Specialization and advanced skill training

- Resulting from more stringent demands from buyers;
- Management of a boutique in a tourist location: much more profitable than in a non-tourist one.

Economic and technological constraints

The craft of artisan is increasingly under economic and technical pressures, which have a considerable influence on their design and production work. This situation is the result in particular of the fact that the amount of capital needed to set up a workshop is much higher than before, when one includes investments in specialized equipment, marketing expenses and regular participation in trade shows.

This presents particular challenges. On the one hand a greater investment in specialized equipment is needed, and on the other, the greater investment needed in production results in an increased business risk for many artisans.

There is a need for greater investment in purchasing high-quality equipment required to allow economic production and top-quality materials.

Organization of work and role of the family enterprise

- Considerable reduction in operating costs and possible tax advantages for a family enterprise;
- Development of long-term capital: investment of time and money with no short-term return.

5- Commercial trends in the sector

- Need to export to regional markets;
- Improvement of product quality;
- Price distinction depending on the distribution channels;
- Price structure capable of appealing to middlemen;
- Payment terms and sales conditions;
- Promotion at the point of sale and marketing at trade shows;
- Management of inventory and “just in time” deliveries by wholesalers and retailers.

6- Performance of the artisanal sector

Situation of the sector

- Economically important sector;
- Not insignificant additional income;
- Essential in combating poverty, in particular in the rural sphere because the trade is pursued as a supplemental activity;
- Most developed sector in the region: less expensive raw materials and skilled and inexpensive labour force.

7- Development strategy for the artisanal sector

Creation of groupings to:

- Facilitate the development of creativity, design and innovation;
- Facilitate and render permanent the access of the artisans to resources (guide services);
- Promote professional categorization: “artisan, skilled worker, socially recognized”;
- Create a match between supply of artisanal skills and regional/national/international demand;
- Improve the knowledge of artisans in the technical sphere;
- Promote the formalization of the artisanal sector: training the trainers in the procedures for setting up an enterprise;
- Facilitate artisans’ access to information (ensuring an adequate and efficient database).

Sharing of functions to support artisans’ work

- Organization
  - Administrative organization
  - Accounting organization: financial planning
- Communication
  - Press relations to be in touch with developments
- Technical
  - Workshop and sharing services to lower expenses (cost of equipment, etc.)
- Marketing
  - Optimization of publicity photographic services to highlight the products
  - Creation of catalogues for launching products and for improved steering of client choices

Support, incentive and promotion activities for the artisanal sector (centred around marketing)

- Organization of shows, workshops on latest trends and exhibitions, competitions for inventiveness, best stand, best reception, etc.;
- Promotion and protection of the spirit of innovation and creation;
- Establishment of a purchasing cooperative for supplies;
- Establishment of a selling cooperative for distribution;
- Drafting of a financing policy to make the artisanal industry sustainable in the long term.

Annex IV: Decree instituting the regime for protection of the Nile crocodile in Madagascar

MINISTRY OF ENVIRONMENT AND FORESTS

Draft Decree instituting the regime for protection of the Nile crocodile in Madagascar and the conditions for trade in the species and in products derived from it

THE PRIME MINISTER, THE HEAD OF THE GOVERNMENT

Having regard to the Constitution;

Having regard to Act 2011-014 of 28 December incorporating into the domestic juridical framework the roadmap signed by the Malagasy political actors on 17 September 2011;

Having regard to Act 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora;

Having regard to Order 60-126 of 3 October 1960 establishing the regulations on hunting, fishing and the protection of fauna;

Having regard to Order 60-128 of 3 October 1960 establishing the procedure applicable to the prevention of offences against the legislation on forests, hunting, fishing and the protection of nature;

Having regard to Order 75-014 of 5 August 1975 ratifying the Convention on International Trade in Endangered Species of Wild Fauna and Flora;

Having regard to Decree 2006-097 of 31 January 2006 setting the procedures for implementation of the law on international trade in species of wild fauna and flora;

Having regard to Decree 2006-400 of 13 June 2006 classifying species of wild fauna;

Having regard to Decree 2010-647 of 6 July 2010 establishing the remit of the Ministry of Environment and Forests and the general organization of that Ministry;

Having regard to Decree 2011-653 of 28 October 2011 appointing the Prime Minister as Head of the Transitional Government of National Unity;

Having regard to Decree 2011-687 of 21 November 2011, modified by Decrees 2012-495 and 2012-496 of 13 April 2012, 2013-635 of 28 August 2013, 2013-662 and 2013-663 of 4 September 2013, appointing the members of the Transitional Government of National Unity;

On a proposal from the Minister for the Environment and Forests

Sitting in the Council of Government

Hereby decrees:

TITLE I

GENERAL PROVISIONS

SECTION I:

DEFINITIONS AND MEASURES FOR PROTECTION OF CROCODILIAN SPECIES

Article 1 – For the purposes of the present Decree, the following definitions apply:

Scientific Authority: The Authority having the role of issuing its opinion that export for commercial purposes does not jeopardize the survival of the species;

Hunter*:* Any person carrying out hunting of wild crocodiles, being allowed to pursue their trade in the localities stipulated by the zoning criteria and in observance of the standards on the size of skins authorized for sale;

Commercial hunting: The hunting carried out by any natural person or legal entity intending to deal in specimens derived from crocodiles;

Harvester: Any person, company and/or enterprise pursuing the trade of harvesting of skins and crocodile-derived products, in the localities stipulated by the zoning criteria and in observance of the standards on the size of skins authorized for sale;

Leather-goods maker: Any person, company or enterprise making crocodile-derived products, having a production facility and registered with the relevant sector Ministries;

CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora, ratified by Madagascar by virtue of Order 75-014 of 5 August 1975;

Farming: Breeding undertaken from eggs laid by reproductive animals present on the farm;

Captive breeding: Breeding of a species undertaken in a location that is intensively modified by mankind in order to have generations having no contact with specimens at liberty; such locality may include, this list not being exhaustive, enclosures, artificial shelters, disposal of wastes, provision of care, a system for protection against predators and feeding;

Ranching: Breeding undertaken from wild-harvested specimens (eggs or young crocodiles);

Management Authority: National administrative authority having the role of demonstrating that a specimen has not been obtained in contravention of the legislation in force on fauna and flora in Madagascar before issuance of an export licence, and that the export authorization is in conformity with the opinion of the Scientific Authority;

Specimen: Any part or product obtained from the animal that is easily identifiable;

Tanner: Any person, company and/or enterprise having a tanning facility for the transformation of rawhide into tanned skins which can be used in the making of leather-goods articles;

Seller: Any person, company or and/enterprise offering for sale crocodile-derived articles, having one or more points of sale and registered with the relevant sector Ministries;

Article 2 - The present Decree establishes the general framework of the permanent and necessary general measures intended to protect the Nile crocodile with the objective of sustainable

management and economic utilization of the species in conformity with the national regulations in force on the protection of fauna.

It confirms observance of the international commitments undertaken by the Republic of Madagascar under CITES.

Article 3 - The Nile crocodile in Madagascar enjoys the status of a protected animal on Malagasy territory. Hunting, catching, egg-collecting, killing, captive breeding and export are permitted only with authorization from the Forestry Administration or the CITES Management Authority.

Article 4 – Only cases of legitimate defence eliminate the liability of a person that has killed a crocodile. The person must provide proof of legitimate defence of himself or herself or of help to a person endangered by the wild animal.

Article 5 - Killing of the species is authorized by the administration in charge of forest resources if crocodiles, with the situations being supported by evidence, constitute a danger or cause damage to personal property in accordance with the provisions of Order 60-126 of 3 October 1960.

Article 6 - In either of those two cases, the skins of the animals killed must be provided to the Forestry Administration or, if that is not possible, to the territorial administration in the form of the "Fokontany" which constitutes a basic administrative sub**d**ivision. Either recipient shall be required to issue an acknowledgement of receipt. The Ministry responsible for forests will determine by way of the relevant regulations the disposition and utilization of the skins in question.

Where the basic territorial administration is the recipient of the skins of the specimens killed, it will inform the closest Forestry Administration for the latter to make the provisions that are required in order to fulfil the stipulations of the preceding paragraph.

The same obligation applies to anyone finding the remains of a crocodile.

Article 7 – Furthermore, the slaughter of ranch or farm crocodiles must under all circumstances be attended by the competent authority of the Forestry Administration.

Article 8 – Non-observance of the provisions of the articles above constitutes a criminal offence and makes the offender liable to the penalties provided for by the relevant legislation.

TITLE II

SECTION I

COMMERCIAL HUNTING OR CAPTURE

Article 9 - Hunting or capture for commercial purposes requires an authorization issued by the Ministry in charge of forests.

An authorization for hunting will be valid for the hunting season, the opening and closing dates of which are set by a decree of the Ministry in charge of forests.

Article 10 – Non-observance of the administrative provisions contained in the authorization, such as exceeding the quota assigned or other cases observed will result in immediate cancellation of the authorization, with the holder not being entitled to seek any compensation from the administration, without prejudice to the possibility of prosecution.

Article 11 – However, with the aim of protecting the reproductive stock, the killing or capture of a crocodile exceeding the measurement between specimens of a minimum of 1 m and a maximum of 2.50 m in length, equivalent to a belly size between 20 and 50 cm and a back size between 27 and 70

cm at the third buttons, is strictly prohibited, even for persons in possession of an authorization for hunting or capture, and renders the offender liable to prosecution.

SECTION II

TRANSPORT PERMIT

Article 12 - Transportation of products must be accompanied by a pass indicating the number, places of origin and final destination of the products. It must be signed by the holder and marked and initialled by the department responsible for forests.

SECTION III

CHARGES AND FEES

Article 13 - The fee to be paid for a hunted or captured crocodile, for egg collection and for exporting will be set by regulation.

TITLE III

CONTROL SYSTEM FOR FARMING AND RANCHING

SECTION I

TECHNICAL STIPULATIONS

Article 14 – Any form of captive breeding must be in conformity with the technical conditions laid down in the standard schedules of requirements drawn up by the Management Authority, namely the Forestry Administration.

Article 15 – Any natural person or legal entity wishing to undertake crocodile farming or ranching must demonstrate, before receiving approval, the requisite technical capacity and have adequate financing, in the view of the Forestry Administration, for optimum operation of the breeding facilities.

Article 16 – In the case of farming, the authorization for egg collection or for collection of reproductive specimens will be issued only after installation of a technically appropriate infrastructure, as confirmed the Forestry Administration.

Article 17 – Breeders wishing to undertake artisanal crocodile breeding must be in conformity with the provision of articles 14 and 15. They may form themselves into an association and provide for the installation of infrastructure to avoid man-crocodile conflict.

Article 18 – Any breeding of crocodiles, once the criteria required for captive breeding have been met, must obtain an approval from the Management Authority, namely the Forestry Administration.

SECTION II

BREEDING

Article 19 – At each check by the Forestry Administration, ranchers must be able to provide the origin of the specimens coming from suppliers, recorded in a register set up for the purpose.

Article 20 – It is expressly forbidden for ranchers to harvest crocodiles in the wild.

SECTION III

TANNERIES

Article 21 – If the ranch has a tannery, the rancher must supply information on the skins processed and turned into products, by means of an internal tagging system.

The tannery must provide, upon any request from the Forestry Administration, all necessary proof that the products derived from crocodiles processed in the tannery do not come from specimens caught outside the ranch.

TITLE IV

MONITORING OF THE UTILIZATION OF AND TRADE IN CROCODILE-DERIVED PRODUCTS

SECTION I

ARTISANAL PRODUCTS

Article 22 – All actors operating in the sector of processing of or trade in crocodile-derived products must be in possession of licences, professional identification or other documents confirming their status, issued by the departments in charge of their particular sphere of activities before issue of the approval from the Forestry Administration.

The tanners and leather-goods makers are considered to be actors in the industry.

Article 23 – All actors, at each inspection by the Forestry Administration, must provide information on the suppliers of skins and other derived products, the date of sale and the identifying data on the purchaser.

Article 24 - The artisans will ensure that the skins and derived products in circulation on the national market are in accordance with the size limits in conformity with the provisions of article 11 of the present Decree, on pain of prosecution without prejudice to seizure and confiscation of the non-conforming products.

SECTION II

TAGGING SYSTEM

Article 25 - The procedures for tagging of handcrafted products and those originating from ranches shall be established by decree.

SECTION III

PRODUCTS OF COMMERCIAL HUNTING

Article 26 – Holders of authorizations for commercial hunting are required to set up an exploitation register marked and initialled by the Forestry Administration, which must be presented upon any demand from hunting control officers.

Article 27 – Any utilization of products resulting from hunting must be recorded in an exploitation register which any authorized officer of the Forestry Administration may verify while carrying out a check.

Article 28 – Pursuant to Resolution Conf. 13.7 on control in specimens that are personal effects or intended for domestic use, any individual may take as personal effects four specimens of crocodilian species per person for export without a CITES export permit.

Products intended for local sale may be exported in conformity with the preceding paragraph subject to the issue of an authorizing invoice by the seller, stamped for approval by the Forestry Administration.

SECTION IV

RIGHTS OF APPROVED BREEDERS

Article 29 – The approval issued by the Management Authority, namely the Forestry Administration, provided for in article 18 of the present Decree gives the holder the right to transport, hold, sell and export all the products from his or her breeding facility, except for wild animals.

Article 30 –In the case of exports, the products to be exported must be accompanied by the documents required by CITES such as the export permit, and must be correctly identified by a marking system including the country code, the year of export, the product number and the identifying mark of the operator. The quota assigned to each ranch is determined on the basis of its production capacity.

TITLE IV

DETERMINATION OF AND PENALTIES FOR OFFENCES

Article 31 – Authorized agents of the Forestry Administration, the Customs, the administrations covering trade, breeding and artisanal industry, Criminal Investigation officers and guards of protected areas are empowered to seek out and determine offences.

Article 32 – Infringements of the present Decree are determined and prosecuted in accordance with the provisions of Order 60-126 of 3 October 1960 establishing the regulations on hunting, fishing and the protection of fauna as well as those of Act 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora.

TRANSITIONAL AND FINAL PROVISIONS

Article 33 – Operators active in the sector, in particular those carrying out informal activities, are requested to make a declaration of existence to the Forestry Administration within a period of three months starting from the publication of the present Decree in order to regularize their situation. After that period, all activities undertaken illicitly will be subject to penalties in accordance with the legislation in force.

Article 34 – All procedures related to import, export and re-export under CITES continue to be in force.

Article 35 – The provisions contrary to the present Decree, in particular Decree 94-700 of 8 November 1994 regulating the management of the Nile crocodile in Madagascar are and remain repealed.

Article 36 - The Deputy Prime Minister responsible for Economy and Industry, **the** Minister for Environment and Forests, the Minister for Trade, the Minister for Breeding, the Minister for Finance, the Minister of the Interior, the Minister for Promotion of Artisanal Industry, the Minister for Domestic Security, the Minister of Transport and the Secretary of State at the national Gendarmerie are hereby made responsible, each of them in the spheres of concern to them, for the implementation of the present Decree, which will be published in the Official Gazette of the Republic.

Annex V: Ministerial decree approving the schedules of requirements

MINISTRY OF ENVIRONMENT AND FORESTS

Decree ---------- /2013 approving the schedules of requirements which lay down the general stipulations concerning the exploitation regime and the conditions for transformation of specimens of Malagasy crocodile and derived products

THE MINISTER FOR THE ENVIRONMENT AND FORESTS

Having regard to the Constitution;

Having regard to Act 2011-014 of 28 December incorporating into the domestic juridical framework the roadmap signed by the Malagasy political actors on 17 September 2011;

Having regard to Act 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora;

Having regard to Order 60-126 of 3 October 1960 establishing the regulations on hunting, fishing and the protection of fauna;

Having regard to Order 60-128 of 3 October 1960 establishing the procedure applicable to the prevention of offences against the legislation on forests, hunting, fishing and the protection of nature;

Having regard to Order 75-014 of 5 August 1975 ratifying the Convention on International Trade in Endangered Species of Wild Fauna and Flora;

Having regard to Decree 2006-097 of 31 January 2006 setting the procedures for implementation of the law on international trade in species of wild fauna and flora;

Having regard to Decree 2006-400 of 13 June 2006 classifying species of wild fauna;

Having regard to Decree 2010-647 of 6 July 2010 establishing the remit of the Ministry of Environment and Forests and the general organization of that Ministry;

Having regard to Decree 2011-653 of 28 October 2011 appointing the Prime Minister as Head of the Transitional Government of National Unity;

Having regard to Decree 2011-687 of 21 November 2011, modified by Decrees 2012-495 and 2012-496 of 13 April 2012, 2013-635 of 28 August 2013, 2013-662 and 2013-663 of 4 September 2013, appointing the members of the Transitional Government of National Unity;

Having regard to Decree …… of…….. establishing the protection regime for the Malagasy Nile crocodile and the conditions for selling specimens and derived products;

HEREBY DECREES

Article 1 – The conditions relating to the regime for exploitation and processing crocodile-derived products, as well as the technical stipulations to which harvesters and hunters, tanning facilities, leather-goods makers, sellers, exporters and breeders are subject, are specified in the schedules of requirements appended to the present decree.

Article 2 - Non-observance of the requirements and conditions listed in the schedule of requirements will result in suspension of exploitation.

Article 3 – To that end, the Forestry Administration orders that measures to achieve a state of conformity be completed within two months. If no measure directed towards rectifying the situation is undertaken by the operator and the actors operating in the sector by the end of the time-period allowed, the Administration may withdraw the permits and approvals granted and order the immediate closure of the establishment without prejudice to the application of the relevant legal provisions.

Article 4 – The present decree as well as the standard provisions of the schedule of requirements will be published in the Official Gazette of the Republic and communicated wherever necessary.

Done in Antananarivo, on …

Annex VI: Schedules of requirements for the actors in the industry

I- Schedule of requirements for operators in the crocodile industry

******

Harvester

******

TITLE I

General considerations

Article 1- For the purposes of the present schedule of requirements,

a harvester is considered to be any person pursuing the trade of harvesting skins and crocodile-derived products, in the potential zones and in observance of the standards on sellable size; and observing the following conditions:

Completion of training on the conditions for harvesting and transportation to the operator's facility.

TITLE II

Technical requirements

Article 2 – Any operator who is a holder of an authorization for commercial harvesting undertakes to fulfil the technical requirements specified in the authorization issued by the Directorate-General for Water and Forests.

Article 3 – The operator undertakes to observe:

The conditions for conservation of the products:

- Temperature;
- Ventilation;
- Humidity;
- Health conditions;
- Maintenance of hygiene in the space where the products are kept.

Article 4 - The harvester must be in possession of an incoming and outgoing register marked and initialled by the competent Forestry Administration, in line with the model below:

Incoming date	**Type of skin (back/belly)**	**Width (cm)**	**Supplier (name+address +contact)**	**Place of harvesting**	**Addressee (name+address +contact)**	**Outgoing date**	**Remarks**

The incoming entry will include the date of receipt of the skins, the type of skin, in other words whether the skin is cut from the belly or the back, the width of the skin in centimetres, the name of the supplier, i.e. the hunter, with notation of the place of harvesting.

The outgoing entry must show the name of the addressee with his precise address and his contact details, as well as the date of departure of the skins from the harvesters.

This register must be available at all times, kept up-to-date, and accessible to the officers responsible for tracking and control. The latter are required to make note of any observations at every visit.

Article 5 - The harvester undertakes to provide the greatest quantity of information possible on the place of hunting.

Article 6 - The harvester must submit an annual harvesting report to the Forestry Administration.

TITLE III

Administrative and legal requirements

Article 7 - The harvesting authorization will be valid for a period of one year, and renewable at the Directorate-General for Forests (DGF).

Article 8 - The authorizations do not permit under any circumstances the harvesting of live crocodiles, unless this is clearly stated in the document.

Article 9 - A quota is assigned to each harvester every year on the basis of scientific data. The harvester submits an application to the DGF to obtain permission for handling skins and/or products derived from wild crocodiles, stating the names of the hunters, the hunting sites, the number of specimens to be taken, in observance of the standards on size measurements provided for in article 11 of the Decree instituting the regime for protection of the Nile crocodile in Madagascar and the conditions for trade in the species and in products derived from it.

Article 10 - The operator undertakes to pay:

to the revenue office of the Directorate-General for Forests the fee relating to each product harvested;

a fixed amount of 40,000 ar per year for approval as a harvester in order to participate in crocodile-related activities in Madagascar.

Article 11 – The operator must be in possession of professional identification (NIF, Statistics) and in a regularized situation with respect to the supervisory Ministry.

Article 12 – He must pay commissions to the decentralized collective entities at the harvesting site.

Article 13 – Transportation of the specimens must be under a pass stamped and signed by the closest Department of Environment and Forests.

Article 14 - The destination of all the skins or derived products harvested must be the tanning facilities approved by the Administration in charge of forests.

Article 15 - The skins or crocodile-derived products determined to be illegal will be seized and confiscated, without prejudice to the possibility of criminal prosecution in accordance with the relevant legislation.

Article 16 – In the event of non-observance of the articles above, the harvesting authorization will be suspended, and the seriousness of the offence will be ascertained by the competent department.

Article 17 – The operator is required to conform to the regulations in force throughout the national territory.

II- Schedule of requirements for operators in the crocodile industry

******

Tanning facility or tannery

******

TITLE I

General considerations

Article 1- for the purposes of the present schedule of requirements,

a tannery is considered to be any facility for working skins, any company and/or enterprise for transformation of rawhide into tanned skins to obtain leather usable in the making of leather goods intended for sale.

TITLE II

Technical requirements

Article 2 - Any operator who is a holder of approval undertakes to fulfil the technical requirements specified in the authorization issued by the Directorate-General for Forests.

Article 5 - The rawhide intended for delivery to the tannery represents skins in accordance with the standards covering size measurements as provided for by article 11 of the Decree instituting the regime for protection of the Nile crocodile in Madagascar and the conditions for trade in the species and in products derived from it.

Article 6 – In order to ensure the traceability of the products, each skin entering the tanning facility must be tagged by the Forestry Administration, pursuant to a declaration by the operator. This non-rusting tag must still be with the product when it leaves the facility. Loss of the tag will make the operator liable for a penalty.

Article 7 - Each tanning facility must be in possession of an incoming and outgoing register marked and initialled by the competent Forestry Administration, in line with the model below:

Incoming date	**Tag number**	**Type of skin (rawhide)**	**Type of skin (back/belly)**	**Width (cm)**	**Name of supplier +address+contact**	**Addressee**	**Outgoing date**	**Remarks**

The incoming entry will include the date of receipt of the skins, the tag number, the size of each skin, the source of the skins with the name of the harvester who supplied the skins.

The outgoing entry will state the destination of the tanned skins (sale to another operator, local sale, etc.), the date of sale and the identification of the buyer.

Stock level: the stock of rawhide skins and tanned skins, with their respective measurements.

This register must be available at all times, kept up-to-date, and accessible to the officers responsible for tracking and control. The latter are required to make note of any observations at every visit.

Article 8 – Each tanning facility must submit an annual report to the Directorate-General for Forests/Management Authority to record its tanning activity and its stock.

Article 9 – In order to ensure ongoing monitoring of the facility, periodic and regular visits, and also random checks, will be made by officers of the Directorate-General for Forests/Management Authority, the service in charge of monitoring and the Scientific Authority.

TITLE III

Administrative and legal requirements

Article 11 - The operator undertakes to pay to the Directorate-General for Forests:

- an amount of 3,000 ar per tag placed on each skin
- a fixed amount of 40,000 ar per year for approval as a tanner in order to participate in crocodile-related activities in Madagascar.

Article 12- In accordance with the provisions of article 22 of Decree No. …, all artisans operating in the sector of processing or selling crocodile-derived products must be in possession of licences issued by the departments in charge of their respective sphere of activity before issuance of the approval by the Forestry Administration

Article 13 - The tanning facility must source its skins from approved harvesters.

Article 14 - The crocodile skin products determined to be illegal will be seized and confiscated, without prejudice to the possibility of criminal prosecution of the offender.

Article 15 - In the event of non-observance of the articles above, the approval will be suspended, and the seriousness of the offence will be ascertained by the competent department.

Article 16 - The operator is required to conform to the regulations in force throughout the national territory.

III- Schedule of requirements for the operators in the crocodile industry

******

Leather-goods maker/artisan

******

TITLE I

General considerations

Article 1- For the purpose of the present schedule of requirements,

a leather-goods maker/artisan is considered to be any person or company/enterprise turning tanned skins into finished crocodile products.

TITLE II

Technical requirements

Article 2 - Any operator who is a holder of approval undertakes to fulfil the technical requirements specified in the present schedule of requirements.

Article 3 - A leather-goods maker/artisan will have an artisanal leather-goods-making facility on Malagasy territory.

Article 4 - The articles made will come from skins that are in compliance with the standards regarding size measurements as provided for by article 11 of the Decree instituting the regime for protection of the Nile crocodile in Madagascar and the conditions for trade in the species and in products derived from it.

Article 5 – A leather-goods maker/artisan must be in possession of an incoming and outgoing register marked and initialled by the competent Forestry Administration, in line with the model below:

Incoming date	Tag number	Type (back/belly)	Width (cm)	Name of supplier +address+contact	Finished products	Addressee	Outgoing date	Remarks

The incoming entry will include the date of receipt of the skins, the type of skin (rawhide if coming from a harvester and tanned if coming from a tannery), the width, the tag number, the source of the skins with the name of the harvester and/or tannery that supplied the skins, the name and number of the finished products made from a skin.

The outgoing entry will state the destination of the articles made (export, sale to another operator, local sale, etc.), the date of sale, the size of each skin and the type of the articles sold.

The stock level is the stock of tanned skins with their respective measurements and the made-up articles.

This register must be available at all times, kept up-to-date, and accessible to the officers responsible for tracking and control. The latter are required to make note of any observations at every visit.

Article 6 - The leather-goods maker/artisan must submit an annual report to the Forestry Administration to record his activity and the state of his stock.

Article 7- The leather-goods making facility must retain the tag coming from the tanned skins after use, for recovery by the Forestry Administration. Loss of the tag makes the operator liable for a penalty.

Article 8 - In order to ensure ongoing monitoring of the facility, periodic and regular visits, and also random checks, will be made by officers of the Directorate-General for Forests/Management Authority, the service in charge of forest monitoring and the Scientific Authority.

TITLE III

Administrative and legal requirements

Article 9 – The leather-goods makers undertake to pay to the Directorate-General for Forests a fixed amount of 40,000 ar per year for approval as a leather-goods maker in order to participate in crocodile-related activities in Madagascar.

Article 10 - In accordance with the provisions of article 22 of Decree No. …, all artisans operating in the sector of processing or selling crocodile-derived products must be in possession of licences issued

by the departments in charge of their respective sphere of activity before issuance of the approval by the Forestry Administration.

Article 11 - The leather-goods-making facility shall source its tagged tanned skins from tanning facilities approved by the Forestry Administration

Article 12 – Any skins or crocodile-derived products determined to be illegal will be seized and confiscated, without prejudice to the possibility of criminal prosecution of the offender.

Article 13 - In the event of non-observance of the articles above, the approval will be suspended, and the seriousness of the offence will be ascertained by the competent department.

Article 14 - The operator is required to conform to the regulations in force throughout the national territory.

IV- Schedule of requirements for the operators in the crocodile industry

******

Seller

******

TITLE I

General considerations

Article 1- For the purpose of the present schedule of requirements,

a sales facility/seller is considered to be any person or company /enterprise selling crocodile-derived articles.

Article 2 - This schedule of requirements relates only to the local market.

TITLE II

Technical requirements

Article 3 - Any operator who is a holder of approval undertakes to fulfil the technical requirements specified in the present schedule of requirements.

Article 4 - The seller has a point of sale on Malagasy territory.

Article 5 - The crocodile articles represent the skins in accordance with the standards on size measurements as provided for in article 11 of the Decree instituting the regime for protection of the Nile crocodile in Madagascar and the conditions for trade in the species and in products derived from it.

Article 6 - Each article upon entry to the point of sale must be listed by means of a tagging system administered by the Forestry Administration, upon a declaration by the seller. The tag numbers of products sold shall be noted in the stock register. Loss of a tag makes the operator liable to a penalty.

Article 7 - Each point of sale must have a stock register marked and initialled by the Forestry Administration in line with the model below:

Incoming date	Tag number	Name of finished product	Name of leather-goods maker	Address of goods-making workshop	Outgoing date	Addressee (name+ address+contact)	Remarks

The incoming entry will contain information on the date of receipt of the finished products and the source of them, indicating the name of the leather-goods maker supplying the products and the tag number of each finished product.

The outgoing entry will list the tag number of the product sold, the destination of the articles sold (export, local sales, etc.) and the date of the sale.

The stock level is the stock of finished products at the point of sale

This register must be available at all times, kept up-to-date, and accessible to the officers responsible for tracking and control. The latter are required to make note of any observations at every visit.

Article 8 – Each seller must submit an annual activity report to the Forestry Administration to record his or her stock level.

Article 9 - In order to ensure ongoing monitoring of the facility, periodic and regular visits, and also random checks, will be made by officers of the Directorate-General for Forests/Management Authority, the service in charge of forest monitoring and the Scientific Authority.

TITLE III

Administrative and legal requirements

Article 10 – Pursuant to Resolution Conf. 13.7 on control in specimens that are personal effects or intended for domestic use, the approval allows its holder to sell four different crocodile articles per individual for export. The person may take them away without a CITES permit, but with an authorizing invoice issued by the Management Authority. Such authorizing invoice may not cover more than a maximum of four different articles.

Article 11 - The operator undertakes to pay:

- a fee of 2,000 ar per article to the revenue office of the Directorate-General for Forests for issue of the authorizing invoice;
- an amount of 500 ar per tag placed on each article;
- a lump sum of 40,000 ar per year relating to tracking of crocodile-related activities in Madagascar.

Article 12 - In accordance with the provisions of article 22 of Decree No. …, all artisans operating in the sector of processing or selling crocodile-derived products must be in possession of licences issued by the departments in charge of their respective sphere of activity before issuance of the approval by the Forestry Administration.

Article 13 - The seller shall source its finished products from leather-goods-making facilities approved by the Forestry Administration

Article 14 – Any crocodile-derived products determined to be illegal at the point of sale will be seized and confiscated, without prejudice to the possibility of criminal prosecution of the offender.

Article 15 - In the event of non-observance of the provisions of the preceding article, the approval will be suspended, and the seriousness of the offence will be ascertained by the competent department.

Article 14 - The operator is required to conform to the regulations in force throughout the national territory.

V- Schedule of requirements for the operators in the crocodile industry

******

Breeder

******

TITLE I

General considerations

Article 1- For the purposes of the present schedule of requirements:

- a breeder is considered to be any person or company/enterprise producing crocodile skins by means of breeding specimens in a closed facility allowing no contact with the crocodilian population in the wild and in observance of the conditions stipulated in the present schedule of requirements;
- an egg-collector is considered to be a person instructed by the breeder pursuant to authorization for egg-collecting in the current year, issued by the Forestry Administration. The collector must be familiar with the relevant collecting techniques in order to reduce to a minimum losses caused by handling;
- ranching is considered to be breeding of specimens from eggs taken from the wild;
- farming is considered to be breeding of animals from reproductive specimens kept in the facility.

TITLE II

Technical requirements

Article 2: Any breeder who is a holder of approval undertakes to fulfil the technical requirements specified in the present schedule of requirements.

Article 3: The breeder must maintain the following success rates:

- 60 per cent of success in incubation;
- 80 per cent of success in fattening specimens up to the size at which they may be slaughter, except under exceptional circumstances.

Article 4: The breeder must have the following infrastructure items:

- an incubator
- a nursery
- several pools for the different age groups or different size classes or an area adequate to the operating capacity
- pools for the reproductive specimens
- a slaughter unit

- a feed preparation room
- a skin preparation room
- a skin storage room.

Article 5: The breeder undertakes to ensure the technical conditions for breeding:

- water control system
- adequate heating system
- nurturing and hygiene.

Article 6: The breeder must engage a competent facility director cognizant with the techniques and all criteria for successful breeding, as well as subordinate employees, depending on the size of the facility's breeding stock.

Article 7 – The breeder must be in possession of an incoming and outgoing register marked and initialled by the competent Forestry Administration recording each stage of the breeding: incubation, nursery, growing pool, reproductive specimen pool, slaughter and skin storage, in line with the annexed models.

Each facility must record the metabolic rates of the specimens.

This register must be available at all times, kept up-to-date, and accessible to the officers responsible for tracking and control. The latter are required to make note of any observations at every visit.

Article 8 - In order to ensure ongoing monitoring of the facility, periodic and regular visits, and also random checks, will be made by officers of the Directorate-General for Forests/Management Authority, the service in charge of forest monitoring and the Scientific Authority.

TITLE III

Administrative and legal requirements

Article 9: The authorization for egg-collection will be valid for a period of one year, and renewable from the Directorate-General for Forests (DGF).

Article 10: Every live product or skin must be individually identified by a marking system (microchip, tag, clipping, etc.) that can be verified at any check.

Article 11: Slaughtering, authorized in advance by the Administration pursuant to a request from the breeder, must be attended. The skins coming from this operation will be tagged (national tag).

Article 12: The operator undertakes to pay:

an amount of 3,000 ar per tag placed on each skin (price may be revised depending on the supplier);

a lump sum of 100,000 ar per year relating to tracking of crocodile-related activities in Madagascar;

costs of the officers of the Administration for any visit other than those organized by the Administration itself.

Article 12: The operator may, if needed, locate the units of his breeding operation in different places. However, each unit must be approved by the Administration before being placed into operation. Transfers of live animals or products between these units must be authorized and carried out under a transport pass.

Article 13 - In the event of non-observance of the provisions of the preceding article, the approval will be suspended, and the seriousness of the offence will be ascertained by the competent department.

VI- Schedule of requirements for the operators in the crocodile industry

******

Exporter

******

TITLE I

General considerations

Article 1- For the purpose of the present schedule of requirements,

An exporter is considered to be any entity or company/enterprise active in the international trade in skins and/or crocodile-derived articles.

Article 2 – This schedule of requirements relates exclusively to the international market.

TITLE II

Technical requirements

Article 3 - Any operator who is a holder of approval undertakes to fulfil the technical requirements specified in the present schedule of requirements.

Article 4 - An exporter must have a storage facility for the products to be exported, located on Malagasy territory in order to facilitate verification

Article 5 - The crocodile articles represent the skins in accordance with the standards on size measurements as provided for in article 11 of the Decree instituting the regime for protection of the Nile crocodile in Madagascar and the conditions for trade in the species and in products derived from it. In the case of products derived from captive breeding, the traceability must be easily verifiable.

Article 6 - Each article or skin upon entry to the storage location must be listed by means of an international tagging system administered by the Forestry Administration, upon a declaration by the seller. The tag numbers of products sold shall be noted in the stock register.

Article 7 – All exporters must have a stock register marked and initialled by the Forestry Administration, in line with the model below:

Incoming date	**Tag number**	**Name of the finished product**	**Name of the leather-goods maker**	**Address of the leather-goods-making workshop**	**Outgoing date**	**Addressee (name+ address+contact)**	**Remarks**

The incoming entry will contain information on the date of receipt of the finished products and the sources thereof, indicating the name of the leather-goods maker supplying the products and the tag numbers of each finished product.

The outgoing entry will contain the tag number of the product sold, the destination of the articles sold (export, local sale, etc.) and the date of sale.

The stock level is the stock of finished products at the point of sale

This register must be available at all times, kept up-to-date, and accessible to the officers responsible for tracking and control. The latter are required to make note of any observations at every visit.

Article 8 - The exporter must submit a quarterly activity report to the Forestry Administration to record his or her stock level.

Article 9 - In order to ensure ongoing monitoring of the facility, periodic and regular visits, and also random checks, will be made by officers of the Directorate-General for Forests/Management Authority, the service in charge of forest monitoring and the Scientific Authority.

TITLE III

Administrative and legal requirements

Article 10 - The operator undertakes to pay:

- a fee of 4 per cent for products originating in the wild, 2 per cent for products originating from ranching and 1 per cent for products originating from farming;
- an amount equal to 2 per cent of the price FOB shown on the invoice as a contribution to the tracking of crocodile-related activities in Madagascar.

Article 11: All exporters undertake to import their own export tags in accordance with his yearly forecast. The tags must be lodged with the Forestry Administration

Article 12 - In accordance with the provisions of article 22 of Decree No. …, all operators exporting skins or crocodile-derived products must be in possession of licences issued by the departments in charge of their respective sphere of activity before issuance of the approval by the Forestry Administration.

Article 13 – The exporter shall source its finished products from leather-goods making facilities approved by the Forestry Administration.

Article 14: Exhibitors at international fairs must provide the traceability of the products to be exported.

Article 15 - Any crocodile-derived products determined to be illegal at the storage facility will be seized and confiscated, without prejudice to the possibility of criminal prosecution of the offender.

Article 16 - In the event of non-observance of the provisions of the preceding article, the approval will be suspended, and the seriousness of the offence will be ascertained by the competent department.

Article 17 - The operator is required to conform to the regulations in force throughout the national territory.

Annex VII: Minutes of meetings

MINUTES OF THE MEETING OF 27 SEPTEMBER WITH THE MINISTRY OF TRADE, DIRECTORATE FOR PROMOTION OF FOREIGN TRADE (DPEE)

LIST OF PARTICIPANTS

ZISY BERTHIN	DPEE
RANAIVO CHARLES FIRAVAHANA	DPEE
RASAMIZANAKA HENRI	DPEE
RAHERIJAONA EDDIE JOSEPH	DGF
RAKOTOZANANY ALAIN	SGFF
RAKOTOVAO J. CLARISSE	DPEE/SPDCS
RASOAHARINIVO A.	DPEE/SI
RAZANASETA JOSEPHINE	DRIIE/SCE
RASOLOFOMANANA ANJARASOA	DPEE/SI
RABARY DIERA HARIVOLA	DPEE/SI
HENINTSOA HERVE	DPEE
RABESIHANAKA SAHONDRA	SGFF/DGF
ROBSOMANITRANDRASANA ERIC	SGFF/DGF
RAFENOMANANA FELANA	SA ANIMALS
ANDRIANJARATINA RAKOTOSON LIVANIAINA	SA ANIMALS
RAVAOARIMALALA ATTALE	SP CITES ANIMALS

MINUTES

The meeting started with a brief introduction of the members present.

Then the Director of the DPEE briefly explained the decision anticipated at the end of the meeting.

The Head of the SGFF department introduced the objective of the meeting.

With a view to obtaining clarity around the crocodile industry, the Directorate-General for Forests observed that the industry also concerned other departments. That was the reason for organizing this meeting.

Then there was a slide presentation on the history of the crocodile industry up to its present situation.

- **HISTORY**

Madagascar had signed the CITES Convention in 1975. Crocodile were listed in Annex I. Then they were transferred from Annex I to Annex II after the Conference of the Parties (CoP) in 1981, subject to the condition that breeding facilities be created. Subsequently, four facilities were approved but at the present time only two remained.

Madagascar had had an export quota for wild skins until 2009, and a quota of 3,500 for finished products.

The problem observed among the breeders was the laundering of skins and the lack of regulation of the actors in the crocodile industry. CITES had sent lists of priority actions to be carried out but in the light of the crisis in Madagascar since 2009, the Ministry did not have the resources to do so. The moratorium had been imposed from 2010 to the present day.

Since the moratorium, Madagascar had made a call for declarations of interest in order to survey all the actors working in the crocodile industry with the objective of regularizing them and eliminating all the actors in informal sectors. The actors surveyed had declared the stocks that they held. The survey was continuing through the present year, 2013.

In 2011, a representative of CITES from Geneva had arrived in Madagascar to examine in detail the situation of the industry and the efforts made so far. This representative had reported that Madagascar could benefit from financial support in order to carry out studies on species that could be offered for sale, including crocodiles.

Madagascar had sent an annual report to CITES in 2012, and the moratorium was still in force, with recommendations being made on the priority actions to be completed.

The Directorate-General for Forests (DGF) had already approached the Ministries for Promotion of Artisanal Industry and of Trade to examine the interministerial provisions to be set up in order properly to manage the crocodile industry.

In 2013, Madagascar had sent a delegation to attend CoP16 in Thailand, but the moratorium was still in place. CITES would not issue any more recommendations but would wait for completion of the suggestions already made. In the view of CITES, Madagascar had made progress but this was not yet satisfactory. A project on crocodiles had been signed and raising of the moratorium depended on the implementation of that project.

- **OUTCOMES**

Various types of actors in the industry had been surveyed: hunters, harvesters, tanners, leather-goods makers and sellers. There were interconnections among the actors.

Crocodile-derived products (skins and finished products) had also been counted.

The new strategies envisaged by the Ministry of Environment and Forests were presented:

- Regularization of the actors identified and distribution of the schedules of requirements relevant to their activity
- Updating of the legal texts on crocodile management
- Categorization of the activities of the artisans formally identified, by the final destination of the products (local market or export)
- Distinction between export authorizations depending on the categories of activities (authorizing invoice for the four articles on the local market or CITES permit for exports of skins and finished products originating from ranches and wild products)
- Request for a quota for the finished products, taking into consideration the data on harvesting and also on the state of the wild population

After the presentation, there was an open discussion.

With regard to the quota of 3,500 finished products, operators exported products in bulk on the occasion of the international fair approved by the Ministry of Trade.

The Ministry of Trade had an instrument governing exports and imports and also a ministerial note on the consideration of samples of the products at international fairs. It also issued an expert authorization in order to support the operators.

Each Ministry had instruments and notes concerning export products.

DECISIONS TAKEN

- A restricted committee should be set up, comprising one representative of each Ministry having to do with the crocodile industry. This committee would have the task of inventorying the legal and regulatory instruments in force within each Ministry. The instruments would have to be centralized at a focal point for processing and standardizing.
- The Ministry of Trade could give support to the setting up of a platform for the crocodile industry as had already been done for the vanilla industry.
- Mr. Henri RASAMIZANAKA was appointed to be a member of the restricted committee.

MINUTES OF THE MEETING OF 30 SEPTEMBER WITH THE MINISTRY FOR PROMOTION OF ARTISANAL INDUSTRY (MPA)

LIST OF PARTICIPANTS

RAZAFINIRINA CHARLINE	MPA
RAZAFIMAHATRATRA EMILE	MPA
ANDRIAMAHARISOA GASISOA MIHARY	MPA
RABESIHANAKA SAHONDRA	SGFF/DGF
ROBSOMANITRANDRASANA ERIC	SGFF/DGF
RAFENOMANANA FELANA	SA ANIMALS
RAHERIJAONA EDDIE JOSEPH	DGF
RAKOTOZANANY ALAIN	SGFF
ANDRIANJARATINA RAKOTOSON LIVANIAINA	AS ANIMALS
RAVAOARIMALALA ATTALE	SP CITES ANIMALS

MINUTES

The Director for Promotion of Artisanal Industry briefly described the meetings already held between the two Ministries.

The Head of the SGFF department briefly introduced the objective of the meeting. With a view to obtaining clarity around the crocodile industry, the Directorate-General for Forests observed that the industry also concerned other departments. That was the reason for organizing this meeting.

Then there was a slide presentation on the history of the crocodile industry up to its present situation.

- **HISTORY**

Madagascar had signed the CITES Convention in 1975. Crocodile were listed in Annex I. Then they were transferred from Annex I to Annex II after the Conference of the Parties (CoP) in 1981, subject to the condition that breeding facilities be created. Subsequently, four facilities were approved but at the present time only two remained.

Madagascar had had an export quota for wild skins until 2009, and a quota of 3,500 for finished products.

The problem observed among the breeders was the laundering of skins and the lack of regulation of the actors in the crocodile industry. CITES had sent lists of priority actions to be carried out but in the light of the crisis in Madagascar since 2009, the Ministry did not have the resources to do so. The moratorium had been imposed from 2010 to the present day.

Since the moratorium, Madagascar had made a call for declarations of interest in order to survey all the actors working in the crocodile industry with the objective of regularizing them and eliminating all the actors in informal sectors. The actors surveyed had declared the stocks that they held. The survey was continuing through the present year, 2013.

In 2011, a representative of CITES from Geneva had arrived in Madagascar to examine in detail the situation of the industry and the efforts made so far. This representative had reported that Madagascar could benefit from financial support in order to carry out studies on species that could be offered for sale, including crocodiles.

Madagascar had sent an annual report to CITES in 2012, and the moratorium was still in force, with recommendations being made on the priority actions to be completed.

The Directorate-General for Forests (DGF) had already approached the Ministries for Promotion of Artisanal Industry and of Trade to examine the interministerial provisions to be set up in order properly to manage the crocodile industry.

In 2013, Madagascar had sent a delegation to attend CoP16 in Thailand, but the moratorium was still in place. CITES would not issue any more recommendations but would wait for completion of the suggestions already made. In the view of CITES, Madagascar had made progress but this was not yet satisfactory. A project on crocodiles had been signed and raising of the moratorium depended on the implementation of that project.

- **OUTCOMES**

Various types of actors in the industry had been surveyed: hunters, harvesters, tanners, leather-goods makers and sellers. There were interconnections among the actors.

The supply chain of the crocodile industry had been identified.

Rawhide skins are first obtained by fishermen, local communities or hunters, and are then passed to the harvesters. The skins are processed at the tanners. Then the leather-goods makers turn the skins into finished products which then arrive on the stalls of the sellers or at their export destination.

Crocodile-derived products (skins and finished products) had also been counted.

The new strategies envisaged by the Ministry of Environment and Forests were presented:

- Regularization of the actors identified and distribution of the schedules of requirements relevant to their activity
- Updating of the legal texts on crocodile management
- Categorization of the activities of the artisans formally identified, by the final destination of the products (local market or export)
- Distinction between export authorizations depending on the categories of activities (authorizing invoice for the four articles on the local market or CITES permit for exports of skins and finished products originating from ranches and wild products)
- Request for a quota for the finished products, taking into consideration the data on harvesting and also on the state of the wild population

After the presentation, there was an open discussion.

The Director for Promotion of Artisanal Industry explained the conditions required for someone to become an artisan from the Ministry's point of view.

A question was raised on what was really meant by "artisan". An artisan was someone who transformed a raw material.

The artisans, or rather the artisanal enterprises, in the case of the crocodile industry were the tanners and the leather-goods makers.

A book containing regulatory instruments dealing with the artisanal industry had been produced by the relevant Ministry.

The Ministry for Promotion of Artisanal Industry (MPA) suggested also that an export quota should be set for finished products derived from crocodile skins.

The establishment of a restricted committee had already been proposed by the MPA in order to examine in detail the specific points to be dealt with by the Ministries having to do with the crocodile industry.

The team from the Directorate-General for Forests requested cooperation with the MPA in order to obtain data on the history of artisanal industry and the artisans, as well as export data.

DECISIONS TAKEN

- According to the MPA, the condition required for someone to become an artisan is for them to obtain a professional identification issued by the Ministry following a visit to verify in detail the artisan's activity. The Ministry also requires artisans to belong to an economic interest group.

- After the meeting with the Ministry of Trade, a restricted committee was being set up and would comprise a representative of each Ministry having to do with the crocodile industry. This committee would have the task of inventorying the legal and regulatory instruments in force within each Ministry. The instruments would have to be centralized at a focal point for processing and standardizing.
- In the case of the Ministry for Promotion of Artisanal Industry, the Director and Ms. Razafinirina Charline are also members of the restricted committee.

MINUTES OF THE MEETING OF 23 OCTOBER 2013 FOR ADOPTION OF THE UPDATING OF THE NATIONAL LAW ON CROCODILES AND THE SCHEDULES OF REQUIREMENTS FOR THE ACTORS IN THE CROCODILE INDUSTRY

LIST OF PARTICIPANTS

RABEMANANTSOA JEAN CLAUDE	DGF
ANDRIAMANALINA ROGER LUC	DGF/DCAI
RABESIHANAKA SAHONDRA	DGF/SGFF
RASAMIZANAKA HENRI	MIN TRADE DPEE/SPE
ROBSOMANITRANDRASANA ERIC	SGFF/DGF
RAKOTONJANAHARY IFALIANA	MIN TRADE
RANDRIAMBAO PROSPER	ARTISAN
RASOLOFONIRINA CHRISTOPHE MICHEL	HUNTER/HARVESTER
DIBRA INTER-DEVELOPPEMENT	HUNTER
RATIARISON LYDIE	HUNTER
RANDRIANARISOA VOLATIANA SUZI	ARTISAN/SELLER
RANOROARISOA HARY VIVIANE	ARTISAN
RAVOLOLONTSOA IRENE	ARTISAN
PAYET DIDIER	ARTISAN
RAKOTONIRINA HERINJAKA JULIEN	ARTISAN
RAFANOMEZANTSOA HERILALAINA ROLAND	ARTISAN
RAZAIARISOA LEONTINE	ARTISAN
VOAHANGY NIRINA MALALA V.S.	ARTISAN
FARANIRINA NICOLE	ARTISAN
RASOLOARISOA HENRIETTE	ARTISAN
RANDRIAMALALA and IENNE ROLAND	ARTISAN
RAZAFIARIMANANA SAHOBIMALALA	SELLER
TANTELIMAMPIONONA LEA	SELLER
RAMAROSON ANDRY (Mme Rondro)	SELLER
RASAMIMANANA REMI	ARTISAN
RAKOTOMALALA JEROME	ARTISAN
RASOANJANAHARY FENOSOA	DPA (Directorate for Professionalization of Artisans)
ANDRIAMAHARISOA ROJO L.	DPA
NENERLALANDE LIKA	SE/DPA/MPA
RAKOTOMANOELINA MIREILE SYLVIE	ARTISAN
RAKOTONDRAIBE FARA LALAINA	ARTISAN/ SELLER
RAVAONIRINA EDOUARDINE	LEATHER-GOODS MAKER
RAHARINJAKA VINCENT	HARVESTER/TANNER MIANDRIVAZO
RANDRIANARISON RAMANANA	HARVESTER/TANNER
SIMONE ARNOUX	HUNTER
RAFIDY VOLOLONA	ARTISAN TANNER
BESSAGUET DANIEL	SERCA/SOBEK/CF
RAMANANTENASOA DOREL	LEATHER GOODS
RAHARINIVO SAHONDRA	LEATHER GOODS
RAHARINIRINA MAMINIAINA FANJASOA	ARTISAN
DJERRYH NOELINAUD ROBERT	DAA/SE/MPA
RAKOTOSOA HERINIAINA ODON	MPA/DAA

RASOARIMALALA BERNADETTE	ARTISAN
RALIMANANA ALINE	CROCORANCHING II
RAFENOMANANA FELANA	SCIENTIFIC TEAM
ANDRIANJARATINA R. LIVANIAINA	SCIENTIFIC TEAM
RAKOTOZANANY ALAIN	SGFF
RAVAOARIMALALA ATTALE	SP CITES FAUNE

MINUTES

Review of the situation in Madagascar since the moratorium in June 2010 and the various steps taken by Madagascar up to securing financial assistance at CoP16 in Bangkok in order to be able to carry out certain of the actions among the CITES recommendations.

AGENDA:

- Presentation of the draft law drawn up by a legal expert within the Directorate-General for Forests and approval of it, during the morning
- Presentation du schedule of requirements of each actor in the crocodile industry and approval thereof, in the afternoon

- **MORNING**

A presentation was given on the present situation concerning crocodiles in Madagascar since the moratorium, still in force today.

According to the content of document SC62 Com. 5, paragraph 5, Madagascar should develop a strict system of control for ranches and should quantify the existing retail outlets as well as establishing the procedures to be followed concerning illicit products and/or those not complying with established size limits.

Based on to the survey of the actors in the crocodile industry, a typology of actors had been drawn up: the hunter, the harvester, the tanner, the leather-goods maker and the seller, with the exact number of actors and the interlinkages among them.

ACTORS	NUMBER
HUNTER	8
HUNTER/HARVESTER	8
HUNTER/HARVESTER/LEATHER-GOODS MAKER	1
HUNTER/HARVESTER/LEATHER-GOODS MAKER/SELLER	1
HARVESTER	16
HARVESTER/TANNER	1
TANNER	2
TANNER/LEATHER-GOODS MAKER	2
TANNER/LEATHER-GOODS MAKER/SELLER	9
LEATHER-GOODS MAKER	44
LEATHER-GOODS MAKER/SELLER	19
SELLER	122

The sites visited during the different surveys were described:

Hunter/Harvester	Tanning facility	Leather-goods-making facility	Point of sale
Regions: - Boeny - Sofia - Sava - Vakinankaratra	- **Antananarivo:** Manarintsoa, Ambolokandrina, Alasora, Ambohijanahary,	- **Antananarivo** Alasora, Ambolokandrina, Manarintsoa, Ambodimita,	- **Antananarivo**: Craft village, Coum 67 ha, CENAM, Pochard, Andravoahangy, Antaninarenina,

- Menabe - Melaky	Ambohimanarina, Betongolo, Ambodimita, Androhibe - **Miandrivazo**	Androhibe, Andohalo, Ampahibe, Betongolo, Ambohimanarina	Andohalo, Betongolo, Tanjombato, Ankorondrano, Ivato - **Mahajanga** - **Toamasina** - **Antsiranana** - **Nosy Be**

The supply chain for skins is also known. The hunting is performed by hunters or fishermen or also by the local community. The product arrives at the harvester in the form of rawhide for supplying the tanning facilities who transform the rawhide into tanned skin. This will then be made into various articles at the leather-goods-making facilities and then displayed on the stalls of the sellers or prepared for export.

The main crocodile products of interest to CITES are eggs, skins and derived products.

The system for traceability of crocodile products is the tagging system, which has the objective of giving an individual reference for the skins and every article derived from them.

For the skins, the tag used is made of non-rusting aluminium and for the products derived from skins, the tag is made of cardboard.

According to the last survey of articles derived from crocodile skins in August 2013, 658 skins were tagged at the tanners and leather-goods makers, 79 of which have already been sold. With regard to articles derived from crocodile skins, 15,258 products were tagged, 271 of which have already been disposed of.

The new strategies envisaged by the Ministry of Environment and Forests comprised the updating of the laws and regulations on crocodile management in Madagascar, followed by regularization of all the actors in the industry with schedules of requirements for each of them.

The legal expert at the DGF then spoke to explain in detail the draft law on national crocodile management in Madagascar.

This law includes revision of the regulatory provisions on Malagasy crocodilian species:

- Strengthening of the normative and technical provisions for breeding;
- Strengthening of the provisions on control of ranches, farms and the artisanal branch;
- Utilization of products originating from commercial hunting;
- Monitoring of utilization and selling of crocodile-derived products;
- On detection of and penalties for offences: Order 60-126 and Act 2005-018;
- Transitional and final provisions.

The draft Decree was then presented in its entirety and discussed article by article. The Decree would institute the regime for protection of the Nile crocodile in Madagascar and the conditions under which specimens and derived products may be sold.

Following presentation of the draft Decree there was a question and answer session.

The representative of the Ministry of Trade, as the issuer of authorizations for the products of the operators to be exported, provided clarification on what was called a sample in the case of products destined for export, such as in the case of international fairs for market-prospecting purposes.

Clarification was then given concerning the authorizing invoice in the case of the 4 articles. By contrast, the fee related to the CITES permit was applied upon export of finished products, including in the case of a fair.

With regard to the way to obtain approval in the industry, the actors requested collaboration with the DGF on what had to be done before approval could be granted. Each actor had a role to play, from the hunter to the seller.

The way of determining the quota system on the basis of hunting was also discussed. It is obtained in line with the potential of the crocodile population.

There was then a discussion on the standard regarding specimens that could be hunted. Sometimes in the wild, belly or back width defined as the standard did not correspond to the approximation of the total length of the specimen.

- **AFTERNOON**

The session concentrated on the content of the schedule of requirements for each actor. For that purpose, group working is a very effective methodology. Two groups were formed: the first comprised the hunters, harvesters and tanners, with support from representatives of the Ministry for Promotion of Artisanal Industry, while the second comprised the leather-goods makers and sellers, supported by representatives of the Ministry for Promotion of Artisanal Industry and the Ministry of Trade. The content of the schedule of requirements was read and discussed article by article in order to make corrections and/or improvements.

DECISIONS TAKEN

- After various clarifications, the draft Decree was adopted at the end of the morning.
- After the discussions and corrections, the schedule of requirements for each actor was also adopted.
- The schedule of requirements for the exporters of crocodile-derived finished products would be presented and discussed subsequently.
- The meeting for the adoption of the law on crocodiles and the schedule of requirements of the actors in the crocodile industry was concluded.

MINUTES OF THE MEETING OF 13 NOVEMBER 2013 TO ADOPT THE SCHEDULES OF REQUIREMENTS FOR BREEDERS AND EXPORTERS IN THE CROCODILE INDUSTRY

LIST OF PARTICIPANTS

RABESIHANAKA SAHONDRA	DGF/SGFF
ROBSOMANITRANDRASANA ERIC	SGFF/DGF
BESSAGUET DANIEL	SERCA/SOBEK/CF
ANDRIANJARATINA R. LIVANIAINA	SA ANIMALS CROCO
RAFENOMANANA FELANA	SA ANIMALS CROCO
RAHERIJAONA EDDIE JOSEPH	SGFF
RAVAOARIMALALA ATTALE	SP CITES ANIMALS

MINUTES

Agenda: Presentation of the schedule of requirements for ranches and exporters

According to the content of document SC62 Com. 5, paragraph 5, Madagascar should develop a strict system of control for ranches and procedures to be followed concerning illicit products and/or those not complying with established size limits.

The session concentrated on the content of the schedule of requirements of the above two actors.

The schedule of requirements was discussed article by article and corrected on the basis of the discussion and suggestions.

DECISIONS TAKEN

The schedules of requirements for ranchers and exporters were adopted

MINUTES OF THE MEETING OF 14 NOVEMBER 2013 FOR THE PRESENTATION AND ADOPTION OF THE FINAL REPORT ON THE CROCODILE PROJECT FINANCED BY CITES

LIST OF PARTICIPANTS

RABESIHANAKA SAHONDRA	DGF/SGFF
ROBSOMANITRANDRASANA ERIC	SGFF/DGF
RAKOTONJANAHARY IFALIANA	MIN TRADE
ANDRIAMAHARISOA GASISOA M	DPA/MPA
RAKOTONDRAZAKA D. F.	DPA/MPA
RASOLOFONIRINA CHRISTOPHE MICHEL	HUNTER/HARVESTER
SELISON VOLOLONIRINA TATIANA	TRAINEE DGF
RAMAROSON ANDRY	SELLER
RAKOTONDRAIBE FARA LALAINA	ARTISAN/SELLER
RAVAONIRINA EDOUARDINE	LEATHER-GOODS MAKER
BESSAGUET DANIEL	SERCA/SOBEK/CF
RAFENOMANANA FELANA	SA ANIMALS CROCO
ANDRIANJARATINA R. LIVANIAINA	SA ANIMALS CROCO
RAHERIJAON EDDIE JOSEPH	DGF/DVRN
RANDRIANASOLO FREDDY	CROCORNMAD
RAVAOARIMALALA ATTALE	SP CITES FAUNE

MINUTES

After an opening address a brief review was given of the situation in Madagascar since the moratorium in June 2010 and the various steps taken by Madagascar up to securing financial assistance at CoP16 in Bangkok in order to be able to carry out certain of the actions among the CITES recommendations.

The agenda comprised the presentation and adoption of the final report on the work carried out.

The final report on all the work carried out was presented.

The four major activities were listed: Tracking of the wild population, study of the industry, drafting and updating of the existing legal and regulatory instruments and the establishment of an interministerial platform.

Activity A:

Adoption of the methodology to be followed to carry out surveys and to track wild crocodile populations:

- Diurnal surveys: observation of specimens, noting of traces of animal activities, survey of nests and egglaying sites, identification of human activities;
- Nocturnal surveys.

The objective of this activity was to verify the situation of the population in the light of the current exploitation.

Choice of sites to be studied:

- Four predetermined sites, of which three had already been inventoried in 1988 and 1997: Mitsinjo (Mahavavy), Mampikony (Tsinjomorona), Besalampy (Maningoza) and Ankavandra (Manambolo);
- Harvesting sites indicated by hunters: lakes and river of the Sava Region, Tsiribihina (already inventoried in 1988);
- Egg collection sites: Ankavandra and Antsalova.

The results obtained were:

- Specimens observed during diurnal studies;

- Footprints from which the presence and size of specimens could be determined;
- Estimate of a relative density after the nocturnal surveys of specimens on a clearly determined transect;
- Reports of incidents caused by crocodiles;
- Identification of hunters and harvesters;
- Estimations of potentials for skins;
- Potentials for nests;
- Persistence of beliefs concerning crocodiles;
- Abundance of the population not affected by hunting;
- Persistence of man-crocodile conflict;
- Destruction of non-collected eggs following the introduction of the moratorium, although hunting continued;
- Setting up of local committees for the management and tracking of the crocodile population and its exploitation.

Constraints encountered during the surveys and tracking:

- The period for studying was not identical with the period of activity of the animals (October-March);
- Some nocturnal surveys not performed and some sites not visited owing to considerations of insecurity;
- Sites not visited owing to constraints of a sociocultural kind.

Activity B

Based on to the survey of the actors in the crocodile industry, a typology of actors had been drawn up: the hunter, the harvester, the tanner, the leather-goods maker and the seller, with the exact number of actors.

The sites visited during the various surveys were as follows:

Hunter/Harvester	Tanning facility	Leather-goods making facility	Point of sale
Regions: - Boeny - Sofia - Sava - Vakinankaratra - Menabe - Melaky	- **Antananarivo:** Manarintsoa, Ambolokandrina, Alasora, Ambohijanahary, Ambohimanarina, Betongolo, Ambodimita, Androhibe - **Miandrivazo**	- **Antananarivo** Alasora, Ambolokandrina, Manarintsoa, Ambodimita, Androhibe, Andohalo, Ampahibe, Betongolo, Ambohimanarina	- **Antananarivo**: Craft village, Coum 67 ha, CENAM, Pochard, Andravoahangy, Antaninarenina, Andohalo, Betongolo, Tanjombato, Ankorondrano, Ivato - **Mahajanga** - **Toamasina** - **Antsiranana** - **Nosy Be**

The supply chain for skins is also known. The hunting is performed by hunters or fishermen or also by the local community. The product arrives at the harvester in the form of rawhide for supplying the tanning facilities who transform the rawhide into tanned skin. This will then be made into various articles at the leather-goods-making facilities and then displayed on the stalls of the sellers or prepared for export.

The reorganization of the market comprises:

- Regularization of the actors identified;
- Traceability of products using the tagging system (aluminium tags for the tanners and cardboard for the finished products at the points of sale);
- Verification of the tags on skins at the leather-goods makers;
- Establishment of product reference standards.

Categories	Types	Measurement (cm)	
		Min	Max

Skins	Belly	20	50
	Hornback	27	70
	Trophy	27	70
Articles	Stuffed	100	250
	Head	15	40
	Fore foot	3 2	10 8
	Hind foot	5 3	19 9
	Back scales	10	28
	Base of the tail	6	18

Survey of products derived from crocodile skins in August 2013

Products	Tagged	Sold
Skins	657	79
Finished products	15,258	271

These products are represented in different sizes on the market.

With regard to tracking of ranches:

- Currently two ranches remain (Crocfarm and Crocoranching II);
- In the case of Crocfarm, the Antananarivo site is devoted to farming and the subsidiary site in Maevatanana was closed after the moratorium;
- Crocoranching has not performed any egg-collecting since 2008;
- The monitoring system developed by the Administration comprises: attended slaughter followed by tagging, marking of the specimens by microchips and observing the growth curves of each specimen.

Activity C

- Installation of a more rigorous monitoring system covering sales of specimens;
- Installation of a traceability system;
- All the actors in possession of licences, professional identification confirming their status;
- Setting of legally binding sizes for the animals;
- Establishment of a regulatory framework covering man-crocodile conflict;

For the reorganization and regulation of the market, the activities of the formally identified artisans are categorized in accordance with the final destination of their products:

- Market for wild skins
  - Local market: sales at national level and four articles for tourists with authorizing invoice;
  - Export market;
    - An export quota for wild skins will be authorized for the approved breeding facilities
    - A quota for finished products
- Farm or ranch-sourced products depending on capacity

The authorizations for exports related to these activities are:

- Authorizing invoice for four articles maximum per person for taking out of the country, with a sign board on their stall indicating their activity;
- CITES permit for ranch-sourced products and wild-sourced products (rawhide and derived products) for the actors wishing to undertake exporting.

Activity D

The responsibility for management and tracking of the crocodile industry is shared:

Management of the species and activities is the responsibility of:

- The Ministry of Environment and Forests, responsible for management of wild resources, CITES;
- The Ministry for Promotion of Artisanal Industry, responsible for regularization, tracking and management of the actors working in the processing of artisanal products;
- The Ministry of Trade, responsible for tracking trade-related activities.

Monitoring in the crocodile industry is the responsibility of:

- The Customs, for checks at the frontiers;
- The Criminal Investigation Police for monitoring of the standards established;
- Law Enforcement for checks on transportation of skins and eggs along the main roads'

The strategies established for sustainable crocodile management in Madagascar are:

- In the policy context, a Strategy and Action Plan for Management of Crocodiles in Madagascar for 2010 – 2015 has already been drafted but needs to be updated in the light of the current situation
- Integration of the system of protected areas into the conservation of the species
- Suggestion of developing ranching close to the natural location in collaboration with the local community
- And the difficulties to be overcome are the lack of data, sociocultural and heritage challenges, environmental and economic challenges, as well as legal and administrative follow-up.

Implementation of these strategies will entail:

- A partnership approach and involvement of the local community in the tracking;
- The tracking and evaluation system should be operated at national level to give an overall assessment and at regional level to track the performance of the different activities;
- Strengthening of the surveillance, monitoring and tracking system;
- Involvement of civil society (as in the case of CMK, Loky Manambato, etc.);
- Information and Communication.

Each actor has a part to play in making the tracking activities sustainable.

Following the studies, tracking and evaluation performed by Madagascar, the country has the following quota proposals:

1. **Quota covering wild skins**
- **Wild skins** (to be distributed to the exporting breeding facilities)
  - ✓ Hunting resulting from man-crocodile conflict
  - ✓ Regulation of the wild population
- **Finished products derived from wild skins** (for export)
  - ✓ Finished product articles (to be examined following the result of the analysis of data on artisans)
  - ✓ Four articles for local sale
2. **Quota for ranched products depending on capacity**

After congratulations by the member of the national crocodile committee, the report was adopted.