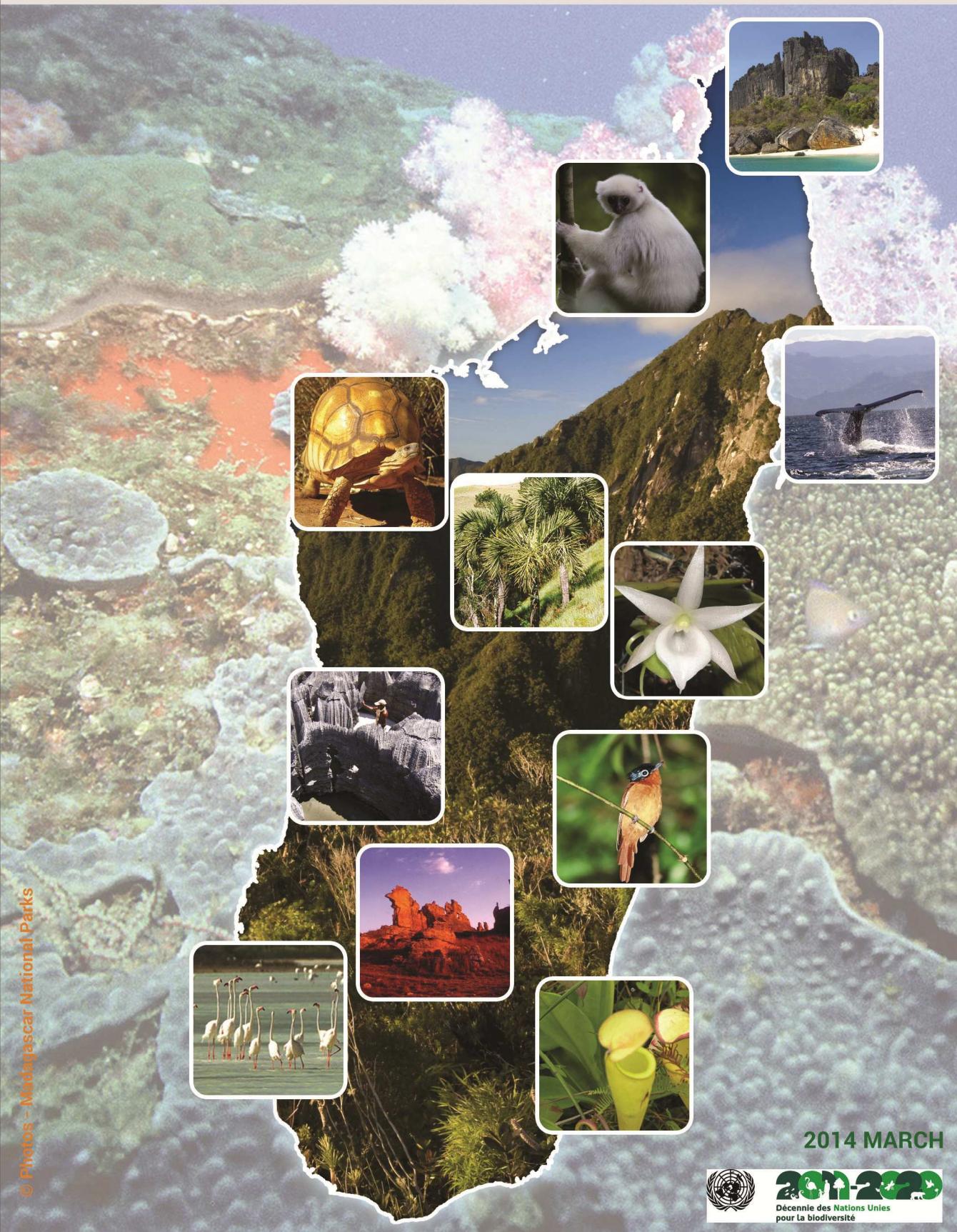




MINISTRY OF ENVIRONMENT AND FORESTS

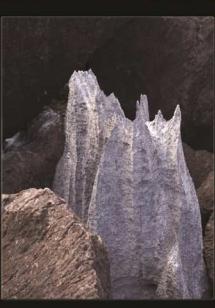


# FIFTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY **MADAGASCAR**



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2014 MARCH



MINISTRY OF ENVIRONMENT AND FORESTS



# FIFTH NATIONAL REPORT TO THE CONVENTION ON BIOLOGICAL DIVERSITY **MADAGASCAR**



2014 MARCH

## PREFACE

The 5<sup>th</sup> national report to the Convention on the biological diversity of Madagascar has a remarkably specific character following a context social, economic and political rather difficult to manage and persist that both during the implementation of its activities as the development of its content. But thanks to the good will to persevere all everyone involved closely or from afar, the report could still be developed and without having experienced various vicissitudes during the implementation of the activities set out.

We know that the development of the content of this report is the result of a collaboration of about 200 people resources working in the field of biodiversity at the national level and willing to give a good image of the country commitments to the Convention on biological diversity signed by our country in 1997.

We know that the various departmental sectors, institutions, associations, various NGOs, platforms and civil society itself are given hand to walk together towards the same direction, which is to give value to this unique heritage and yet in danger. Therefore, that collaboration should continue and be strengthened in the sense that the current national strategy update must also be the subject of concerted action of all stakeholders foregoing.

We know that this report is far from perfect, but at least it reflects the reality lived by the biodiversity conservation malagasy between 2010-2013 unfortunately coinciding to the crisis which persist during the after 2009. The malagasy nature known disturbances unparalleled and also innovations and successes. And it is this ambiguous situation that makes the particularity of the present report.

For illustration, we do quote here what an example on our commitment that is triple the size of our protected areas from 1 800 000ha to approximately 6 000 000d'ha. "Success Story" known mid-term has hindered by the breakdown otherwise the reduction of several funding. It was even noted a few cases of discontinuance of certain promoters in the pursuit of the race for the creation of protected areas; while others were still able somehow advance the process. But the race continues and we are at a stage of finalization asking for more that never a strong collaboration and support between the different sectors.

We thus trust that we will together meet the challenge of our biodiversity give the place it needs in **national planning** and of the **Fourth World Perspective on biological diversity**. We have thus participated to save what remains of biological diversity not only in our country but also of the entire planet Earth.



## ACKNOWLEDGMENTS

The evaluation of the implementation of the Madagascar Convention on Biological Diversity between the period 2010-2013 is transcribed in this fifth national report which saw a participatory approach unparalleled in the annals of the history of our biodiversity.

Many stakeholders are involved in the preparation of this report, including: the public sector (government departments and Universities of Madagascar); technical partners (NGOs, associations, national and international institutions involved in biodiversity conservation and scientific research); environmental and rural development projects; designated authorities and officials of international treaties related to biodiversity; Platforms and other civil society; private sector directly or indirectly related with environmental issues and financial partners (foundations, donors and implementing agencies).

Some two hundred people resources from different entities mentioned above, each according to his expertise and responsibilities helped us to provide relevant and valuable information. All these people have integrated different thematic working groups and sub-groups thereto established for this purpose and sharing their experiences and knowledge that helped develop and enrich this report.

Thus we cannot not express our gratitude and sincere thanks to all those who participated in any way in the preparation of this report. Respectively, therefore, our thoughts go out to : the National Project Coordinator who gave the necessary impetus to the start but had, for reasons of health, prematurely terminate its participation in the project; different groups and sub-groups led by the coordination team; government departments who helped us according to their respective areas; technical and financial partners without which this report would have been incomplete; DGF, DGE and technical departments of the MEF; agencies under the supervision of MEF that have always been with us in the design and finalization of the report; Focal Points of the various treaties and conventions involved in biodiversity; members of the Technical Committee restricts who worked continuously with the coordination team, DCB.SAP team; writing and translation team;... briefly, the great big family of the Biodiversity Conservation.

The National Focal Point CBD Madagascar



## EXECUTIVE SUMMARY

Madagascar possesses substantial wealth in biodiversity. This diversity is very important for the population's welfare, in the economic, socio-cultural, environmental and scientific fields. The biodiversity is part of a multitude of ecosystems variations, both terrestrial and aquatic. The forests, the agricultural fields, the grassy areas mark the terrestrial ecosystems; while the aquatic ecosystems are composed of wetlands, continental waters, and coastal and marine areas.

Madagascar is rich in flora and wildlife. Each origin is composed of different taxonomic groups with high interspecific diversity. Its high level of endemism, about 80%, also characterizes the wildlife and the flora of the Great Island. The various ecosystem types are home to a biologic complex of flora and fauna, sometimes very specific and diverse.

In this fifth national report, the agro-biodiversity, the fungi, and the microorganisms are much more developed than before, and the genetic resources are also included because of their importance in considering the intra-specific diversity.

The biodiversity is subjected to different threats which entail many negative impacts in its condition. This includes the irrational exploitation of resources such as the case of some precious wood species and the destruction of natural habitats in favor of other economic activities. Illicit collection and export of animal species, the most well-known are the tortoises and the sea turtles of Madagascar, the chameleons; lemur hunting is current threats in the protected areas and in other conservation sites. Real threats also exist due to the disturbance caused by climatic change and pollution, fires, land-use change, or implementation of infrastructures, and so forth... Such situation leads to biodiversity loss. This loss is particularly visible during the observation of ecosystems' physiognomic change.

Moreover, several initiatives are presently in-process: research projects, protected areas management projects, ex-situ conservations, conservation projects linked to local, regional, and national development.

As for the species, the situation is rather ambiguous because, on one hand, it seems that some cases of extinction have occurred, but on the other hand, new species are being discovered, among others, 117 ants, 41 species of frogs, 18 species of reptiles, 1 species of bird, 4 species of lemurs, 4 species of bats, and about 50 *Angiosperms* have been described from 2010 to 2014. In some groups, a large number of forms are now being described or are not named yet.

Many strategies of species conservation, but not all, are being implemented since 2010.

Still within the context of research activities, let's mention the extension of the International Training Center for biodiversity valorization. And presently, besides the facilities meant to hold its activities, it began in 2003 to build an air-conditioned laboratory, and later, it could have a conference room, a genetic laboratory, and a collection room.

93 Protected Areas in the V and VI of IUCN categories are newly created, one of which is in the Northeastern part of Madagascar (New Protected Area of Makira, WCS Madagascar) that received the definitive decree of protection. For categories I, II and IV, 4 of the Protected Areas of the Madagascar National Parks' network are definitively created. Altogether, the total areas of all categories make approximately 6.9 million ha. Almost all of them already have received their interdepartmental creation Decree and are about to obtain the definitive creation Decree.

The sustainable management of biodiversity begins to be integrated in the public sectors' planning according to their implication such as the implementation of the SAPM Commission, the steering committee of biodiversity projects (e.g. Biosecurity, Benefits Access and Sharing,) the steering committee on precious woods, the inter-

ministerial Committees (Mining-Forests, Hydrocarbons-Forests, Hydrocarbons-Fishing, Forests-Land Property,) and other Committees is given a new boost given the complexity of managing the biodiversity.

In addition, the ministerial sectors play an important role in integrating the environmental dimension within each department in the sector policies and in view of a sustainable development perspective.

Within the framework of its missions, a committee is responsible for environmental actions resulting from the Ministry's assignments. These missions consist among other things of watching over the technical, legal, and communication aspects. The needs of synergy especially concern the stacking of activities at the level of the protected areas being created or other natural habitats.

As far as natural resources governance and management are concerned, a voluntary involvement of the local communities is noticed. They are networking and creating some coalitions, hence the civil societies weigh considerably in the decision-making process.

In Madagascar, sustainable funding is not entirely ensured yet, considering the contextual evolution and the unceasing changes of the related financing mechanism, as well as the socio-economical instability. The system to monitor the financing implementation of development projects is really insufficient.

In the same way, the socio-political crisis which was rife during these last years has encouraged delinquency to the detriment of those who really want to abide by the laws and the regulations in force; and it was very difficult to get people to respect them. Several cases of illicit natural resources exploitations become uncontrollable, like gold or other precious ore rushes. But some cases of large mining exploitations that are concerned with environmental matters are noticed. But that doesn't exclude the existence of some investors who were popular in terms of biologic diversity destruction.

The ecosystem approach has facilitated the development of interventions inside and outside of the protected areas. Nevertheless, numerous strategies and action plans at the specific level (fauna and flora) could also generate some positive impacts on the biodiversity.

The clauses of the environment laws and the orientation, organization, animation, negotiation, and communication strategies offer privileged instruments allowing reaching the objectives of protected areas management. But at the same time, the "success story" at the beginning of the protected areas creation of increasing the areas threefold from the end of 2003 to 2012 unfortunately has undergone unpredictable constraints when most foreign funding were cut down or put in limbo. Presently, the afore-mentioned constraints seem to be resolved and, hopefully, the situation will shortly come back to normal again.

As for the marine environment, much is left to do in biodiversity conservation as well as in its biodiversity management. Indeed, it has a rather flagrant delay compared to the land environment, and this is due to the lack of specific legal framework.

In sum, during this period between 2010 and 2014, the history of Madagascar's biodiversity has undergone all sorts of incidents sometimes either worrying or quite promising.

## **RESUME EXECUTIF**

Madagascar dispose d'une grande richesse en matière de diversité biologique. Cette diversité est d'une importance capitale pour le bien être de la population, dans le domaine économique, socio-culturel, environnemental et scientifique. La diversité biologique est abritée par une multitude de variantes d'écosystèmes aussi bien terrestres qu'aquatiques. Les forêts, les champs agricoles, les zones herbeuses marquent les écosystèmes terrestres; tandis que les écosystèmes aquatiques sont composés des zones humides, des eaux continentales et des milieux côtiers et marins.

Madagascar est riche aussi bien en flore qu'en faune sauvage. Chaque règne est composé de différents groupes taxonomiques avec une diversité interspécifique élevée. Son important taux d'endémisme, d'environ 80%, caractérise également la faune et la flore de la Grande Ile. Ses différents types d'écosystèmes abritent un complexe biologique de flore et de faune, parfois très spécifique et varié.

Dans ce cinquième rapport national, l'agrobiodiversité, les champignons et les microorganismes ont été plus développés qu'auparavant et les ressources génétiques de par leur importance dans la considération de la diversité intra-spécifique ont aussi été intégrées.

La diversité biologique subit différentes menaces qui entraînent de nombreux impacts négatifs dans son état. Il s'agit notamment de l'exploitation irrationnelle des ressources telle que le cas de certaines espèces de bois précieux et la destruction des habitats naturels en faveur d'autres activités économiques. La collecte et l'exportation illicite des espèces animales, les plus remarquables sont les tortues terrestres et marines de Madagascar, les caméléons, la chasse des lémuriens sont des menaces très présentes dans les aires protégées et dans d'autres sites de conservation. Des menaces réelles existent également de par la perturbation causée par le changement climatique et la pollution, les feux, le changement d'utilisation des terres ou la mise en place d'infrastructures, etc. Ce qui entraîne indéniablement une perte dans la diversité biologique. Cette perte est surtout visible en observant le changement physionomique des écosystèmes.

Par ailleurs, beaucoup d'initiatives sont en cours actuellement, des projets de recherches, des projets concernant la gestion des aires protégées, les conservations ex-situ, des projets de conservation alliés avec le développement local, régional et national.

Quant aux espèces, la situation est plutôt ambiguë car d'un côté, quelques cas de constatation d'extinction sont supposés, mais de l'autre côté, l'on continue à découvrir de nouvelles espèces, entre autres, de 2010-2014, 117 fourmis, 41 espèces de grenouilles, 18 espèces de reptiles, 1 espèce d'oiseau, 4 espèces de lémuriens, 4 espèces de chauves-souris et une cinquantaine d'Angiospermes ont été décrites. Dans des groupes, nombreuses sont les formes qui sont en cours de description ou qui ne sont pas encore nommées.

Beaucoup de stratégies de conservation des espèces mais pas toutes sont actuellement en cours de mise en œuvre depuis 2010.

Toujours dans le cadre des activités de Recherches, on note également l'extension du Centre international de formation pour la valorisation de la biodiversité et actuellement outre ses logistiques pour l'accueil de ses activités a pu, après avoir commencé par un laboratoire climatisé en 2003, avoir une salle de conférence, un laboratoire de génétique et une salle de collection.

Le nombre d'Aires Protégées nouvellement créées des catégories V et VI de l'IUCN sont actuellement au nombre de 93 dont une au nord-est de Madagascar (Nouvelle Aire Protégée de Makira, WCS Madagascar) qui a obtenu le décret définitif de protection. Pour les catégories I, II et IV, 4 des Aires Protégées du réseau de Madagascar National Parks ont été créées définitivement. La superficie totale créée de toutes catégories confondues est

d'environ 6,9 millions d'ha. Presque toutes ont déjà obtenu leur Arrêté interministériel de création et sont en phase terminale pour l'obtention du Décret définitif de création.

La gestion durable de la biodiversité commence à être intégrée dans la planification des secteurs publics selon leur implication comme la mise en place de la Commission SAPM, Comité de pilotage des projets concernant la biodiversité (ex : Biosécurité, Accès et Partage des Avantages,), Comité de Pilotage sur les bois précieux, Comité interministériels (Mines-Forêts, Hydrocarbures-Forêts, Hydrocarbures-Pêches, Forêts-Foncier), d'autres Comités sont en cours de redynamisation vu la complexité de la gestion de la biodiversité.

Par ailleurs, les secteurs ministériels jouent un rôle majeur dans l'intégration de la dimension environnementale au sein de chaque département dans les politiques sectorielles et dans une optique de développement durable. Dans le cadre des missions qui lui sont dévolues, une cellule est responsable des actions environnementales résultant des attributions de son ministère. Ces missions consistent entre autres, à veiller aux aspects techniques, juridiques et de communication. Les besoins de synergie concernent surtout les superpositions d'activités au niveau des aires protégées en cours ou autres habitats naturels.

En ce qui concerne la gouvernance et la gestion des ressources naturelles, on note une participation volontaire des communautés locales. Ces dernières se lient en réseau, forment des coalitions d'où le poids considérable des sociétés civiles dans les prises de décision.

A Madagascar, la pérennisation financière n'est pas encore entièrement assurée vu l'évolution contextuelle et les changements incessants du mécanisme de financement y afférents ainsi que l'instabilité socio-économique. L'insuffisance de dispositif de suivi des mises en œuvre des financements de projets de développement est notamment ressentie.

De même, la crise socio-politique qui sévissait ces dernières années favorise la délinquance au détriment de ceux qui veulent bien suivre les lois et règlementations en vigueur, et il s'avérait très difficile de les faire respecter. Plusieurs cas d'exploitations illicites des ressources naturelles deviennent non maîtrisables, à l'exemple de ruées vers l'or ou autre minerai précieux. Mais on a pu noter quelques cas de grandes exploitations minières soucieux des questions environnementales. Ce qui n'exclut pas non plus l'existence de quelques cas d'investisseurs qui ont fait parler d'eux en termes de destruction de la diversité biologique.

L'approche écosystémique a facilité la mise au point des interventions tant à l'intérieur qu'à l'extérieur des Aires Protégées. Néanmoins, de nombreuses stratégies et plans d'action au niveau spécifique (faune et flore) ont pu aussi engendrer certains impacts positifs sur la diversité biologique.

Les dispositions des lois sur l'Environnement et des stratégies d'orientation, d'organisation, d'animation, de négociation et de communication, offrent des instruments privilégiés en faveur de la réalisation des objectifs en matière de gestion des Aires protégées. Mais en même temps le « success story » du début de la création des aires protégées pour l'atteinte du triplement de leur surface de fin 2003 à 2012 a malheureusement connu des contraintes imprévisibles quant à la rupture de la plupart des financements extérieurs ou leur mise en veilleuse. Actuellement, lesdites contraintes semblent commencer à être levées et on espère d'ici peu à un retour à une situation normale.

En ce qui concerne le domaine marin, il reste beaucoup à faire tant du point de vue conservation que gestion de sa biodiversité. En effet, on connaît un retard assez flagrant par rapport au domaine terrestre et ce, du fait surtout de l'insuffisance de cadre juridique spécifique.

Enfin, durant cette période entre 2010 et 2014, l'histoire de la biodiversité de Madagascar a connu des péripéties tantôt inquiétantes et tantôt assez prometteuses.

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## ACRONYMES

<b>ABETOL</b>	: Aménagement en Bois Énergie de la ville de ToLiary
<b>ABV</b>	: Approche Bassins Versants
<b>ACP</b>	: Groupe des Etats d'Afrique, des Caraïbes et du Pacifique
<b>ACR</b>	: American Carbon Registry
<b>ADEMA</b>	: Aéroport de Madagascar
<b>ADES</b>	: Adesolaire Association pour le Développement de l'Energie Solaire
<b>ADN</b>	: acide désoxyribonucléique
<b>ADT</b>	: Analyse Diagnostique Transfrontalière
<b>AFD</b>	: Agence Française de Développement
<b>AfOA- OI</b>	: Afrique Orientale et Australe et de l'Océan Indien
<b>AGR</b>	: Activités Génératrices de Revenus
<b>AMESD/COI</b>	: African Monitoring Environment Sustainable Development / Commission Ocean Indian
<b>AMPs</b>	: Aires Marine Protégées
<b>ANAE</b>	: Association Nationale des Actions Environnementales
<b>ANCESM</b>	: Association Nationale du Commerce Equitable et Solidaire de Madagascar
<b>AND</b>	: Autorité Nationale Désignée
<b>ANEDD</b>	: Action Nationale pour l'Education au Développement Durable
<b>ANCESM</b>	: Association Nationale du Commerce Equitable et Solidaire de Madagascar
<b>ANGAP</b>	: Association Nationale pour la Gestion des Aires Protégées
<b>AP</b>	: Aires Protégées
<b>APA</b>	: Accès aux ressources et Partage des Avantages découlant de leurs utilisations
<b>APVNSE</b>	: Appui à la Production et à la Vulgarisation de Nouveaux Supports Energétiques
<b>ARPEGE</b>	: Appui Régional à la Promotion d'une Education pour la Gestion de l'Environnement
<b>ARSIE</b>	: Association du Réseau des Systèmes d'Information Environnementale
<b>ASCLME</b>	: Projet Grands Ecosystèmes Marins des Courants d'Agulhas et de Somalie
<b>ASEB</b>	: Analyse Situationnelle et Estimation des Besoins en Santé et Environnement
<b>ASGIPC</b>	: Approche Stratégiques de la Gestion Internationale des Produits Chimiques
<b>ATT</b>	: Accord Type de Transfert de Matériels
<b>AVG</b>	: Alliance Voahary Gasy
<b>BAP</b>	: Plan d'Action pour la Biodiversité
<b>BBOP</b>	: Business and Biodiversity Offset Program/ Programme de compensation de la Biodiversité
<b>BGCI</b>	: Botanic Gardens Conservation International
<b>BV</b>	: Bassint Versant
<b>BVPI</b>	: Bassins Versants et Périmètres Irrigués
<b>CA</b>	: Capitalisation des Acquis
<b>CAZ</b>	: Corridor Ankeniheny Zahamena
<b>CCC</b>	: Convention sur le Changement Climatique
<b>CCE</b>	: Cahier des Charges Environnementales
<b>CCEE</b>	: Centre Culturel d'Éducation en Environnement
<b>CDB</b>	: Convention sur la Diversité Biologique
<b>CDD</b>	: Commission du Développement Durable

<b>CEPF</b>	: Critical Ecosystem Partnership Fund
<b>CEPRB</b>	: Centre d'Echange sur la Prévention des Risques Biotechnologiques
<b>CER</b>	: Cellules Environnementales Régionales
<b>CES</b>	: Commerce Equitable et Solidaire
<b>CGD</b>	: Contribution à la Gestion Durable
<b>CHEF</b>	: Commission Hydrocarbure – Environnement – Forêt
<b>CHM</b>	: Clearing House Mechanism / Centre d'échanges en biodiversité
<b>CI</b>	: Conservation International
<b>CIACESM</b>	: Comité Interministériel d'Appui au Commerce Equitable et Solidaire de Madagascar
<b>CIDST</b>	: Centre d'Information et de Documentation Scientifique et Technique
<b>CIFF</b>	: Comité Interministériel Forêt - Foncier
<b>CILDH</b>	: Conventions internationales sur la lutte contre les déversements des hydrocarbures en mer
<b>CIMF</b>	: Commission Interministériel Mines – Forêts
<b>CITES</b>	: Convention sur le commerce international des espèces de faune et de flore sauvages menacées d'extinction
<b>CLD</b>	: Convention sur la lutte contre la Désertification
<b>CLP</b>	: Comités locaux de Protection
<b>CMK</b>	: Complexe Mahavavy Kinkony
<b>CNARP</b>	: Centre National d'Application de Recherche Pharmaceutique
<b>CNRE</b>	: Centre National de Recherche sur l'Environnement
<b>CNRIT</b>	: Centre National de Recherche Industrielle et Technologique
<b>CNRO</b>	: Centre National de Recherches Océanographiques
<b>COAP</b>	: Code des Aires Protégées
<b>COBA</b>	: Communauté Locale de Base
<b>COFAV</b>	: Corridor Forestier Fandriana Vondrozo
<b>COI</b>	: Comité de l'Océan Indien
<b>COMESA</b>	: Common Market for Eastern and Southern Africa
<b>COP</b>	: Conférence of Parties
<b>CPAI</b>	: Charte pour la Promotion de l'Accès à l'Information
<b>CR</b>	: Danger Critique
<b>CRAT</b>	: Centre de référence sur les agents tératogènes
<b>CSER</b>	: Comité du Suivi Environnemental Régional
<b>CSI</b>	: Comité de Sauvegarde de l'Intégrité
<b>CSP</b>	: Centre de Surveillance des Pêches
<b>CTD</b>	: Collectivités Territoriales décentralisées
<b>CTE</b>	: Comité Technique d'Evaluation
<b>CWR</b>	: Crops Wild Relatives
<b>DDT</b>	: DichloroDiphénylTrichloroéthane
<b>DBEV</b>	: Département Biologie et Ecologie Végétale
<b>DCBSAP</b>	: Direction de la Conservation de la Biodiversité et du Système des Aires Protégées
<b>DEAP</b>	: Droits d'Entrée dans les Aires Protégées
<b>DGF</b>	: Direction Générale des Forêts
<b>DGSF</b>	: Direction Générale des Services Fonciers
<b>DRDR</b>	: Direction Régionale du Développement Rural
<b>DREF</b>	: Direction Régionale de l'Environnement et des Forêts
<b>DRFP</b>	: Département de Recherches Forestières et Piscicoles

<b>DRRC</b>	: Dispositif Régional sur les Récifs Coralliens
<b>EES</b>	: Evaluation Environnementale Stratégique
<b>EIE</b>	: Etude d'Impact Environnemental
<b>EMCs</b>	: Ecosystème Marin et Côtier
<b>EN</b>	: En Danger
<b>EPIC</b>	: Etablissement Public à Caractère Industriel
<b>ERE</b>	: Education Relative à l'Environnement
<b>FAO</b>	: Food and Agricultural Office
<b>FAPBM</b>	: Fondation pour les Aires Protégées et la Biodiversité de Madagascar
<b>FEM</b>	: Fonds pour l'Environnement Mondial
<b>FFI</b>	: Fauna and Flora International
<b>FI.MPA.MI.FA</b>	: Fikambanana Miaro ny Mpaniriky Fano
<b>FIFAMANOR</b>	: Fikambanana Famokarana Malagasy Norvezianina
<b>FOFIFA</b>	: Foibe Fikarohana Momba ny Fampandrosoana eny Ambanivohitra
<b>FTM</b>	: Foibe Taon-tsaritany Malagasy
<b>GBIF</b>	: Système mondial d'information sur la biodiversité
<b>GEF / UNEP</b>	: Global Environment Facility / Programme des Nations unies pour l'environnement
<b>GEF-IDA</b>	: Global Environment Facility / International Development Association
<b>GELOSE</b>	: Gestion Locale Sécurisée
<b>GEM</b>	: Grands Ecosystèmes Marins
<b>GEOSS</b>	: Global Earth Observation System of Systems
<b>GIDS</b>	: Gestion Intégrée des Déchets Solides
<b>GIRE</b>	: Promotion de la Gestion Intégrée des Ressources en eau
<b>GIZC</b>	: Gestion Intégrée des Zones Côtières
<b>GSPM</b>	: Groupe des Spécialistes des Plantes à Madagascar
<b>GTSE</b>	: Groupe de Travail intersectoriel et multidisciplinaire en Santé et Environnement
<b>HCC</b>	: Haute Cours Constitutionnel
<b>ICBG</b>	: International Cooperative Biodiversity Groups
<b>IHSM</b>	: Institut Halieutique et des Sciences Marines
<b>IMVAVET</b>	: Institut Malgache des Vaccins Vétérinaires
<b>INSTAT</b>	: Institut National de la Statistique
<b>INSTN</b>	: Institut National des Sciences et Techniques Nucléaires
<b>IPBES</b>	: Plateforme Intergouvernementale sur la Biodiversité et le Service de l'Ecosystème
<b>IPGRI</b>	: International Plant Genetic Resources Institute
<b>IRAAC</b>	: Initiative Régionale Agroécologie Changement Climatique
<b>IUCN</b>	: International Union of the Conservation Nature
<b>JMB</b>	: Journée Mondiale de la Biodiversité
<b>JME</b>	: Journée Mondiale de l'Environnement
<b>JMZH</b>	: Journée Mondiale des Zones Humides
<b>KFW</b>	: Kreditanstalt für Wiederaufbau, en français : Établissement de crédit pour la reconstruction
<b>IOSEA MOU</b>	: Indian Ocean - South-East Asian Marine Turtle Memorandum of Understanding
<b>LME</b>	: L'approche Grand Ecosystème Marin
<b>LMMA</b>	: Locally Managed Marine Areas
<b>LPE</b>	: Lutte Contre les Plantes Envahissantes
<b>MAEP</b>	: Ministère de l'Agriculture, de l'Elevage et de la Pêche

<b>MAP</b>	: Madagascar Action Plan
<b>MBG</b>	: Missouri Botanical Garden
<b>MCOP</b>	: Mécanisme Compensatoire relatif à l'Octroi de Primes
<b>MDP</b>	: Mécanisme de Développement Propre
<b>MEC</b>	: Mise En Conformité
<b>MECIE</b>	: Mise en Compatibilité des Investissements avec l'Environnement
<b>MEF</b>	: Ministère de l'Environnement et des Forêts
<b>Min Elv</b>	: Ministère de l'Elevage
<b>MINTOUR</b>	: Ministère du Tourisme
<b>MHN</b>	: Muséum national d'Histoire naturelle
<b>MNP</b>	: Madagascar National Parks
<b>MPE</b>	: Maison des Petites Elevages
<b>MSBP</b>	: Millennium Seed Bank partenariat
<b>MTPM</b>	: Ministère chargé des Travaux Publics et de la Météorologie
<b>NAP</b>	: Nouvelle Aire Protégée
<b>NTPF</b>	: Non Timber Forest Product
<b>OGM</b>	: Organisme Génétiquement Modifié
<b>OIO</b>	: Océan Indien Occidental
<b>OEMC</b>	: Office de l'Education de Masse et du Civisme
<b>OLEP</b>	: Organe de Lutte contre l'Evènement de Pollution marine par les hydrocarbures
<b>OMD</b>	: Objectifs du Millénaire pour le Développement
<b>OMNIS</b>	: Office des Mines Nationales et des Industries Stratégiques
<b>ONE</b>	: Office National pour l'Environnement
<b>ONESF</b>	: Observatoire National du Secteur Forestier
<b>ONG</b>	: Organisation Non Gouvernementale
<b>ONTM</b>	: Office National du Tourisme à Madagascar
<b>OPJ</b>	: Officier de Police Judiciaire
<b>OVM</b>	: Organisme Vivant Modifié
<b>PADR</b>	: Plan d'Action pour le Développement Rural
<b>PAFAF</b>	: Programme d'Appuis Financiers pour les Associations des Femmes
<b>PAG</b>	: Plan d'Aménagement et de Gestion
<b>PAN</b>	: Plan d>Action National
<b>PANAGED</b>	: Plan d'Action Nationale Genre et Développement intégrant la gestion environnementale
<b>PNDR</b>	: Programme National pour le Développement Rural
<b>PAPs</b>	: Populations Affectées par le Projet
<b>PAS</b>	: Programme d'Action Stratégique
<b>PBZT</b>	: Parc Botanique et Zoologique de Tsimbazaza
<b>PC</b>	: Produits Chimiques
<b>PCB</b>	: Polychlorobiphényles
<b>PCD</b>	: Plan de Développements Communaux
<b>PCDBA</b>	: Plateforme de Concertation pour le Développement Durable de la Baie d'Antongil
<b>PCI</b>	: Peripheral Component Interconnect
<b>PDDAA</b>	: Programme Détailé de Développement de l'Agriculture en Afrique
<b>PEID</b>	: Petits Etats Insulaires en Développement
<b>PEREDD</b>	: Politique Nationale de l'Education relative à l'Environnement pour le Développement durable

<b>PFL</b>	: Produits Forestiers Ligneux
<b>PFNL</b>	: Produits Forestiers Non Ligneux
<b>PGEDS</b>	: Plan de Gestion Environnementale et de Développement Social
<b>PGES</b>	: Plan de Gestion Environnementale et Sociale
<b>PGME</b>	: Programme Germano-Malagasy pour l'Environnement
<b>PGRA</b>	: Plan de Gestion des Réfrigérants Actualisée
<b>PIB</b>	: Produit Intérieur Brut
<b>PLAE</b>	: Programme de Lutte Anti-Erosive
<b>PN</b>	: Parc National
<b>PNAEPA</b>	: Programme National d'Accès à l'Eau Potable et l'Assainissement
<b>PNAT</b>	: La Politique nationale de l'Aménagement du Territoire
<b>PNDR</b>	: Programme National de Développement Rural
<b>PNLCC</b>	: Plan National de lutte contre le Changement Climatique
<b>PNUD</b>	: Programme National de l'Union pour le Développement
<b>PNUE</b>	: Programme National de l'Union pour l'Environnement
<b>POPs</b>	: Polluants Organiques persistants
<b>POWPA</b>	: Program of work on Protected Areas
<b>PPA</b>	: Peste Porcine Africaine
<b>PREE</b>	: Programmes d'Engagement Environnemental
<b>PSA</b>	: Programme Sectoriel Agricole
<b>PSA</b>	: Plantes sauvages apparentées
<b>PSAEP</b>	: Programme Sectoriel Agriculture Elevage et Pêche
<b>PSE</b>	: Paiements des Services Environnementaux
<b>PSSEM</b>	: Protocole Standard de Suivi Ecologique Marin
<b>QMM</b>	: Qit Madagascar Minerals
<b>RAMP</b>	: Réseau des Aires Marines Protégées
<b>RC</b>	: Renforcement de Capacités
<b>RDV</b>	: Renforcement des Dispositifs de Vigilance
<b>REDD</b>	: Reduced Emissions from Deforestation and Dégradation
<b>REEM</b>	: Rapport sur l'Etat de l'Environnement à Madagascar
<b>REPC</b>	: Réseau des Educateurs et Professionnels en Conservation de la diversité
<b>RFT</b>	: Réserves Foncières Touristiques
<b>RPGAA</b>	: Ressources Phytogénétiques destinées à l'Agriculture et à l'Alimentation
<b>RPI</b>	: Propre Ressource Interne
<b>SAGE</b>	: Service d'Appui à la Gestion de l'Environnement
<b>SAICM</b>	: Stratégic Approach to International Chemicals Management
<b>SAMIFIN</b>	: Sampandrahahara Malagasy Iadiana Amin'ny Famotsiambola
<b>SAPM</b>	: Système des Aires Protégées de Madagascar
<b>SBSTTA</b>	: Organe subsidiaire chargé de fournir des avis, scientifiques, techniques et technologiques
<b>SEESO</b>	: Synergie Energie Environnement dans le Sud Ouest de Madagascar
<b>SM</b>	: Stratégie de Maurice
<b>SNAT</b>	: Schéma National de l'Aménagement du Territoire
<b>SNGDB</b>	: Stratégie Nationale pour la Gestion Durable des Ressources
<b>SNGF</b>	: Silo National des Graines Forestières
<b>SPANB</b>	: Stratégie et Plan d'Action National pour la Biodiversité
<b>SPE</b>	: Service de la Préservation de l'Environnement

<b>SRAT</b>	: Schéma Régional de l'Aménagement du Territoire
<b>SSP</b>	: Species Survival Program
<b>SWIOFP</b>	: South West Indian Ocean Fisheries Project
<b>TBE</b>	: Tableau de Bord Environnemental
<b>TEAM</b>	: Tropical Ecology, Assessment and Monitoring
<b>TGRN</b>	: Transfert de Gestion des Ressources Naturelles
<b>TIRPAA</b>	: Traité International sur les Ressources Phylogénétiques pour l'Alimentation et l'Agriculture
<b>TPF</b>	: The Peregrin Fund
<b>UICN</b>	: Union Internationale pour la Conservation de la Nature
<b>USD</b>	: United States Dollar
<b>VNT</b>	: Vulgarisation de Nouvelles Techniques
<b>VPDAT</b>	: Vice Primature charge du Développement et de l'Aménagement du Territoire
<b>VU</b>	: Vulnérables
<b>WAVES</b>	: Wealth Accounting and Valuation of Ecosystem Services
<b>WCS</b>	: Wildlife Conservation Society
<b>WIOMER</b>	: Western Indian Ocean Marine Ecoregion
<b>WWF</b>	: World Wild Fund for Nature
<b>ZEE</b>	: Zone Economique Exclusive
<b>ZIT</b>	: Zone d'Intérêt Touristique

## **INTRODUCTION**

**Madagascar is classified among the 10 hotspots of the world biodiversity.** The unique natural heritage of Madagascar is severely threatened. The natural forest which originally covered most part of the island is rapidly disappearing.

Over the past years, tremendous progress has been made on comprehensive studies, conservation, and on Madagascar's flora and wildlife future.

Madagascar is one of the rare very rich countries from its natural resources point of view. It must take care of its natural capital and wisely manage its biodiversity through restoration and sustainable and fair use actions for the benefit of its citizens. Actually, its natural ecosystems are characterized by the diversity and the endemism of its flora and fauna species.

Despite the assets that Madagascar has had since 165 million years, the unsustainable exploitation of its biodiversity and the loss of systemic eco-services represent a large threat to the realization of its forest policies and its biodiversity. And even though the latter is not yet revised but is still in progress, we can already say that it matches to almost all the 2011-2020 Aichi and the Millennium Development Goals in its entirety.

Groups of animals and plants have conquered the big island by air, by sea, or carried by other animals or pieces of plants floating on the sea. Thus, they colonized empty ecological niches in Madagascar. The affinities of the Malagasy people stands are African, but also Indian, Malaysian, and Australian. However, the history of the groups of animals and plants is so old and particular that they all have something specific and unique most of the time. They were real relicts which have now disappeared from the land masses but have developed in isolation in Madagascar.

However, the ecological processes and biodiversity of Madagascar constitute very important economic assets. The protection of natural ecosystems maintains the primary ecological functions, like the gradual and continuous restitution of water. The resulting soils protection prevents the accompanying problems that now chronically affect the country's economy, such as the silting up of rice-growing perimeters, harbor and hydroelectric infrastructures, of road subsidence...

As far as the climate is concerned, rainfalls in Madagascar range from 800 to 1,000 millimeters in large cities from 2010 to 2013. It rains between 80 and 90 days per year, there is a remarkable decrease compared to 2008. The annual rainfall is high from October to April, but decreases only in September and October. Regarding the temperature, the annual averages are between 13°C and 20.5°C.

This document reports the progress made by Madagascar in implementing the Objectives of the Convention on Biodiversity compared to the convention' strategic plan: the 2010 Aichi Objective of the biodiversity and the measures to be taken. All data will remain the basic elements to serve in developing the "Strategy and the National Action Plan of Madagascar" and for the purposes of the "Strategic Plan and the 20 Aichi Objectives for 2011-2020."

To begin, the first part of this national report shows that the evolution of the condition and the biodiversity trend associated with the variety of genes, species, and natural ecosystems still continues and allows identifying the priority critical areas for appropriate management and conservation actions. This evolution is essentially due, inter alia, to reduced natural habitats, overexploitation of natural resources, invasive alien species proliferation, climate change, and to mining and oil exploration. The biodiversity trends are due to daily anthropogenic activities, which have become hard to handle given the economic situation.

Then, in order to deal with these different factors of biodiversity loss and natural ecosystems deterioration, the second part addresses the general public for measures to be implemented that must be effectively focused on two regulatory and planning for biodiversity management tools.

Obviously, any form of resources use, mainly oriented towards economic activities, must reduce the negative ecological impacts by improving the compatibility of the production with biodiversity preservation (EIES: enforcement of the MECIE Decree of 3<sup>rd</sup> February 2004.)

The natural resources conservation is not a new idea in Madagascar. Different texts that have classified sites of biological importance in different conservations sites, including all categories of protected areas, inter alia, the Madagascar National Parks networks and the newly-created ones. These efforts have been lately followed by areas increase of existing protected areas and by the revision of the categorization statute.

Thus, the law related to the Environment Charter of 21 December 1990 and the laws on the Code of Protected Areas Management of 11 February 2003, with their implementing decrees, which are being updated and revised, together provide the legal framework to ensure Madagascar's biodiversity conservation and management as they are both under revision.

Presently, programs related to biodiversity conservation in Madagascar have generally been implemented by the Ministry of Environment and Forests which is in charge of conservation. It works closely with other public (more than 15) and private sectors, as well as with the technical and financial partners such as NGOs, associations and institutions, civil society or other platforms, and relies on the existing interinstitutional mechanisms and on planning documents (PAGS, PGES, PSS.)

Finally, the third and last part of this report shows the progress made within the CDB framework, which are measured in terms of implementation through monitoring and evaluation systems.

Actions related to biodiversity conservation and management have been significantly developed, while others are still in the phase of launching or implementation.

Thus, the three main parts described in this report are as follows:

**Part I:** Madagascar's Biodiversity

**Chapter I:** Importance and Values of the Biodiversity

**Chapter II:** Status and Trends of the Biodiversity

**Part II:** Integrating Biodiversity into the Strategies and National Action Plans - Implementing the Convention

**Chapter I:** The National Strategy for the Sustainable Biodiversity Management 2002-2012

**Chapter II:** Integrating Sectoral and Cross-Sectoral Considerations on the Biodiversity

**Chapter III:** Initiatives and Their Efficiency

**Chapter IV:** Funding Mechanism and Resources Mobilization

**Part III:** Assessing Progress Against the Aichi Objectives in the Global Strategic Plan of Biodiversity.

## PART I: MADAGASCAR'S BIODIVERSITY

Madagascar is among the 10 hotspots of biodiversity and boasts a unique natural heritage. The island is marked by a large diversity of ecosystems which is home to an important biodiversity both in plant and wildlife species, with a high rate of endemism. The importance of Madagascar's biodiversity is reflected by its economical, socio-cultural, ecological, and scientific values.

### Chapter I: IMPORTANCE AND VALUES OF THE BIODIVERSITY

#### I.1.- ECONOMICAL VALUES

##### I.1.1.- International Trade

Madagascar's biodiversity is a very important natural economic capital for the country. Many fauna and flora species have high values on the international trade level. Various threatened wild species are listed in the appendices of the CITES Convention. Amphibians, reptiles, and birds, as well as flora species, including the recently-added Malagasy precious woods (*Dalbergia* and *Diospyros*;) and a succulent is recorded in these appendices.

Madagascar's exports (including processed products and derivatives) have continuously increased from 2008 to 2011, for a value of MGA 724.79 billion in 2008 to 1,018.58 billion in 2011. The tables below summarize the contribution of the main forest products, on the one hand, and of the other exports, on the other hand.

**Table 1:** Summary of the Evolution of the Forest Products Exports Income (in Ariary - MGA)

Type of Products	2009 Value	2010 Value	2011 Value	2012 Value	Royalties Collected in 2012
Pinewood	810,425,214	3,536,158,728	2,909,723,019	548,888,045	8,699,732
Rosewood	365,705,027	237,553,935	105,023,620	6,997,512	104,963
Plain wood	1,846,483	51,699,535	-	-	-
Ordinary woods	149,679,707	342,517,783	129,125,854	121,398,877	1,954,978
Manufactured products	2,104,075,252	1,604,133,221	879,997,539	1,043,036,330	16,034,553
Secondary products	81,378,478	59,024,656	32,266,283	33,829,988	667,230
Essential oils and medicinal plants	18,538,060,195	16,273,686,010	14,625,480,845	9,633,440,198	43,021,592
Fauna and flora	608,269,945	629,720,832	439,555,622	575,484,138	26,532,152
<b>TOTAL</b>	<b>22,659,440,301</b>	<b>22,734,494,700</b>	<b>19,121,172,782</b>	<b>11,963,075,088</b>	<b>97,015,200</b>

Source: Development of Natural Resources Department / Ministry of Environment and Forests

**Table 2:** Other Products Exported by Madagascar (in Ariary - MGA)

Type of Products	2009 Value	2010 Value	2011 Value	2012 Value
<b><i>Fishery Products</i></b>				
Fish	5,977,494,105	8,330,526,451	8,894,958,228	
Various Shellfish	179,432,102	281,079,156	280,441,691	
Shrimps	153,306,704,493	123,878,785,484	134,815,374,581	
Lobsters	2,801,740,826	6,449,474,731	6,426,949,393	
Other crustaceans and molluscs	16,774,613,084	17,395,205,356	17,880,272,289	
<b><i>Agricultural Products and Derivatives</i></b>				
Food Products	44,459,949,372	39,428,385,532	46,376,592,288	62,002,194,142
Cash crops	205,452,274,440	231,457,383,493	169,020,762,165	392,573,690,697
By-Products/ By-Products of Plant Origin	193,966,792,275	204,002,765,544	263,063,629,858	313,861,831,496
Products / By-products / Derived from Animal Origin	21,870,084,229	23,859,965,100	43,881,300,834	52,256,930,623

Source: INSTAT, 2013

Exports constitute a source of income for local populations and the operators working in these sectors. They are at the origin of important currencies inflows in the Country's Treasury.

### I.1.2.- Industry and Handicrafts

Many biodiversity products constitute raw materials used in different kinds of national and foreign industries. As an example, we can mention wood, medicinal and aromatic plants which are transformed into manufactured products.

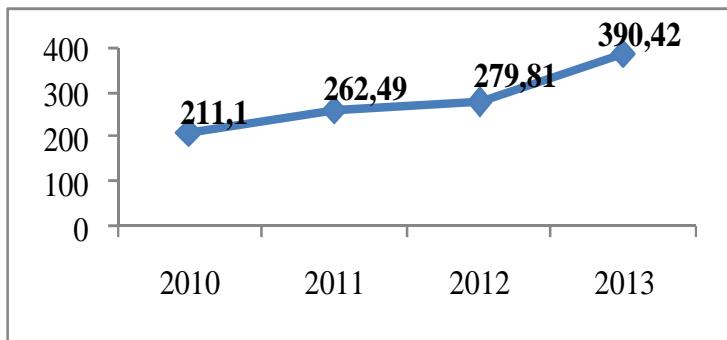
Manufacturing handicrafts from local raw materials from biodiversity elements are sources of income for people. Tourists are the most targeted buyers for these products.

### I.1.3.- Tourism

Because of its uniqueness, Madagascar's biodiversity is an important tourist attraction. The unique wildlife, including lemurs, birds, chameleons, amphibians, and whales are part of the island's interesting curiosities. Concerning the flora, the baobabs and other Madagascar's emblematic species attract foreign visitors.

The turnover from the tourist industry amounted to USD 0.5 billion (World Bank, 2013.) In 2013, th income in foreign currencies from tourism was estimated at DTS 256.86 million or USD 390.42 million, the equivalent of MGA 861.63 billion. Therefore, tourism represents an appreciable source of income for the country and for the local communities living in important biodiversity areas, like the Montagne d'Ambre, Ankarafantsika, Andasibe, Ranomafana, and Isalo.

Madagascar welcomed 196,375 tourists in 2013, 47.45% of which came from France. An annual growth rate of 15% is noticed that year.



**Picture 1 : Evolution of the income from the Tourism Sector from 2010 to 2013 in USD**

*Sources: Ministry of Tourism; Research Department of the Central Bank of the Republic of Madagascar*

In the Protected Areas of Madagascar National Parks' networks, the number of visitors has significantly evolved since 2010, but the reason for the decline in 2013 was related to the different proposed dates for the presidential elections in Madagascar.



**Picture 2 : Evolution of the Visitors in the MNPs' Protected Areas (2010-2013)**

#### I.1.4.- Domestic Trade

In Madagascar, sales of agricultural produces by farmers, collectors, and traders create many jobs. It concerns crop products and cash crops for breeding and fishing.

Fauna and flora products are also sold in local markets. For example, crustaceans and fish trade is an important source of income for local populations, intermediaries, and sellers.

Other forms of economic advantages from wildlife are also obtained from secondary products – for instance: bats' guanos, widely used as fertilizer, and honey-collection for people living in the forests vicinity.

The medicinal plants (*Drosera* spp, *Centella asiatica*, *Aloe vaombe*, *Myrothamnus moschatuss*, relieving plants of inselbergs among the most 2,000 species reputed to have medicinal virtues) and the ornamental plants (horticultural species *Aloe* spp, *Pachypodium* spp, and the special palm trees and forest species) are marketed locally and involve local different interest groups (traders, herbalists, pharmaceutical manufacturers, landscapers, and so forth...)

In the field of animal husbandry, resources from the sector have an overall value of MGA 4,700 billion or USD 2.4 billion. The number of livestock represents a capital value estimated at MGA 3,600 billion, or USD 1,800 million. For goat and sheep, it is estimated at MGA 30 billion or USD 15 million. As for the pigs, they are valued at MGA 468 billion or USD 234 million, and the poultry at MGA 120 billion or USD 60 million (Ministry of Livestock, 2013.)

## I.2.- SOCIAL VALUES

### I.2.1.- Food

The households' diet is mainly based on cereals bought in the market or, to a lesser extent, those that they produce themselves. The most common example is about rice (*Oryza sativa*), which is the staple food of all Malagasy people. The short-cycle breeding (namely poultry) is an activity open to vulnerable populations whose income can be improved (Ministry of Livestock, 2013.)

Fishing, hunting, and picking are also practiced, especially during the lean season and the crisis periods to compensate the lack of food or to generate extra incomes. They target amphibians, crocodiles, small mammals, birds, fish, shellfish, mushrooms, yams, and wild fruit.

### I.2.2.- Building Materials and Home Products

Plant products (trees or herbaceous plants such as bamboo and rattan) constitute important raw materials widely used by the populations. In Madagascar, many constructions and confections (houses, furniture, dugouts...) make extensive use of wood and other plant parts (leaves, stems, so forth...)

For a long time, coral beds were extracted in the Southwest to serve as building materials for new permanent structure houses or for tombs.

### I.2.3.- Domestic Fuels

The majority of the Malagasy population uses mainly wood and other plant products for cooking the food.

### I.2.4.- Traditional Medicine

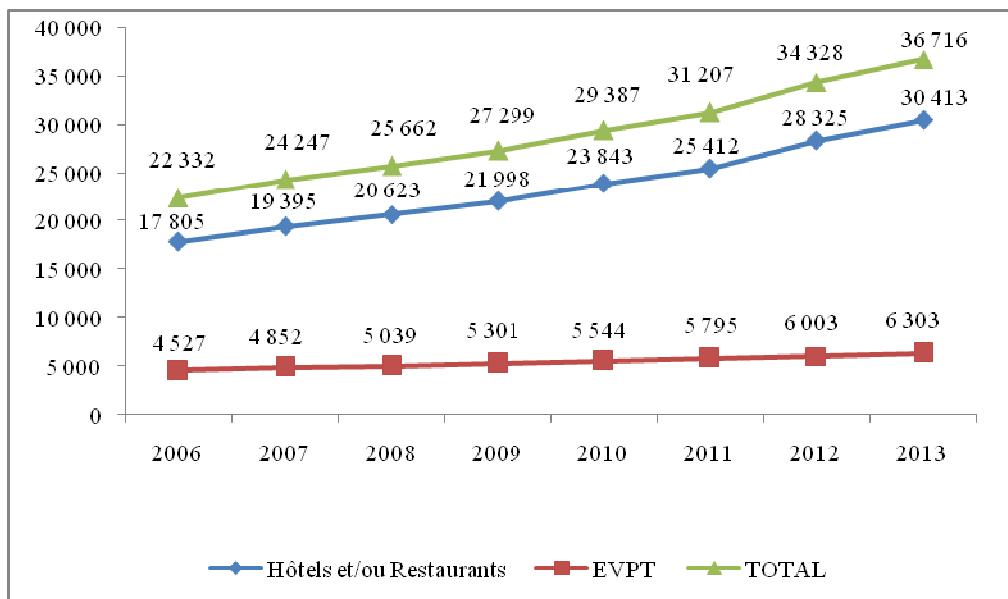
Traditional medicine is another way of valorizing the biodiversity products in Madagascar. For that end, body parts of some animal species or their derivatives are used to make medicinal and magic potions. For example, the *Galidia elegans*' tail is used to make a kind of talisman in the South (Goodman, 2012,) the crocodile's oil to heal asthma, the oil of *Cryptoprocta* to soothe ear's pains.

The Malagasy flora also includes many species used in traditional medicine. For example, the Vahona (*Aloe macroclada*) is used to heal stomachaches, the Ambarasaha (*Burassaia madagascariensis*) to prevent malaria.

### I.2.5.- Employment

In terms of employment, the agricultural sector employs about 70% of the active workforce, about 75% of the Malagasy population, and estimated at 22.3 million in 2013/14, living in the rural areas (FAO, 2013.) The most common activities revolve around food crops, farming, and to some extent, fishing. Concerning

tourism, the sector created in 2011 31,207 jobs, 25,412 of which concern lodging and/or restaurants, and 5,795 in the travel sector and tourist services, which tend to increase since 2004 as shown in the picture below.



**Picture 3 : Evolution of the Direct Employment Generated by the Tourism Sector in Madagascar from 2006 to 2013**

*Source: Ministry of Tourism*

### I.3.- CULTURAL VALUES

Madagascar's biodiversity is strongly linked to the population's cultures. Some Malagasy tribes consider lemurs as their ancestors or their origins, they are sacred and hunting them is strictly forbidden. It is the same for one species of snake, Boa manditra. The zebu has a very important cultural value in some regions of the country, particularly in the South, and plays an important role when the people observe different customs and rites. Many villages are named after an animal species. For example, Ampanihy is translated as "the place where bats live."

In many regions of the island, some tree species also represent sacred values to the local populations. The Baobab tree is for example used as tombs in some areas; in others, it is prohibited to cut tamarind trees for fear of curses.

Water resources and/or wetlands are used for different cultural or religious rites [(Fitampoha, Fanompoa in the North, sacred water for circumcisions, and so on...) (CI, 2011)]

### I.4.- SCIENTIFIC VALUES

Madagascar is home to nearly 5% of the world biodiversity. New discoveries are constantly cited. The scientific values of Madagascar's biodiversity are based on the high rate of endemism.

**Table 3 : Interspecific Diversity and Endemism of Some Biological Resources**

Taxa	Specific Wealth	Endemism (%)
<b>Plants</b>	Between 12,000 and 13,000 vascular plants	96 (90 of which live in dense dry forests)
	586 Pteridophytes	45
	202 Palms	96
	1000 Orchids	86
<b>Reptiles</b>	389	90
<b>Amphibians</b>	About 500 (278 are described and 150 are pending description)	100
<b>Birds</b>	282	37
<b>Primates</b>	103	100
<b>Unflying Small Mammals</b>	60	92
<b>Bats</b>	43	73
<b>Carnivores</b>	13	77
<b>Freshwater Fish</b>	159	66
<b>Invertebrates</b>	8,356	93
<b>Aquatic Insects</b>	1,257	87
<b>Malacofauna</b>	993 snails and land slugs	97
	41 freshwater snails	49
<b>Ants</b>	1,292	98
<b>Crustaceans (Astacoids)</b>	7	100

Source: Final Draft of the Report on Ecosystem Profile, Hotspots of Madagascar and the Indian Ocean Islands, 2013

The Malagasy fauna shows an exceptional level of endemism which even extends to the taxonomic family groups; and the endemism rate reaches 100% for some (Andreone et al., 2012; Glaw & Vences, 2007; Goodman, 2008, 2011, 2012; Soarimalala & Goodman 2011.)

The Malagasy flora is one of the richest in the world because it is estimated to count between 13,000 and 14,000 species living on 590,000 km<sup>2</sup> of areas, with an endemism rate of more than 80% and a high number of endemic families reaching five. For comparison sake, Brazil has the highest number of species (55,000) but has no endemic family (Ramananjanahary et al, 2010; Rabarimanarivo et al., 2014.) The endemism rate is noteworthy and can reach or approach 100% in several groups. This is the case of palms with 202 species and 99% of which is endemic (Rakotoarinivo et al., 2013,) the Orchidaceous with 1,100 species and 86% of which are endemic (Rakotoarivelo et al., 2013,) and the Aloe with 151 species, all endemic (Klopper et al., 2013)

The scientific values are also based on genetic diversity between and within species, a field which however remains under-explored and whose related actions should be strengthening. This can be illustrated by the diversity of microorganisms encountered in Madagascar. Since 2005, the field of research on bioactive molecules of microbial origin was developed in Madagascar and has demonstrated these resources' diversity. The microbial DNA of many microorganisms, generally rhizosphere, was extracted. They are isolated and are presently under study in genetic engineering. Secondary metabolites extracted from their culture have proved effective in mitigating the spread of some pathogenic strains.

## I.5.- VALUES OF ENVIRONMENTAL SERVICES

Madagascar's biodiversity provides several services on the functioning of ecosystems. The impacts of these environmental services are felt from the watershed to the coastal areas.

**Various forms of forests and vegetation**, namely those on slopes and mountains, ensure soil fixation, and thus, prevent erosion and sedimentation. Moreover, plants play roles in regulating air zones and provide habitats and food sources for animals. Natural mountain forests are regulators of water regimes (Razafimamonjy, 2001.)

**Wetlands** are carbon "pool" or reservoir, and play a regulatory role of water in case of flood or drought. (Convention of Ramsar, X.24 resolutions of Changwon, 2008.)

**Marine and coastal areas** have ecological values. Mangroves should play a role in capturing the sediments upstream (case of silting of the Bombetoka estuary) and in protecting the coastline against marine aggression (Morondava coastal areas.) Reefs play a role in protecting the coasts, are habitat for many species, and contribute to capture carbons. Meadows are food sources and habitats for various species of marine fauna (Dugongs, sea turtles, fish, and invertebrates, so forth...)

**Animal Species** play key roles in the mechanism of ecological functioning within ecosystems: roles in the food chain (being predators, preys, detritivorous or omnivores.) Frugivorous or nectarivorous species like some insects, lemurs, birds, and bats play a role in agricultural yield, pollination, and forest regeneration (Prum & Razafindratsita, 2003; Razafindratsita & Zack, 2009.)

Amongst other things, **plants** affect:

- the photosynthesis by assimilating the atmospheric carbon dioxide, regulating the atmospheric gases affecting the climate;
- the fixation of atmospheric nitrogen (especially by legumes);
- the preservation of soils and waters by maintaining the hydrological cycle and fighting against erosion;
- the gene bank which is a source of information and materials for sustainable and profitable production;
- the animals' habitat and food: the plant species that guarantee a nutritive supply to some animal species are key species, like the *Canarium* spp. for lemurs' food, the *Ficus* spp for the frugivorous wildlife; other species serve as shelters, birdhouses/nest-boxes (*pandanicol* amphibians living on *Pandanus* spp.) and as spawning areas for many animal species (*Mantella aurantiaca* spends the adult stage of its development in the forest adjacent to the laying marshland.) Their disappearance leads to major changes in the ecosystem functioning.

**The microorganisms** are very active elements in the biologic balances of forest, agricultural, and herbaceous ecosystems. Actually, they are the natural decomposers of organic wastes (trunks, branches, dead leaves, dead animals...,) the mineralization process of which is also assisted by various categories of microorganisms (ligninivores and cellulolytic saprophytic fungi, bacteria nitrifiers, and others.) Some fungi and microorganisms (mycorrhizal fungi, rhizoidal bacteria) live in harmony with plants. This association is vital for both partners (examples in primary nutrients mobilization and fixation (nitrogen, phosphorus, and potassium,) minerals necessary for plants in absorbing chlorophyll and supplying carbohydrates that are essential to microorganisms' growth.)

## **Chapter II: STATUS AND TRENDS OF THE BIODIVERSITY**

### **BIODIVERSITY**

Madagascar is a country with megadiversity due to the exceptional originality and diversity of its ecosystems, its flora and wildlife with a high degree of endemism.

#### **II.1.- ECOSYSTEMS**

Madagascar has many habitats that can be classified into two large ecosystems: terrestrial ecosystem (vegetation) and aquatic ecosystems (wetlands, coastal, and marine zones.)

##### **II.1.1.- Terrestrial Ecosystems**

In Madagascar, the terrestrial ecosystem diversity is particularly determined by climatic, edaphic, physiographic (altitude and exposure,) and anthropogenic factors.

###### **II.1.1.1.- Forest Ecosystems**

85 % of the Malagasy population live in the rural areas and depend highly on forest ecosystems. Forest biodiversity is the very basis of their livelihood. Specifically, these ecosystems help to ensure the production of wood (timber, service, and fuelwood) and non-timber (tubers, fruits, honey, mushrooms, medicinal plants, game, and so forth...) for human livelihood and the maintenance of environmental services such as the water cycle, climate regulation, nutrient recycling, and soil recovery.

The latest data on the general characteristics of forest ecosystems were provided by Moat & Smith (2007,) who established a vegetation classification including 10 principal physiognomic types.

**Table 4 :** Forest Ecosystems in Madagascar

<b>Types of Forest Ecosystems</b>	<b>Total Areas in km<sup>2</sup></b>	<b>% of Forest Cover</b>
Tropical Rainforest	47,637	8.06
Degraded Rainforest	58,058	9.81
Western Tropical Rainforest	72	0.01
Tapia Forest	1,319	0.22
Western Subhumid Forest	4,010	0.68
Western Dry Forest	31,970	5.40
Southwestern Spiny Forest	18,355	3.10
Southwestern Damaged Spiny Forest	5,427	0.92
Mangroves Forest	2,433	1.43
Coastal Forest	274	0.05

*Source: Moat & Smith, 2007, cited by CT-REDD, 2013 and MEF, 2012*

###### **II.1.1.2.- Climate Forest Formations**

###### **A.- Eastern Ecoregion and Sambirano: Rainforest**

This type of ecosystem corresponds to the dense humid evergreen rainforest of low and medium altitude (0 - 1300m,) represented respectively by plants association of the MYRISTICACEAE to *Anthostema*, and *Weinmannia* to *Tambourissa series*. It covers an area of 47,737 km<sup>2</sup>, 39 % of which is in protected areas.

The *degraded* forest, locally known as 'savoka', has an extremely variable appearance depending on the level of degradation. It can evolve from a secondary forest into a bushland or even in a mosaic of savannah. The forest vegetation is mainly composed of ruderal species such as the *Harungana madagascariensis*, *Ravenala madagascariensis*, *Tremaorientalis*, *Dombeya* spp. and so forth... as well as introduced species including the *Solanum* spp.

The degraded rainforest covers 58,058 km<sup>2</sup> of areas; 2.45% of which is in protected areas.

### **B.- Central Ecoregion: the Tapia Forest**

The Tapia forest covers an area of 1,319 km<sup>2</sup> and 20,60% of which is in protected areas.

This type of forest, a forest remnant, spreads onto the western and central highlands and corresponds to the medium altitude, *sclerophyllous* forest (800 to 1,300m.) The floristic association led by the endemic *Uapaca bojeri series* (locally called 'Tapia') refers to the series of *Uapaca bojeri* and *Chlaenaceae*, with the most characteristic species of which include the *Sarcolaena oblongifolia*, *Schizolaena microphylla*, *Asteropeia labati*, *Weinmannia* spp., and the *Agauria* spp. The peculiarity of this forest formation lies in the trees physiology with thick bark to adapt to frequent fires and to particularly sandstones soil types.

### **C.- Western Ecoregion**

#### **i. Western Rainforest**

This forest covers 72 km<sup>2</sup> and is found in the highlands and especially on the Eastern slopes of Analavelona – a wetland in the middle of the western dry region. The forest lies on an altitudinal gradient between 700 and 1300m. The vegetation physiognomy is characterized by 25m of height with a closed canopy and well-defined understory vegetation. Its formation is a mixture of three types of vegetation: evergreen, sclerophyllous, and dry (on rocky outcrops.)

#### **ii. Western Subhumid Forest**

This forest covers 4,010 km<sup>2</sup> of areas, 6.88% of which is included in the networks of protected areas. It is located in the Western slopes and along the Mangoky River from Bevoay (vegetation dominated by *Adansonia grandiflora* and *Adansonia rubrostipa*) Westward to Beroroha in the Northeast and Sakarahato in the Southeast (vegetation dominated by *Adansonia zebra* in the Zombitse–Vohibasia forest.) It is characterized by species such as *Givotia madagascariensis*, *Colvillea racemosa*, *Terminalia* spp., *Neobeguea mahafaliensis*, *Gyrocarpussa americanus*, *Diospyros* spp., and *Cordyla madagascariensis*. This formation is drier in the West and wetter in its Eastern limit. Hence, it is home to deciduous and evergreen species

This ecosystem type corresponds to semi-deciduous rainforest and spreads inland on the Western slope. During the dry season, understory plant species represented by the *Dracaena*, *Grewia*, and *Euphorbia* genera remain evergreen, while those on the upper floor/ overstory are deciduous.

#### **iii. Western Dry Forest**

It covers 31,970 km<sup>2</sup> of areas, 17.12% of which is included in protected areas. This vegetation type extends from the Mangoky River in the South to Antsiranana in the North. It is cut by wetter mountains such as the Amber Mountain and the Manongarivo Mountain.

This type of ecosystem is the equivalent of the dense deciduous dry forest or deciduous of low and medium altitude (0 - 1600m) with the plant association of the *Dalbergia*, *Commiphora*, and *Hildegardia* series.

The Western dry forest is diverse depending on the rainfall and the substrate that supports it. Physiognomically, it is in the form of dense forest, thicket or deciduous bushland depending on the rainfall and the substrate. Nevertheless, there are some common taxa that characterize this formation. The most represented species are *Commiphora* spp., *Cedrelopsis grevei*, *Colvillearacemosa*, and *Dalbergia* spp. The landscape is distinguished by the presence of various species of baobabs such as *Adansonia grandiflora*, *Adansonia za*, and *Adansonia rubrostipa*.

## **D.- Southern Ecoregion**

### **i. Southwestern Spiny Dry Forest**

It covers 18,355km<sup>2</sup> of areas, 4.46% of which is in protected areas. It lies mainly on the limestone plateaus and sandstone inland from Andohahela in the East to Morombe in the West. It varies from an ordinary forest to an impenetrable thicket depending on the substrates and rainfall.

The *degraded* spiny dry forest formation has a fragmented low and bushy appearance with the remnants of the *Didieraceae* species family. It extends over an area of 5,427 km<sup>2</sup>, 6.55% of which is protected.

This forest ecosystem also includes Southwestern xerophytic and deciduous thicket and refers to the series of *Didiera* and *Euphorbia*. This is usually found at altitudes between 0 and 300m. Formation is low and bushy. Taxa characteristics are: *Didiera madagascariensis*, *Givotia madagascariensis*, *Adansonia rubrostipa*, *Adansonia za*, *Adansonia grandiflora*, *Alluaudia procera*, *Alluaudia montagnacii*, *Alluaudia comosa*, and *Cedrelopsis grevei*.

## **E.- Physiographic Forest Formation (or in Altitude)**

### **i. Mountain Dense Rainforest**

This type of ecosystem exists only in the form of remnants above 1600m in altitude. All the natural vegetation has been modified by anthropogenic activities. Floristically, the mountain forest refers to the series of *Weinmannia* and *Tambourissa*. It is home to the sole endemic conifer species of *Podocarpus madagascariensis* of the *PODOCARPACEAE* family.

The permanent fog provides cool and humid microclimate promoting the development of epiphytic plant species (*Asplenium nidus*), tree fern (*Cyathea genus*), luxuriant lichens (*Usneasp*), and mosses.

### **ii. Silva Lichen**

Found at the highest altitudes of the central highlands, this type of forest formation corresponds to the ericoid high mountain bush. It includes remnants of sclerophyllous thickets and Paucispecific Mountains with the specific genres *Erica*, *Senecio*, *Vernonia*, *Psiadia*, *Ocotea*, *Cussonia*, *Vitex*, *Vaccinium*, inter alia. It is a clear, low, and relatively bushy forest formation.

This type of formation is also home to rock plants and adapted to shallow soils. It is composed by species of succulents like *Euphorbia*, *Kalanchoe*, and *Aloe*, and so forth...

The sclerophyllous high mountain forest (+1,800m above sea level) covers 25.66 km<sup>2</sup> of areas corresponding to secondary and/or degraded forest formations over 1.36 km<sup>2</sup>.

## **F.- The Edaphic Forest Formation**

### **i. Mangroves**

(See Chapter on Marine and Coastal Ecosystems)

### **ii. Coastal Forest**

The area of coastal forest is 274 km<sup>2</sup>, 13.83% of which is in protected areas. It is a variant of edaphic rainforest. It is found in coastal areas, namely on quaternary dune sands and alluvium or lacustrine deposits. The vegetation of this type of ecosystem consists of three main components, which are the forest on sand, swamp forest, and grasslands. Floristically, the dominant species in the forest on sand are large trees such as *Intsia bijuga*, *Uapaca littoralis*, *Uapaca thouarsii*, *Sarcolaena multiflora*, *Calophyllum inophyllum*, and so forth...; the medium-sized and small trees are dominated by the family of RUBIACEAE. Degraded coastal forest formations are grasslands dominated by CYPERACEAE taxa, and herbs such as *Cynodon* spp, as well as shrubs such as *Dodonea viscosa* and *Erica* spp., amongst others.

### **iii. Swamp Forests**

This type of forest formation can be observed in the rainforest zone, particularly in the coastal forest. In the Eastern ecoregion, swamp forest is characterized by the *Anthostema madagascariensis*, *Pandanus* spp., *Typhoodorum lindleyanum*, and species of the CYPERACEAE family. In the Western ecoregion, permanent marshes occupy depressions, in which the *Raffia farinifera* species grows with ferns, *Cyperus*, and several species of *Pandanus*. These forests are in regressive condition due to their transformation into rice fields.

### **Iv. Riparian Forests**

These forest formations grow along rivers and large rivers and correspond to alluvial and stream banks forests. They form a narrow strip of special species related to the swamp forests. Floristically, some overstory species are evergreen (*Protorhus*, *Eugenia*, so on...) and others deciduous (*Canarium*, *Khaya*, *Terminalia*, so on...). The understory species remain evergreen.

## **II.1.1.3.- Dryland Ecosystems**

Covering the Western and central highlands and the associated escarpments, as well as the Southern and the Eastern fallows, these types of forest formation cover a total area of 382,426 km<sup>2</sup>, 4.51% of which is in protected areas.

The Savannahs are widely represented in Madagascar since they cover 70% of the territory. Although they are rich enough, savannahs are floristically very poor (less than 5% of the biodiversity) and physiognomically very homogeneous. 72% of Madagascar's savannahs are located in the Western region and 20% in the Eastern region. Savannahs are rare (0.5%) at high altitude (>1,800m.) The vast majority of savannahs (68%) are found between 0 and 800m (low altitude) and 32% between 800 and 1,800m in altitude.

Savannahs are composed of a mosaic of wooded or shrubby grasslands depending on the dominant vegetation type. It refers to wooded and shrubby savannahs, where some remnants of the *Weinmannia* and *Tambourissa* series are found in the island's Central Highlands (especially in the valleys.) This type of ecosystem is called pyroclimactic as it is strongly shaped by frequent bushfires occurrences for pasture renewal and cropfields clearance. In the high mountains, the floristic characteristics genres are, amongst others, *Erica*, *Helichrysum*, *Cynorkis*, *Vernonia*, *Psiadia*, and *Vitex*.

The savannah dominates the highlands but extends to the West and the North. It is dominated by common species such as *Aristida rufescens*, *Hyparrhenia* spp., *Heteropogon contortus*, *Loudetia simplex*, *Ctenium concinnum*, and studded with shrubs species such as *Stereospermum euphoriooides*, *Sclerocarya birrea* spp. *caffra*, *Gymnosporia longifolia*, *Dicoma incana*, and *Acridocarpus excelsus*.

The savannahs are developed on trays in order to establish woody vegetation particularly represented by reforestation and to introduce species like *Pinus*, *Eucalyptus*, and *Cupressus* genus.

Over the past few decades, cultivation in the savannah areas has been strongly increased.

In the West, the woody component of the savannah is dominated by *Tamarindus indica*, *Stereospermum euphoriooides*, *Poupartia caffra*, *Ziziphus* spp., as well as palm trees species such as the *Bismarkia nobilis* and *Hyphaene shatan*.

Apart from savannahs, the coastal bushy formation in the Southwest also includes arid ecosystems. It covers 1,761 km<sup>2</sup> of areas, 5% of which is protected. This type of ecosystem is especially found along the Southern coast on essentially sandy soil, along a narrow strip from Soalala in the North to Cap Ste Marie in the South. It is characterized by an open, bushy, and low structure dominated by floristic species such as *Euphorbia stenoclada*, *Stereospermum nematocarpum*, and *Tamarindus indica*.

**Table 5 :** Arid Ecosystems in Madagascar

Types of Dry and Arid Ecosystem in Madagascar	Total Area in km <sup>2</sup>
Mosaic of grassland – Grassland of the highlands	246,687
Mosaic of wooded grassland– Bushland	135,739
Coastal Bushland in the Southwest	1,761

### II.1.1.3.- Agricultural Ecosystems

Climatic conditions and soil types greatly affect the type of agriculture practiced by the producers. The total area of farmland was estimated at 23,522 km<sup>2</sup> (Moat & Smith, 2007.)

Thus, on the rather humid Eastern coastal strip, sustained perennial crops (tropical fruit trees, vanilla plants, and pepper plants, so on...) are observed.

The central highlands are temperate zones where basic food crops and forage for ruminant livestock breeding predominate.

In the West, with a semi-arid or arid climate, people devote themselves to root crops (cassava, sweet potato, so forth...) And during low flows, they benefit from the moistured flood banks to produce short cycle subsistence crops.

According to the topography, different types of agricultural ecosystems can be distinguished:

- Agricultural ecosystems in the shallows: rice cultivation in the rainy season, then after the rice they cultivate off-cycle cash crops in the dry season (potato, green beans, various vegetables, and forage crops, so on...)
- Agricultural Ecosystems in the lower slopes: market gardening all year round in the highlands, forage for dairy cows;

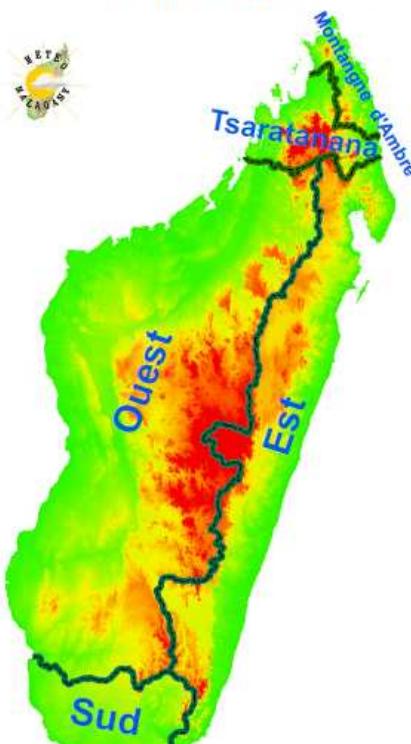
- Agricultural ecosystems on *tanety* or slopes: cultivation practiced during the rainy season (corn, upland rice which is increasing now, so on...) or all-year long such as cassavas, sweet potatoes, so forth...

## II.1.2.- Aquatic Ecosystems

### II.1.2.1.- Wetlands and Mainland Waters

Wetlands and mainland waters extend over an area of 5,339 km<sup>2</sup>. They consist of lentic areas (lakes, marshes, swamps) occupying an area of 2,000 km<sup>2</sup>, the lotic areas (rivers, streams,) covering 3,000 kms and groundwater from 8 hydrogeographical areas and major aquifers. In general, water sources are from the five major watersheds corresponding to the five climatic regions of Madagascar (Montagne d'Ambre of 11,200 km<sup>2</sup>, Tsaratanana of 20,000 km<sup>2</sup>, the Eastern slope of 150,000km<sup>2</sup>, the Western slope of 365,000 km<sup>2</sup>, and the Southern slope of 48,800 km<sup>2</sup>. Each basin has its own hydrological regime and the whole is divided into 256 pools.

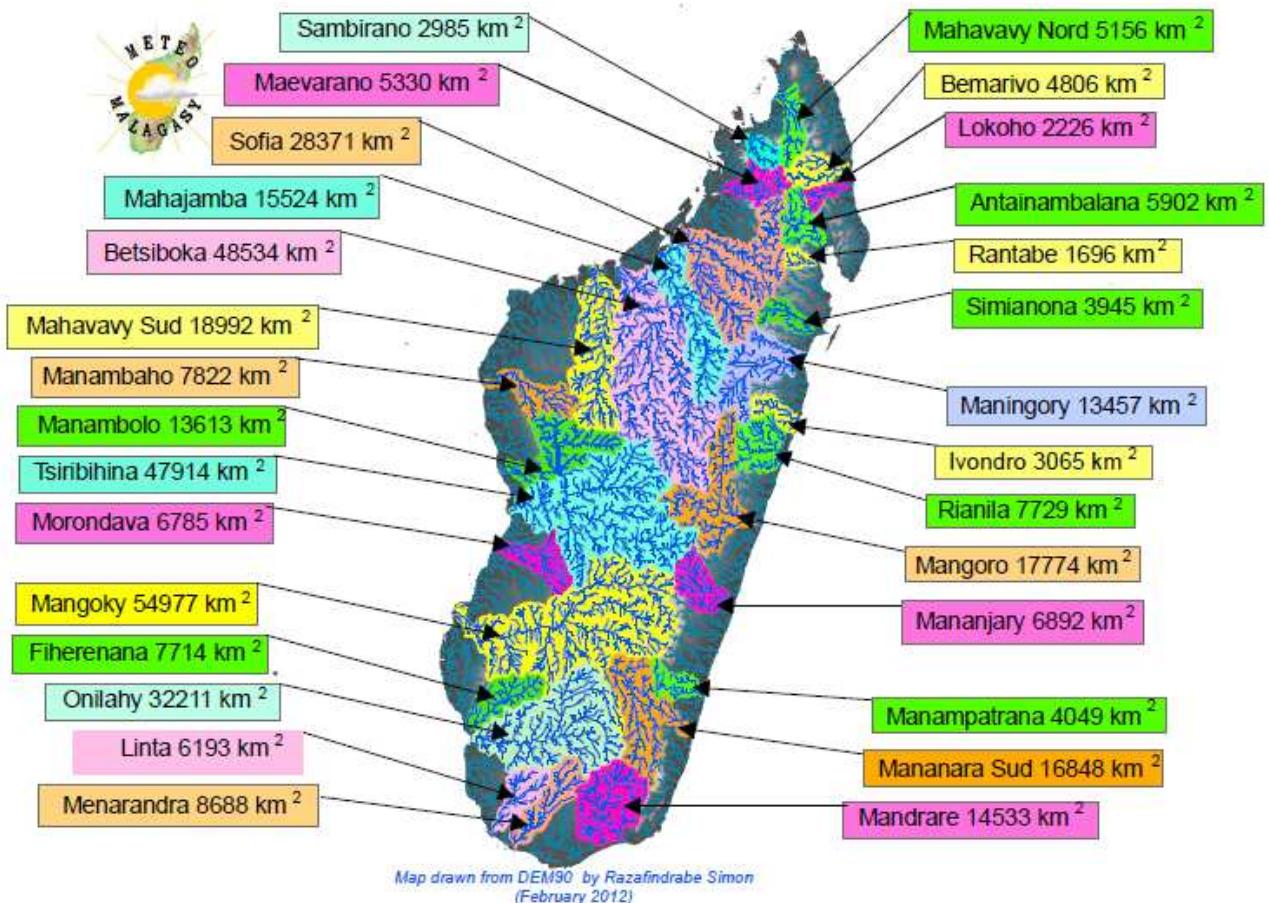
**LES CINQS VERSANTS NATURELS  
DE MADAGASCAR**



Map drawn from DEM90 by Razafindraibe Simon  
(February 2012)

**Picture 4 : Location of Natural Slopes in Madagascar**

## PRINCIPAUX BASSINS HYDROGRAPHIQUES DE MADAGASCAR



**Picture 5 : Location of Watersheds in Madagascar**

The different types of wetlands in Madagascar are:

- Tectonic lakes, due to tectonic accidents, usually in the form of faults, like the case of Lake Alaotra (220 km.) This type of lake is generally elongated;
- Lakes on plains, located mainly in the Western part of Madagascar. They are characterized by their shallowness and seen in areas where drainage is unsteady; their size varies according to the seasons (case of Lakes Bemamba, Bemarivo, Kimanomby, Iboboka, and Hima...);
- The volcanic lakes formed in craters are usually round or oval, relatively small in size and often very deep. They form several strings in volcanic areas: in the Middle West (Itasy, Andranotoraha, Amparihikisoa...); in the North (large and small lakes in the Montagne d'Ambre and 12 small lakes in Nosy Be,) in central Madagascar (Tritriva and Andraikiba in the Vakinankaratra region);
- The natural dam lake, trapped in valleys or lowlands by extensive scree or alluvium (case of Lake Ihotry and Kinkony);
- The lakes and artificial water reservoirs which are developed for hydroelectric purposes (Mantasoa, Tsiazompaniry, Mandroseza;) to irrigate agricultural areas or to supply the large cities with water.

Approximately, **1,300 lakes** (with lagoons) are identified on the Malagasy territory. The main coastal lakes are located in the Eastern region of the island. It is a chain of lakes connected together by artificial channels, which constitute the Canal des Pangalanes along the coast over 600kms.

Freshwater marshes and swamps are formed of spaces where shallow waters from underground waters, springs, streams, or runoff accumulate on a more or less permanent basis. These swamps and marshes hold an important place among the wetlands because of their large number and their area.

There are many lagoons and the main identified ones in Madagascar are those of Loza, the longest on the West coast (456 km,) those of Pangalanes (180 km<sup>2</sup>,) Anony (22.62 km<sup>2</sup>,) Ampahana (21.75 km<sup>2</sup>,) Masianambo (13.29 km<sup>2</sup>,) Tampolo (1.55 km<sup>2</sup>.)

Underground waters are originated from the following 8 hydrogeographical areas:

- Highlands with high rainfall (Northern and central parts);
- Highlands with low rainfall (Southern part);
- Sedimentary Basin in the Far South;
- Toliara sedimentary Basin;
- Morondava sedimentary Basin;
- Mahajanga sedimentary Basin;
- Antsiranana Sedimentary Basin;
- The East coast sedimentary Basin.

The thermomineral waters are found in the regions of Vakinankaratra (Antsirabe,) VatovavyFitovinany (Ranomafana,) AtsimoAndrefana (Bezaha,) Melaky (Besalampy,) and Itasy.

### **II.1.2.2.- Marine and Coastal Ecosystems**

The marine and coastal ecosystems are amazing because of their rich biodiversity.

#### **A.- Coral Reefs**

Concerning the number of geo-morphological units, Madagascar has 86 units (of level 5) 24.43% of which is located in the Indian Ocean. The area is estimated at 24.83% of the region, coming in the second position after the Seychelles.

**Table 6 : Areas of the Various Inventoried Components**

<b>Components</b>	<b>km<sup>2</sup></b>
Total Land Mass	594,290
Emerging Land Mass on Reefs	546
Non-Reef Areas	4,485
Reef Areas	5,076
Reef and Non-Reef Areas	9,561

*Source: Andréfouet et al, 2009*

For species living in Madagascar's marine and coastal ecosystems, 788 species of reef fish have been identified, this number is similar to those of the neighboring islands (Mauritius, Seychelles, Chagos, and Maldives) together.)

The coral diversity is composed of 380 species, the highest in the Western Indian Ocean and the Red Sea, comparable to the figures found in the Coral Triangle (known to be the richest in marine biodiversity.)

**Table 7 : Specific Wealth of Corals**

Species	Northwest	Northeast	Southwest
	McKenna S.A. and G.R. Allen (2003) D. Obura et al. (2011)	D. Obura et al. (2011) Maharavo et al. (2009)	Gough C. et al. (2009) Harding S. (2006)
Corals	318 1 endemic genus 8 species never seen elsewhere	281 4 monospecific genera endemic to the region 1 rare species recently described 23 species not yet recorded in Madagascar	164 hard corals 19 species not found elsewhere in Madagascar 4 genres/ probably new species

### **B.- Seagrass and Algae**

The tropical Indo-Pacific region has the greatest diversity of seagrass species with 24 species (Short F. T. et al, 2007.) Seagrass and algal assemblages, despite their importance, are little known in Madagascar, and very few studies are dedicated to them. Available scientific documentation reveals the presence of 11 species of flowering plants in Madagascar (Razafindrakoto & MEF, 2012.) Besides, a total of 91 species of algae including species indicator of ecological disturbances are identified in Northeastern Madagascar (Obura et al. 2011.)

The extent of Madagascar's *phanerogamesis* seagrass are unknown since they have never been mapped and are difficult to distinguish in aerial photographs or satellite images. Based on the surfaces of clear and protected shallow marine waters zones, the extent of seagrass areas of Madagascar should exceed that of the coral reefs, estimated at 3,000 km<sup>2</sup> (Cooke & Brand 2012.)

### **C.- Mangroves**

Mangroves are open or closed (if they are degraded) forest stands installed in the intertidal zone. They cover about 2,433 km<sup>2</sup> of areas, 15.97% of which are included in the networks of protected areas.

98% of these formations are spreading along the West coast, occupying mainly seabeds, while those on the East coast are small and located mainly in the North East, between North Mananara and Antsiranana.

Floristically, it is poor because only 11 species are known in Madagascar (Bentje & Bandeira, 2007.) The most common species are the *Rhizophora mucronata*, *Bruguiera gymnorhiza*, *Ceriops tagal*, *Avicenia marina*, *Sonneratia alba*, and *Lumnitzeraracemosa*. This composition is related to that of the East African coastal region, and part of the old mangroves of the Indo-Pacific. However, in areas with high rainfall, mangroves of larger sizes grow with considerable biomass.

Other species may be encountered in mangroves: *Scaevola Sericeae*, *Hibiscus tiliaceus* (*Malvaceae*), *Derris uliginosa*, coconuts (on raised sandy benches in mangrove estuaries,) *Acrostichum aurum* as back mangrove or along the *Typha* sp (*Typhaceae*) swamp edges, and can form important plantings.

### **II.1.3.- Protected Areas**

During the four years period following the 4th report date, the Malagasy Government has started to definitely establish new protected areas covering a total area of 4,751,895 ha. In the beginning, these new areas are endowed with global temporary protection status. Thereafter, since 2010, five (5) protected areas have received the status of permanent protection. They are:

- The "Makira" protected area (372,470 ha) managed by the Wildlife Conservation Society (WCS);
- And four other protected areas managed by Madagascar National Parks (MNP.)

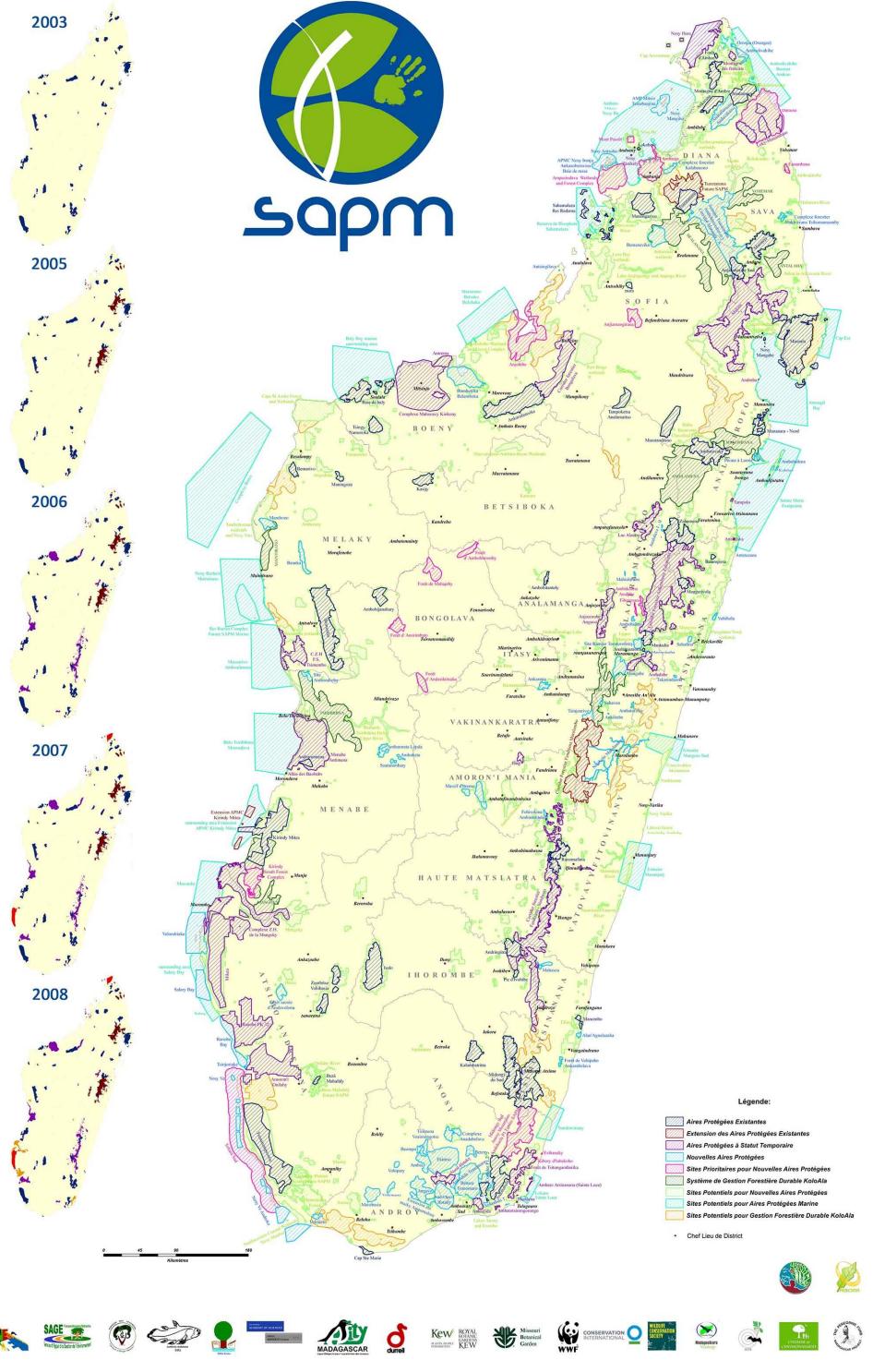
143,316 ha of these are marine and coastal ecosystems and 193,162 ha are terrestrial ecosystems. Thus, the total area of protected areas (including the new ones with permanent status) is 2,490,000 ha, representing 36% of the national objective (which is 6.9 million hectares.) Other new protected areas (NAPs) in creation and some in extension phase are in the process of obtaining permanent status. For activities related to creation and management of marine and coastal protected areas, monographies on fishery resources have been made for some areas.

Financial difficulties caused by the 2009 political crisis have severely hampered the process of creating the permanent status of NAPs with temporary protection, hence, negotiations and consultations with other concerned government departments have been carried out resulting in the ministerial Decree No. 9874/2013 of 6 May 2013 extending the overall temporary protection of the new protected areas sites until May 2015 for their permanent creation.

In terms of connectivity, corridors of protected areas have been established over a total length of approximately 1,200 km from North to South of Madagascar. They link six (6) protected areas which are part of the World Heritage Ala Atsinanana rainforest (Andohaela, Andringitra, Ronomafana, Zahamena, Masoala, and Marojejy) with three (3) major corridors: the Corridor Forest of Ankeniheny Zahamena (CAZ,) Corridor Forest of Fandriana-Vondrozo (COFAV,) and Corridor of Marojejy Anjanaharibe – Marojejy Tsaratanana.

Currently, small NAPs are still home to a high diversity of species and an incredible endemism. However, most are almost isolated sites (case of Bemanevika, Ankaratra, or Ambohidray.)

## EVOLUTION DU SYSTEME DES AIRES PROTEGEES DE MADAGASCAR de 2003 jusqu'en 2011



## **Picture 6 : Distribution Map of Madagascar's Protected Areas**

## II.2- SPECIES

### II.2.1.- The Flora

The flora, composed of different plant species, is the basic building block of all terrestrial ecosystems. On the one hand, vegetation offers vital ecosystem services. On the other hand, species of flora are used by local population and are important in terms of supply service. The plant elements have socio-economic, ecological, and cultural values.

#### II.2.1.1.- Present Flora Condition

Madagascar's flora is one of the richest in the world. It is estimated to have between 13,000 and 14,000 species, 80% of which is endemic.

Creating online flora for all inventoried plants is set as one of the objectives (objective 1) of the World Strategy for Plant Conservation updated during the 11<sup>th</sup> Conference of the Parties to the Convention on Biodiversity in Nagoya. Thus, Madagascar Catalogue or Madcat, the online flora of Madagascar vascular plants is established and accessible at [www.tropicos.org/Project/MADA](http://www.tropicos.org/Project/MADA). The site is currently the most updated one as regards flora of vascular plants. Madcat has counted to date a total of 11,386 species, 8,916 of which are endemic (78%,) 1,687 kinds and 304 of which are endemic (18%,) 241 families and 5 (2%) of which are endemic, and finally 66 orders (Rabarimanarivo et al., 2014.)

Since the publication of the 4<sup>th</sup> national report, the number of *Pteridophytes* processed in the online flora has been meaningfully increasing, given that 31 families, 122 genera, and 616 species are now identified. The Gymnospermeses, which are poorly represented in Madagascar and which were not even listed in Madcat in the 4th national report, now count 3 families, 3 genera, and 7 species. The table below summarizes the data of the flora recorded online in Madcat.

**Table 8 :** Number of Inventoried Plants Taxa in the 2014 Madagascar Catalog

Accepted names	Families	Genera	Species
Pteridophytes	31	122	616
Gymnospermes	3	3	7
Angiospermes	207	1,562	10,763
<b>Total</b>	<b>241</b>	<b>1,687</b>	<b>11,386</b>

Presently, the five families of Malagasy endemic plants are the ASTEROPEIACEAE (1 kind and 8 species,) the BARBEUIACEAE (1 genus and 1 species,) the PHYSENACEAE (1 genus and 2 species,) the SARCOLAENACEAE (10 genera and 68 species,) and the SPHAEROSEPALACEAE (2 genera and 20 species.) Overall, these 5 families are divided into 15 genera and 99 species. The DIEGODENDRACEAE is no longer part of the Malagasy endemic plants family and has been integrated into the BIXACEAE family (Ramananjanahary et al., 2010.)

60% of the genera recorded in Madcat needs to be evaluated, which would represent 1,500 still unknown new species. In total, 500 species (i.e. 17%) must still be inventoried and/or described, bringing the number of vascular plants to 13,900/14,000 species.

From ecological point of view, 57% of the vascular plants flora is found in zones of wet bio-climate and at low altitude. 49% of that flora is composed of timber (bushes, shrubs, trees,) 42% of herbaceous plants, and 9% are lianas.

In terms of endemism, out of the 6,805 endemic species processed in Madcat, 15% are from one region and 22% from 2 to 5 regions.

Apart from the online flora, several works or publications have been issued since the fourth national report with new data inputs on different elements or taxa of Malagasy flora.

Revisions related to different genera have been recently published and allowed describing new species. The *Bremeria* (RUBIACEAE) genus, studied by Andriambololonera (2013,) is an example. The last AETFAT Convention in 2014 allowed many researchers talking about the revisions of genera like *Dombeya*, *Ivodea*, *Vepris*, *Psorospermum*, *Monanthotaxis*, and so forth... (Bytebier et al., 2014.)

The inventories or checklists related to determined taxa or plant groups sharing the same biotope for instance the same biotype are also available since the drafting of the 4th national report.

The CYPERACEAE were inventoried by Muasya et al. in 2013 with 33 genera and 411 species. Klopper et al. (2013) conducted an inventory of the Malagasy Aloe that includes 151 endemic species.

The inventories of the Malagasy aquatic plants had listed 618 species divided into 135 families, the richest of which are the CYPERACEAE (68,) the POACEAE (55,) the FABACEAE (45,) the ASTERACEAE (33,) and the RUBIACEAE (31.)

A check-list of the inventoried plants in the Itremo new protected area is currently being prepared within the RBG Kew. This project which will serve both as plant guide and basic documentation in the scientific research context will deal with the taxonomy, ecology, operating mode, and the conservation of about 600 plant species.

Some guides for the Great Island different ecosystems are also available to better learn about the flora of any particular region. For example, some guides exist for the Ambalabe forest NAP near Vatomandry (Rakotoarivelo 2013,) for the Montagne d'Ambre (Roger 2011,) and for the Antrema NAP (Roger 2011.)

Finally, since the editing of the 4th national report, research on Malagasy *Bryophytes* which was previously nonexistent, has progressed with the works of Marline et al. (2014) and Andriamanantena et al. (2014.)

## **II.2.1.2.- Outstanding Elements of the Malagasy Flora**

### **A.- Baobabs**

Out of the 8 Baobab species existing in the world, 7 species are present in Madagascar, 6 of which are endemic. They are *Adansonia grandiflora*, *A. rubrostipa*, *A. za*, *A. madagascariensis*, *A. perrieri* and *A. suarezensis*. The *A. digitata* species is well represented in the West of Madagascar and common with Africa.

### **B.- Palm Trees**

The Palm trees which are a concrete example of the diversity and the uniqueness of the Malagasy flora have been analyzed by Govaerts and al. (2014.) Out of the 202 native species presently inventoried, only 3 are not endemic of the island, making an endemism rate close to 99%. Madagascar is then listed among the richest countries in palm trees in the world (Rakotoarinivo et al. 2013.) The palm trees of the island are mainly dominated by a genus, the *Dypsis*, which species are all endemic. It is the same for the genera of *Beccariophoenix*, *Bismarckia*, *Lemurophoenix*, *Marojejya*, *Masoala*, *Tahina*, and *Voanioala* which are all

endemic. Since 2008, about thirty new species have been described (Rakotoarinivo & Dransfield 2013.) It is quite likely that many species have yet to be discovered in poorly or not yet inventoried forests of the island.

### **C.- Orchids**

Complementary data about Madagascar's Orchids as well as a key to determine the species were also just published by Bosser and Lecoufle in 2013. In total, 1,100 orchid species are inventoried in Madagascar and 86% of them are endemic. A genus among them, the *Jumellea*, has been recently reviewed (Rakotoarivelo et al., 2013.)

### **D.- Wild Plants Related to Cultures**

This category of plants is not mentioned in the 4<sup>th</sup> national report. During the GEF / UNEP project from 2004 to 2011, a checklist of Malagasy wild plants related to cultivated plants (or CWR) was realized by means of eco-geographical investigations across country, of identification and geo-reference. It allowed discovering 120 CWR species. Five priority taxa have been retained for thorough studies: *Oryza*, *Musa/Ensete*, *Vanilla*, *Coffea*, and *Dioscorea*. It has emerged from the results of these studies that in Madagascar, there are 8 wild *Vanilla* species, about fifty *Coffea* called *Mascorocoffea* characterized by the absence of caffeine, and about forty wild *Dioscorea* which are mostly exploited for human food.

### **E.- Alien Species and Invasive Species**

The works of Kull and al. (2012) contain an exhaustive list of the alien plants in Madagascar. This inventory based on the consultation of database, in particular that of Madcat, of published articles and site observations, allows inventorying 546 naturalized alien species, 611 alien and naturalized species, and 211 species of uncertain status. The best represented families among the alien plants are the FABACEAE (224 confirmed alien species,) MYRTACEAE (143,) POACEAE (71,) CACTACEAE (52,) ASTERACEAE (50,) and SOLANACEAE (33.)

Plants have been introduced in different ways in Madagascar. For trees, the species mainly consist of species reforestation for production use (timber or non timber.) The most dominant genera are *Eucalyptus* and *Pinus*. Many shrubs for agroforestry use and some ornamental species have also been brought into the country. As for agricultural and fodder species, the introduction of new foreign varieties is common.

Among the alien species, many are invasive because of their high adaptation capacity and natural reproduction. However, some native species can also have an invasive property. The data related to invasive plants are relatively unimportant. Bingelli (2003) is the first contemporary reference dealing with invasive plants. He mentions a certain number of invasive species: *Aristida rufescens*, *Heteropogon contortus*, *Hyparrhenia rufa*, *Imperata cylindrica*, *Themeda quadrivalvis*, *Eichornia crassipes*, *Opuntia monacantha*, *Clidemia hirta*, *Psidium cattleianum*, *Rubus moluccanus*, *Rubus rosifolius*, and *Solanum auriculatum*.

## **II.2.2.- Wildlife**

The fauna is Madagascar's unique natural heritage, a large part of which is of universal value. Actually, apart from the presence of an outstanding adaptative radiation within numerous taxa, any other country in the world is richer in endemic species than Madagascar.

## **II.2.2.1.- Current Status of Wildlife**

The Malagasy wildlife shows a high level of endemism which extends to the superfamily groups (lemurs) and to the family for some taxonomic groups; the endemism rate reaches 100% for some (ex: fish, birds, carnivores, and bats) (Andreone et al., 2012; Glaw & Vences, 2007; Goodman, 2008, 2011, 2012; Soarimalala & Goodman 2011.)

### **A.- Invertebrates**

The invertebrates particularly the arthropods are an important part of the animal biomass in the world ecosystems, included in the Malagasy forests. According to available information, the diversity is simply remarkable, yet there is still a striking lack of scientists able to conduct studies explaining the enormous gap on the knowledge of these invertebrates (Goodman 2008.)

#### **i.- Ants**

Ants belong to the *Hymenoptera* order and the *Formicidae* family. In the forest, ants make up of 15% of the total animal biomass (La Salle & Gauld 1993) and 45-50% of the macro-invertebrates biomass of the leaves litters (Olson 1994.) They play an important role in nutriments recycling, seeds dispersal, and the regulation of the populations of other insects (Folgarait, 1998; Bestelmeyer&Wiens 2003.) From 400 species in 2000, the number of ants species registered in Madagascar are now 1,277 ([Antweb](#), 2013) and this is in more than 100 sites including the different protected areas from North to South and from East to West of the island. Meanwhile, some new genera have been discovered: *Malagidris*, *Tanipone*, *Lividopone*, *Stigmatomma*, *Chrysapace*, and recently the *Prenolepis* genus as well as other new species, such as *Pachycondyla darwini* have just been inventoried. Out of the 58 genera of inventoried ants, 11 are endemic: *Adetomyrma*, *Aptinoma*, *Ravavy*, *Lividus-group*, *Tanipone*, *Eutetramorium*, *Myrmicine\_genus01*, *Myrmicine\_genus02*, *Pilotrochus*, *Suckardi group*, and *Vitsika*. More than 75% of the species is endemic to Madagascar. The endemism area is mainly the Northern part of Madagascar with more than 334 inventoried endemic species (Antweb 2013.)

#### **ii.- Freshwater Shrimps**

They belong to two families - Atyidae and Palaemonidae.

##### **- Atyidae**

In Madagascar, twenty-eight species grouped in four genera have been described for several years (Bouvier, 1904; Roux, 1929; Holthuis, 1965; Short & Doumenq, 2003; Cai, 2005.) The endemism rate reaches 77%; however, the taxonomic status of some species like *Caridina* requires some confirmation through MORE thorough studies. The non endemic species are scattered either in the Indian Ocean or in the West IndoPacific. In Madagascar, the *Atyidae* can be found near the sea level up to 1,700m in altitude (Short & Doumenq 2003.) What is presently known about this group is that 16 species are categorized as Insufficient Data and the others as Least Concern (IUCN 2013.)

##### **- Palaemonidae**

In Madagascar, 13 species grouped in 2 genera have been described for this group of freshwater shellfish (Holthuis, 1980; Short & Doumenq 2003): *Macrobrachium* (12 species, 5 of which are endemic) and *Palaemon* (1 non endemic species.) The endemism rate is 38% but the taxonomic status of 3 *Macrobrachium* species needs through further studies for confirmation. Like the *Atyidae*, the non endemic species are scattered in the Indian Ocean or in the West Indo Pacific. In Madagascar, *Palaemonidae* live in the coastal zones up to 1200m in altitude (Short & Doumenq, 2003.) 4 species are presently categorized as Insufficient Data and the others as Least Concern (IUCN 2013.)

### **iii.- Crayfish**

Madagascar is one of the rare countries in the intertropical zone to have native crayfish (Elouard et al., 2008) like *Astacoides* with 7 endemic species (Boyko et al., 2005.) The endemism rate is 100%. Their distribution area is located between 18° and 25° S and 46 and 48° E, between 600 and 1,900m in altitude, in the Southeastern part of Madagascar. Most of these species are dependent on clear and cool waters of the forest (Hobbs, 1987; Rabearisoa, 1995; Rabearisoa et al., 1996; Cumberlidge & Boyko, 2001.) But a more recent study has shown that *Astacoides petiti* can be found up to 1,200m in altitude in Taolagnaro (Ravoahangimalala et al., 2007.)

In the IUCN red list, 3 crayfish species are endangered (EN) - *Astacoides petiti*, *A. caldwelli*, and *A. betsileoensis*. One species is in the category of Least Concern and 2 in Insufficient Data.

### **iv.- Freshwater Crabs**

At the end of the systematic revision of this group and the further description of new species (Ng & Takeda, 1994; Cumberlidge & Stenberg, 2002; Cumberlidge et al., 2005; Reed & Cumberlidge, 2006,) 8 genera and 15 species are presently inventoried in the *Potamonautidae* family: 7 endemic genera in Madagascar, with 15 species; and in the *Sesarmidae* family: 1 genus, *Labuanium* (1 endemic species.)

Out of the inventoried 14 crab species, two are Vulnerable, five in Insufficient Data, and one species is not evaluated.

For the whole shellfish, 6% of the species are classified In Danger, 4% Vulnerable, 45% DD, and 18% without status (IUCN 2013.)

### **v.- Sea/Marine Invertebrates**

6 new species of MURICIDAE (Rafinesque, 1815) observed in the Deep South of Madagascar have been recently identified and described; 3 in the subfamily of MURICINAE (Rafinesque, 1815): *Chicoreus* (*Triplex*) *kantori*, *Naquetia manwaii*, and *Dermomurex* (*Dermomurex*) *charlesi*; 2 in the subfamily of MURICOPSINAE (Radwin & D'Attilio, 1971): *Favartia* (*Favartia*) *tantelyi* and *Favartia* (*Pygmaeapterys*) *fournierae*; and one in the subfamily of RAPANINAE (Gray, 1853): *Semiricinula bozzettii* (Houart & Héros, 2013.)

## **B.- Vertebrates**

### **i.- Freshwater Fish**

The Malagasy continental fish fauna consists of 176 inventoried species. 115 of them are strictly living in freshwater and 98 are endemic.

However, 29% of these endemic species are completely unknown and the lack of information does not allow assessing their status.

One species called *Paretroplus menarambo*, an endemic *cichlide*, was considered Extinct in the wild, until it was discovered again in the Tseny lake in the Northwest of Madagascar in 2008 (Andriafidison et al., 2011;) this species is today considered as Critically Endangered (IUCN, 2013) qualifying the site as the *Alliance for Zero Extinction* (AZE)

### **ii.- Sea Fish**

Existing scientific documentation confirms that Madagascar is home to at least 830 species of reef fish (Cooke & Brand, 2012.)

As for sharks, 4 endemic species of sharks are present on the coasts of Madagascar: the blue-stained chabot shark (*Chiloscyllium caerulopunctatum*) (Kizska et al., 2009,) the large-headed shark (*Bythaelurus clevai*), the rajidé of Madagascar (*Dipturus crosnieri*,) and the dwarf rajidé (*Fenestrajama ceachrani*.)

### iii.- Amphibians

Madagascar counts now 284 amphibian species (Andreone et al., 2012.) It has increased by 16,39% compared to the 2009 situation (Vietes et al., 2009,) as illustrated in the 4<sup>th</sup> national report. This exceptional biological wealth is also characterized by an endemism rate close to 100%. Actually, only one species (*Hoplobatrachustigerinus*) is alien and another one (*Ptychadena mascareniensis*) is considered as native (Vences et al., 2004.)

The last assessment of the Malagasy amphibians was in 2005, as mentioned in the CDB 4<sup>th</sup> national rapport: 55 out of the 220 evaluated species (25%) were considered as Endangered of extinction, 9 of which were Critically Endanger (CR,) 21 Endangered (EN,) and 25 Vulnerable (VU) (Andreone et al., 2005.) After the IUCN Red List update, the number of threatened species has come to 66 and 6 of which CR (reaching to 7 in 2009,) 31 EN, and 29 VU (Andreone et al., 2008.) The only amphibian species classified in CITES Appendix I for Madagascar is *Dyscophusantongilii*. All the species belonging to the *Mantella* genus and *Scaphiophrynegottlebei* are in Appendix II.

Between 2010 and end of 2013, there are 41 new amphibian species described for Madagascar and more than one hundred new forms are already identified and in-process of description.

Numerous species, only known in one or two locations, have been recently inventoried in other sites, implying an extension of their distribution area thus. They are interna alia *Boophis tampoka* (Vences et al., 2011; Raselimanana, 2013,) *Mantella crocea* and *M. manery* (Edmonds, 2009,) and *Plethodontohylafonentana* (Raselimanana, 2013.)

### iv.- Reptiles

Madagascar is presently home to 398 reptile species and many other news forms are already identified or in process of description. It has noted an increase of 7.57% of the specific wealth compared to the situation in the 4<sup>th</sup> national report.

The endemism rate is close to 95%. Endemism has even touched the sub-family level. Such is the case of the *Oplurinae* and the *Gerrhosaurinae*.

Among the 398 reptiles species known in Madagascar, 137 (34.42%) are classified as Threatened of Extinction, 23 of which are Critical Endangered, 52 Endangered, and 62 Vulnerable (IUCN, 2013.) Moreover, 42 species are nearly threatened according to this same source.

It is worth noting that the conservation status of tortoise and the terrapin species is not revised nor re-evaluated in the IUCN Red List.

Apart from *Brookesia perarmata*, classified in the CITES Appendix I, all other chameleon species belonging to the *Brookesia*, *Calumma* and *Furcifer* genera are in the CITES Appendix II. Same thing for the flat-tailed nocturnal gecko species belonging to the *Uroplatus* genus, the diurnal geckos (*Phelsuma*) and the Nile crocodile (*Crocodylus niloticus*) which are all in Appendix II. The tortoises including the species belonging to the *Astrochelys* and *Pyxis* genera are classified in Appendix I.

Between 2010 and 2013, 19 species are newly described for the science. This represents an increase of 5.14% compared to the previous situation.

According to the results of recent biological explorations, numerous species that were only inventoried in one or two locations before have an extended distribution area. Among them are the *Phelsuma klemmeri* (Razafimahatratra et al., 2010,) *P. breviceps* (Gardner & Jasper, 2010,) *Lygodactylus blancae* (Randrianantoandro & Hobinjatovo, 2011,) *Pararhadinaea melanogaster*, and *Amphiglossus tansysoma* (Labanowski & Lowin, 2011.)

As for the turtles, five out of the seven species are in the Madagascar and the Western Indian Ocean region (WIO) waters.

#### v.- Birds

The Malagasy avifauna specific riches are relatively poor compared to those of the other tropical countries but its endemism rate is exceptionally high. It has 282 species but two are probably extinct, *Tachybaptus rufolavatus* and *Coua delalandei*. Compared to the Malagasy avifauna specific wealth mentioned in various literatures, the number of species presented here is the result of recent taxonomic revision confirming the non-validity of the previous systematic of some species as being fully-fledged species, namely *Hypositta perdata* (Fjeldså et al., 2013,) *Monticola bensoni*, and *M. erythronotus* (Cruaud et al., 2011.) Then, a new species for the science, *Mentocrex beankaensis*, was described in 2011 (Goodman et al., 2011.)

As far as endemism rate is concerned, it represents more than 37%, and with a percentage of 69%, the passerines have a high concentration of species not found elsewhere. It is even more remarkable in the forest species with a rate of more than 80%. At the higher taxonomic level, Madagascar has five endemic families, which are the *Mesithornitidae* (3 species,) *Brachypteraciidae* (5 species,) *Leptosomatidae* (a species,) *Bernieridae* (11 species,) and *Vangidae* (21 species) (Goodman & Hawkins, 2008; Raherilalao & Goodman 2011.) Besides, two endemic subfamilies intersect, the COUINAE represented by a genus, *Coua*, and 9 living species; and PHILEPITTINAE including two genera, *Philepitta* and *Neodrepanis*, each being represented by two species.

In combining the IUCN conservation status (2013) and information obtained from the new systematic revisions of the *Hypositta perdata* (Fjeldså et al., 2013) and the *Monticola* complex (Cruaud et al., 2011,) 240 species were evaluated, 36 of which are threatened, including 2 Extinct species, 2 Critically Endangered, 10 Endangered, and 22 Vulnerable.

The previous conservation status of *Actophilornis albinucha* was considered as Least concern, but since 2011, this species is included in the Nearly-threatened category. It is also the case for *Mentocrex [= Canirallus] beankaensis* which was considered as nearly threatened species with declining populations in 2012.

The *Coua verreauxi*, a threatened species, has recently extended its distribution area (Raselimanana et al., 2013.)

About 40 species of sea birds live around the coasts of Madagascar, including albatross, petrels, phaetons, mad, frigates, skuas, seagulls, and terns. With 17 species, the terns are well-represented (Cooke & Brand 2012.)

#### vi.- Unflying Small Mammals

Two groups of small mammals with an important diversity are found in Madagascar: the NESOMYINAE subfamily including all endemic rodents; they consist today of 9 genera and 27 species and the TENRECIDAE family including 8 genera and 32 species (Soarimalala & Goodman 2011.) Three species of the MURINAE subfamily, namely *Rattus rattus*, *R. norvegicus* and *Propelled musculus*, and two species of SORICIDAE, *Suncuses madagascariensis*, and *S. murinus* were introduced into the island.

Six *Tenrecidae* species were considered as threatened species in by the IUCN (2013) two of which are Endangered and four Vulnerables. The others are classified as of Least Concern or with an insufficient Data status (IUCN 2013.) As for the rodents, 6 are considered as Endangered, 1 Vulnerable, and the rests are of Least Concern or with Insufficient Data.

#### **vii.- Bats**

A total of 43 species grouped in 7 families are found in Madagascar, 31 of them are endemic (Goodman, 2011.) Out of the 43 species, 3 belong to the *Megachiroptereses* family and 40 to *Microchiroptereses*. Only one family, *Myzopodidae*, including 2 species, is endemic.

*Pteropus rufus* appears in the CITES Appendice II. One of the 43 species is considered as Endangered and 3 Vulnerable (IUCN 2013.)

#### **viii.- Carnivores**

Madagascar is home to 13 *Carnivora* species including the native and introduced animals (Goodman, 2012.) The three introduced species in Madagascar are the domestic dog (*Canis lupus*), the domestic cat (*Felis silvestris*), and the India chive (*Viverricula indica*.) Out of the 13 species, 10 are endemic and they belong to the *Eupleridae* endemic family. They live extensively in the forest and are often unknown.

Three taxa appear in the CITES Appendice II (*Cryptoprocta ferox*, *Eupleres goudotii*, and *Fossa fossana*.) One of the ten present species is inventoried in the "Endangered Species" category of IUCN Red List (2013): *Galidictis grandidieri*; three in the category "Vulnerable Species": *Cryptoprocta ferox*, *Mungotictis decemlineata*, and *Salanoia concolor*.

#### **ix.- Lemurs**

Due to its very high diversity and its unequalled endemism, Madagascar is the highest world priority concerning primate conservation. With the presence of five families, 15 genera and 105 species and subspecies, the Great Island is actually in the third position among the countries with high diversity of primates (103 during the IUCN Lemur Red list workshop in 2012) (Mittermeier et al., 2000; Schwitzer et al., 2013.)

Most lemurs have a conservation status in the UICN Red List (2012.) According to this list, 94% of the species are threatened with extinct, 24 species of which are Critically Endangered, 49 Endangered, and 20 Vulnerable. The flagship lemurs and those having a Threatened conservation status are targeted in the management plan of most protected areas. Nevertheless, six species are classified among the world's most endangered 25 primates, among others, *Microcebus berthae*, *Lepilemur septentrionalis*, *Varecia rubra*, *Eulemur flavifrons*, *Propithecus candidus*, and *Indri indri* (<http://www.ecorazzi.com/2012/10/15/the-worlds-25-most-endangered-primates/>)

#### **x.- Sea Mammals**

It is confirmed that 23 out of the 37 sea mammal species of the Western Indian Ocean Region have been observed in the coastal zones of Madagascar. They include 17 dolphin species, 5 whale species, and 1 sirenian species (Kizska et al., 2011, Van Canneyt et al., 2011.)

## C.- Particular Wildlife Sites

### i.- Mangroves

The mangrove fauna is abundant. Most species subservient to this environment are also adapted to the high salinity. The majority of mangrove **mammals, birds, and reptiles** are not subservient to this environment. They often come from the neighboring locations and stay there only for food.

Several crustaceans species use mangrove ecosystem as nurseries until their sub-adult stage (shrimps: *Fenneropenaeus indicus*, *Penaeus monodon*, *Alpheus crassimanus*, *Alpheus edwardsii*...,) or as habitat (mangrove crab *Scylla serrata* - the most common species, its potential was estimated at 7,500 tons for all Malagasy mangroves.)

**Fish** species count species of commercial value, but some of them have become scarce, like the *Mugil macrolepis* (*zompona*) which are only found in the markets around Nosy Varika markets, Vatovavy Fitovinany Region, the SouthEast regions. In the latter, silting of mouth rivers has reduced eel production by 42.85% (REEM, 2012.)

Some **rare gastropods** (*Oncidium verruculatum* and *Cassidula labrella*) are seen in some mangroves of Toliara.

### ii.- Other Marine Habitats

Madagascar coastal zones constitute important migration zones for breeding and feeding for the marine mega fauna:

- After working out on satellite-based beacons on humpback whales, information recently obtained reveals the importance of land areas in the Eastern and Western coasts of Madagascar as their migratory routes. The few individuals observed in our territorial waters during the nesting season move toward the Eastern coast of Africa, Kenya, (Cerchio et al., 2013) and Reunion (Globice, unpublished data.) Moreover, the few whales observed in the Mayotte maritime zones use our coastal zones to migrate to the Antarctica for food (Fosette et al., 2014.)
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- Species of sea birds migrate in our coastal habitats (abrupt cliffs or islets) for nesting or feeding purposes; the white-tailed phaeton (*Phaethon lepturus*) migrates to our coasts to nest. The Barau's petrel (*Pterodroma baraui*), endemic to Reunion, migrates to Madagascar's ocean sector for food.
- Turtles from the other WIO regions lay their eggs on the beaches of Madagascar (except for the leatherback turtles.) The coastal habitats are also used as feeding sites by these turtles.
- The migratory routes and the sites of attachment of the whale sharks (*Rhincodon typus*) in the western Indian Ocean become better-known through satellite and acoustic monitoring. This highly migratory species is present around the coasts of Madagascar, especially in the Northwest, during the rainy season (November - December) when the zoo plankton biomass is at maximum (Kizska et al., 2009.)

- The coastal zones of Madagascar, particularly the Northwest, the Northeast and the Southwest, is still home to a small population of dugongs compared to the other WIO maritime zones (Comoros, Mayotte.) Referring to the observations between 2010 and 2012, 15 species have been observed during that period (Van Canneyt et al., 2011; Razafindrakoto & MEF, 2012,) while only one species was observed in 2010 in the maritime zones of Comoros archipelago (Van Canneyt et al., 2011.) This species viability is uncertain in the Mayotte maritime zones (Kizska et al., 2007.)
- The Western coast of Madagascar is a part of the distribution area of the Indo-Pacific humpback dolphins (*Sousa chinensis*) located along the Mozambique Channel (Razafindrakoto et al., 2004, Andrianarivelo 2012.

### **iii.- Masoala Peninsula**

Located in the Northwest, the Masoala peninsula strand so forthes over about 4,200 km<sup>2</sup>. With its outstanding mostly dense rainforest – with 5.9m of rain per year, the peninsula is exceptional in terms of wildlife diversity and endemism. Actually, it is known as the only place in the world where the red *vari* lemur (*Vacecia rubra*) can be found. There are also other rare mammals such as the Allocebe (*Allocebus trichotis*) and the Galidie concolore (*Salanoia concolor*.) The serpent eagle (*Eutriorchis astur*) considered as one of the rare prey birds in the world is also found there. Some rare or threatened birds, as well as at least 135 butterfly species and a great number of beetles also exist on the peninsula. It is also home to other taxa, among which are 76 amphibian species and 72 reptile species (Goodman, 2008.)

### **iv.- Tsingy of Bemaraha**

Located in the Central Western part of Madagascar, the Bemaraha plateau strand so forthes over 250 km. The area consists of large limestone deposits. The plateau is characterized by a dense range of deep cracks separated by fluted laths and abrupt ridges, and a myriad of underground galleries covered with concretions. Within these highly jagged limestone environments, there is a mosaic of habitat dominated by the Western dry forest and which constitute a unique ecosystem and an exceptional wealth of endemic species habitat. The Bemaraha Tsingy is home to at least 11 lemur species, some of them have very restricted distribution, and home to some carnivores and rodents like *Nesomys lambertoni* and *Eliurus antsingy*, restricted in the Central Western limestone locations. The numerous underground caves provide shelter to a variety of bats. The birdlife is rich with at least 94 species, including the Rail of Tsingy (*Mentocrex beankaensis*.) Same thing for reptiles and amphibians: 10 species of which are considered endemic to the Bemaraha Tsingy (Goodman, 2008.)

## **II.2.3.- Agricultural Biodiversity**

### **II.2.3.1.- Agricultural Species**

As mentioned in the CDB's 4th national report, "numerous alien plant species of America like vanilla (*Vanilla fragrans*), corn (*Zea mays*), peanut (*Arachis hypogaea*), cocoa (*Theobroma cacao*), sweet potato (*Ipomea batatas*), of Asia like the pepper tree (*Piper nigrum*), the banana tree (*Ides about spp*), the mango (*Mangifera indica*), the taro (*Colocasia esculenta*), and rice (*Oryza sativa*), or of Africa like the coffee tree (*Coffea spp*), the grapevines (*Vigna spp*), the doliques (*Dolichos lablab*), the yams (*Dioscorea spp*), and many others have thus enabled to develop novel species in the Great Island".

- Plants grown for food purposes (animal and human) in Madagascar are mainly cultivated on the central High Plateau, while the cash crops are mostly on the coasts;
- Food crops: cereals (rice, corn, wheat, barley,) leguminosae (bean, voandzou/groundnut, Cape **peas**, grapevine, cowpea/dolique, groundnut,) tuber plants (cassava, sweet potato, potato, taro;) the market garden produce species like leafy vegetables (black nightshade, amaranths, cabbage, Chinese cabbage, and plants whose leaves are eaten such as bredes; root vegetables like carrots, onions, garlic, green peas; fruit vegetables such as the cucurbitaceous (pumpkins, squashes, zucchini, and chayote,) the solanacea (tomatoes, eggplant, and African eggplant;) stem vegetables (asparagus,) and spices (ginger, peppers, cinnamon, and coriander;
- Cash crops: coffee, vanilla, pepper, clove, sugarcane, tea, cashew, fiber plants (cotton, raffia, sisal, jute,)
- Fruit trees: leeches, banana, pineapple, strawberry, mango, apple, fishing, plum, orange, lemon, watermelon, and passion fruit;
- Fodder plants: graminae and leguminaceas.

### **II.2.3.2.- Animal Husbandry**

"Domestic animals" are mainly composed of cattle (*Bos Taurus*), dominated by Malagasy zebus (*Bos indicus*), pigs (*Scrofa suis*), small ruminants (goats: *Capra aegagrus*; ovines: *Ovis areis*), poultries mainly hens (*Gallus gallus*) and geese (*Anser sp*), ducks (*Anas sp*), guinea fowls (*Numida meleagris*), ostriches (*Struthio sp*), and quails (*Coturnix sp*) as well as the fish species categorized according to their raising environments namely the fresh water fish farming (Tilapias: *Oreochromis niloticus*; Carps: *Ciprinus carpio sp*) and the sea and brackish water fish farming represented mainly by the striped shrimps (*Penaeus monodon*) (Minelv, 2013.)

#### **A.- Zebus**

The Malagasy zebu is an emblematic breed of the Great Island. However, some studies have shown that the number of zebu is in decline for years now. The main known causes are inter alia the various parasitic infestations (Raharimalala, 2012) as well as the existence of young reproducing females but are slaughtered for human consumption (Randriantsoa, 2013.) Nevertheless, the bovine livestock is the main animal genetic resource in Madagascar both economically and socially.

#### **B.- Dairy Cows**

Alien races have been involved in the genetic improvement and the dairy productivity: Norwegian Red Pie, French Frisonne Black Pie, Brune of the Alps, and Holstein. The Rana race is a crossbreed from bullfighting race with the Malagasy zebu.

#### **C.- Small Ruminants**

For small ruminants, the breeding systems are predominantly extensive. The population of small ruminants is mainly intended for meat production, wool and milk, although in some regions the caprine and ovine breeding is used for social and religious purposes. In competition with the bovine meat, the consumption of small ruminant meat increases for populations in the capital. Between the 5 suburban slaughterhouses, a batch of 300 cattle heads is slaughtered every fifteen days. The native races are the most affected so morphological study of these breeds allows developing a tool to monitor performance and to manage the sire's selection process and to create cores for sires' maintenance (Razafindraseta, 2011; Randriamahatana, 2011; Rafenomanjato, 2011 and Razafindratsito Andriatsitohaina, 2011.)

Moreover, the introduction of new breeds (angora and boer) moves the farming system towards intensification, reflecting thus a slight tendency of small ruminant livestock increase (approximately 70% of the goats) since 2008.

#### **D.- Pigs**

Three main breeds (local race, large white and landrace) form the pig livestock in Madagascar. Different forms of crossbreeding have been realized to improve the local breed productivity.

The breeding systems are predominately domestic: 55% are of domestic type with lower level of input, 28% of traditional type and 17% of semi-industrial type.

In 1998, due to the outbreak of swine pestilence, the pig population was decimated to almost 50%, and leaving only 33,000 heads for the reproductive livestock. In 2003, the MPE was consulted for swine launch by importing 12 sires of Large-White race from Reunion Island. Zootechnic measures were taken, namely the regulation of the rearing system into semi-extensive or semi-intensive, and prohibiting of free grazing and the compliance with rationing and/or food.

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The pork industry is considered a speculative hoarding with different categories of operation, in this case, the breeder type, the feeder type, and the mixed type (breeder + feeder.)

Pig farming is widespread in Madagascar, mainly in regions producing raw commodities necessary for their traditional diet (rice, corn, cassava.) There are some regions with high density of pigs and others that have just small numbers per household. Breeding areas are located in Antananarivo (Ambatolampy, Antanifotsy, Betafo, Tsiroanomandidy, and Anjozorobe;) Antsiranana (Ambilobe and Andapa;) Fianarantsoa (Vangaindrano, Ambohimahasoa, and Amoron'i Mania;) Toliara (Mahabo, Beroroha, and Belo / Tsiribihina;) Mahajanga (Port Bergé, Kandreho, and Maevatanana,) and Toamasina (Ambatondrazaka.)

Antananarivo, Antsiranana, and Fianarantsoa represent 87% of the national production.

#### **E.- Poultries**

For all species, 30,000,000 head of poultries have been identified across Madagascar (the chicken represents more than 90%) estimated at MGA 120 billion (USD 60 million.)

About 77.4% of the Malagasy farmers practice this type of farming. According to the MAEP (2007,) a farm raises on average about a dozen poultries, generally as secondary activity to complement agriculture. This number varies from one region to another, between 9 and 24 heads. That shows the relative importance of traditional farming compared to modern poultry farming. The poultry livestock is essentially composed of chickens, gallinaceans, and turkeys. Rearing chicken is the most widespread grouping together more than 83% of the total livestock number.

According to the Ministry of Livestock (2013,) the species of national importance are: broilers are produced in all major towns of the regions with a total production of 26,204 t / year in 2013; laying hens making 70% of the national livestock are in Analamanga Region allowing speculation in all the main towns of its regions; turkeys are mainly found in the Regions of Melaky, Androy, and Anosy; ducks in Analamanga, Haute

Matsiatra, and Sofia Regions; mulard ducks in Analamanga, Haute Matsiatra, and Vakinankaratra Regions; and geese in Alaotra Mangoro, and Sofia Regions.

Poultry farming is one of the main sources of animal protein in Madagascar's rural areas. It contributes to decrease the food imbalance, especially in the countrysides. However, the poultry sector is subject to high health risks (diseases from viruses, bacteria, and parasites) and requires support actions in terms of efficient health organization and control.

#### **F.- Ostriches**

Ostrich farming is a typical industrial and touristic activity in some regions (Morondava, Vakinankaratra, and in the South.) Some breeds have disappeared and the existing breed is the product of recent imports. Ostrich farming contributes to the production of chicks, skins, feathers, and especially meat (served in restaurants.)

For larger birds, ostrich farming remains a curiosity in Madagascar. According to Randrianera (2014,) in 2013, only 32 animals are inventoried in 4 cities (3 in Antananarivo, 13 in Mahajanga, 9 in Fort-Dauphin, and 7 in Antsirabe.)

The Antananarivo and Fort-Dauphin ostriches are used as an attraction in zoos, while those of Mahajanga are in fact intended for meat production.

#### **G.- Guinea Fowls**

The domestication of guinea fowl is an exotic, underdeveloped, uncertain, and fun activity. Among others, guinea fowl breeding of domestic type contributes to produce eggs and meat. Some wild species are exploited in warm Northwestern, Western, Southwestern, and Southern regions of Madagascar: the lilac variety of dotted gray feather with white and light blue variety. The main objective is to produce well-appreciated meat in restaurants. Irrational exploitation or uncontrolled hunts causes instability of the ecosystems where the guinea fowls stay. The number of the guinea fowl livestock in Madagascar is not well-defined due to traditional village and farming modes.

#### **H.- Quails**

The quail farming in Madagascar is a very recent and little-known activity. It is essentially represented by Japanese quail breeding "*Coturnix japonica*" at individual and private farms specializing in the sector. The farming is so far of extensive type improved since 2007. Therefore, the exact number of quails in Madagascar is not sufficiently specified. Moreover, according to a fairly recent study (Razafimandimby, 2013,) the "Caille de Mada" farm owns around 200 to 300 heads of quails of three different varieties: the gray quail, the yellow quail, and the white quail.

The quail products are often regarded as luxury products as regards to meat and eggs while farm by-products (droppings) are used in agriculture.

#### **I.- Fish Farming Species**

Freshwater aquaculture is distributed in the regions of Itasy, Analamanga, and Vakinankaratra while that of sea and brackish water is mainly concentrated in Boeny region (Ramamonjisoa, 2013.) Three types of fish farming exist: fish farming in cages or pens (1,500 to 1,600 km<sup>2</sup>;) fish farming in ricefields – on about 340km<sup>2</sup> - and fish farming in ponds - about 20 km<sup>2</sup>- (MAEP 2004.) However, it is found that the number of fish farmers is low (5.3% of the agricultural population) and that among the three types of fish farming, farming in cage is hardly practiced (MAEP, 2008) showing the predominance of extensive and/or semi-intensive modes then.

## **J.- Kinds of Shrimp Farming**

A booming industry worldwide since 1970, shrimp farming in marine and brackish waters of Madagascar has developed following the success of the Nosy-Be pilot farm in 1992. The Western side of Madagascar represents the most area conducive to shrimp farming on a net developable area of 11,000 ha (Autrand and Rafomanana, 1998.) The shrimp production for consumption grew by 7.5% in 2010 (59.9 million tons) compared to that of 2009 (55.7 million tons) (FAO, 2012.) Being a source of animal proteins for human beings, aquaculture in marine and brackish waters, either extensive or semi-intensive (Nalijaona, 1998; Raoelimanana, 2001) or industrial also provides livelihood and income to local population and is an important source of foreign currencies to the country's economy (Rakotomanana, 2013.) However, shrimp reproduction is low due to lack of sires/spawners (origin and weight) and to the required physico-chemical parameters (Jaondrazana, 2002.)

## **II.2.4.- Mushrooms and Microorganisms**

### **II.2.4.1.- Generalities**

Microorganisms represent the largest group of beings constituting the biodiversity of the planet. The most current estimate attributed to bacteria and *actinomycetes* a record number of more than 10 million of species and 1.5 million fungal species (Hawksworth, 1991; Mueller et al., 2004.) Plant species only has about 300,000 to 500,000 species (Govaerts, 2001; Raven, 2004.) In Madagascar, which is universally known for its flora and fauna mega biodiversity, data on microorganisms are rare. Knowledge of the current microbial diversity status in Madagascar is still limited for the following reasons: the recent effective date for the newly-created Laboratory of Environment Microbiology (by 2002) to begin its operations; investigations limited to some non-representative plots of some types of formations (sclerophyllous forests, dense rainforests;) studies directed towards the harnessing of technology of valorization of microorganisms, but marked by lack of activities and qualified staff in systematic sciences to identify microbiological species.

Various native formations such as the dense rainforests (coastal and in high altitudes of the Eastern slopes,) the clear forests of sclerophyllous type, savannahs, fields, and meadows (central highlands,) semi-deciduous forests, and xerophytic thickets (Western region,) respectively house a diversified specific mycoflora, with many non-identified taxa, i.e. new to science. Now, a CNRE team has inventoried 60 morpho-species of mushrooms consumed by the Malagasy population (belonging to various taxonomic groups, *Agaricus*, *Pleurotus*, *Macrolepiota*, *Collybia*, *Gymnopus*, *Cantharellinae*, *Gasteromycètes*, *Russulaceae*, *Lentinae*, *Marasmiaceae*, and *Tricholomae*,) and about a score of other species whose consumption is only known elsewhere in Africa or Asia.

Many microorganisms of Malagasy origin were discovered for their potential use in medicine. And others play major roles in active life in soils.

### **II.2.4.2.- Status of Fungi and Microorganisms Diversity**

The present status of the fungal diversity within Madagascar's dense rainforests has been established. They are partial data reported in two variant altitudes: coastal forest (F. litt.) on coastal sand and rainforest of average altitude (F.H. Alt.) between 800 and 1,200m in altitude. The total number of inventoried species is 292. The number roughly advanced in 1996 (cf. Monograph of the biodiversity of Madagascar") from the SIBIO data base of 201 fungal species does not allow a comparison or analysis of trends on the general status of this fungal biodiversity. A certain number of study parameters should be integrated: the areas of forest covered by the inventory; annual frequency and length of observations; number of sites representing a given

forest type; main taxa found by site; and conservation level of rare species in protected areas. Among the inventoried 292 species (or taxa,) 230 are represented in the two forests types, 44 are specific to the rainforests in altitude, and 18 are only found in coastal forests. The forest two types account for 87 ectomycorrhizian species, 16 of which belong to the *Cantharellus* genera (food resources of high value) and of arable saprophytes taxa of food and medicinal interests (*Pleurotes*, *Agarics*, *Lentinula*, *Auricularia*, and *Shizophylle*.)

The two habitat types have a certain interest in preserving the fungal diversity. However, forest areas of explored sites (coastal forests: private small forest of Andavakimena and Tampolo forest station of the Antananarivo University; rainforests of average altitude: Ambohitantely reserve, Anjozorobe and Analamazaotra, and the Ranomafana N.P.) are not representative of all dense rainforests, and the investigations time were very limited.

Apart from systematic studies, other investigations illustrate the implication of these microorganisms in ecosystem functioning. Thus, Ramanankierana et al. (2007) showed that 94 taxa of ectomycorrhiziens fungi are associated with *Uapaca bojeri*, which is the fundamental and characteristic element of the sclerophylles forests of the Malagasy highlands. These very authors indicated that these symbiotic mushrooms play an important role in biodiversity conservation within these forests.

In the Eastern part of Madagascar, among the 83 native plant species whose roots have been under observation in 5 forest formations (Saint Luce, Mandena, Petriky, Tampolo, and Mahatsara) only two species (*Stephanostegia* sp and *Camphylospermum obtusifolium*) are nether associated with the ectomycorrhizian fungi nor with the endomycorrhizian fungi (Ducoussو et al., 2008.)

## II.3.- GENETIC RESOURCES

### II.3.1.-Generalities

The level of genes is still hardly defined by the biodiversity management in Madagascar. The main actions led in the country are essentially at the ecosystem level. This is how the development of the protected areas system had truly advanced to allow safeguarding the biologic diversity. Nevertheless, some initiatives have been taken and others are in progress for particular fauna and flora species.

The first reflections on genetic resources started in 1995 with the support of the IPGRI (International Plantation Genetic Resources Institute.) It resulted in Madagascar's participation in regional and international events on genetic resources.

Madagascar ratified the International Treaty on the Phytogenetic Resources for Food and Agriculture (TIRPAA) in 2006. The application of the treaty was coordinated by the Environment Section of the Ministry of Agriculture. The FAO respectively supported the development of two national reports on Phytogenetic Resources for Food and Agriculture (RPGAA) in 1995 and in 2009.

National actions on forest phytogenetic resources began by the end of the 1990s under the auspices of the Silo National des Graines Forestières (SNGF) (=National Silo of Forest Seeds,) a body working under the tutelage of the Ministry of the Environment and Forests. They concern the development of a document of strategic national plan for forest phytogenetic resources management in a participatory process (State, private sector, NGOs, and others) in 2000. The strategic plan provides an overarching guidance and an interim list of priority species, according to three criteria: threatened species, rare species, and socio-economically useful species. The forest phytogenetic resources management actions have been periodically undertaken by

different institutions and coordinated by the SNGF for knowledge capitalization and valorization sake. For that end, a workshop on the theme of “Complementarities of in situ and ex situ conservation actions” was organized in 2006 and two national reports relating the situation of the forest genetic resources were published in 2003 and 2012. Drafting the national report in 2012 is part of the publication process of the world state of forest genetic resources which is being finalized within the FAO.

A certain standard is agreed for contents of national reports on genetic resources: diversity, conservation status (in situ and ex situ,) sustainable use and management, national programs, regional and international cooperation, access to benefits and benefits-sharing, and contribution to food security, to poverty reduction, and to sustainable development (Ramamonjisoa L. et al., 2012; Andriamahazo M. et al., 2009.)

## **II.3.2.- Intraspecific Diversity**

### **II.3.2.1.- Forest Phylogenetic Resources**

Studies conducted on intraspecific diversity especially dealt with studies on species genetic variability and provenance trials.

Some intraspecific genetic diversity studies through molecular biology have been conducted on the following species: *Dalbergias monticola*, *Albizias gummifera*, some *Aphloia* and *Ravensaras* kinds. The study of intraspecific diversity also concerns precious wood species like *Dalbergia* and *Diospyros* genera in order to establish a traceability system in translating the genetic map of each species in barcode form. These studies were carried out in partnership with some foreign research institutions given that Madagascar doesn't have a specialized laboratory for this purpose yet.

Provenance trials and progeny tests on several species such as *Khaya madagascariensis*, *Liquidambar styraciflua*, *Eucalyptus spp*, *Pinus spp*, *Cupressus lusitanica*, *Acacia spp.*, and *Tectona grandis* have been performed. They consisted of comparative studies of sources or progenies aiming at selecting the best genetic materials to serve in seed orchards setup.

Concerns on diversifying sources for a same species during seed collection by the SNGF are worth noting in order to maintain used or conserved genetic diversity.

Other organizations such as the Royal Botanical Gardens of Kew led some researches on genetic variation of the populations in Madagascar. It concerns three palm trees species, namely: *Beccarioiphoenix madagascariensis*, *Lemurophoenix haleuxi*, and *Voanioala gerardii*.

Presently, the molecular biology method through DNA analysis is also used to identify botanical species of Madagascar.

### **II.3.2.2.- Agricultural Phylogenetic Resources**

The intraspecific diversity exists in natural conditions or has been created to respond to different ecological conditions of the country. This includes rice varieties such as the *Latsika* variety in high altitudes (> 1,500m,) the rather rustic X265 with an average cycle; *Oryza punctata* which has two bearing forms: spreading and erect/ developed. In the country, 500 indigenous rice species are known.

There are different varieties of sweet potatoes (*Ipomea batata*), 30 of which are inventoried on the highlands, and 50 in the South and SouthWest. For example, the *Sihanaka*, *Kelihebo*, *Reboha*, and *Tsiroevola* varieties are the identified ones.

As for cassava (*Manihot esculenta*), 31 traditional varieties are inventoried; one of them which is in the South is drought-tolerant. They are the *Resavoa*, *Beambony*, *Manajabagna*, *Kelimanatody*,

and *Menalaingofotsy* varieties. 60 corn varieties are inventoried in Madagascar, including the South African *Pannar* hybrid varieties. For sorghum, there are different local varieties of high size and very long cycle. However, their yields are very low. For potatoes, the *Solanum tuberosum* species, introduced by the 19<sup>th</sup> century, is grown for food. It shows an important intraspecific diversity (variety of skin color, variability of cycle lengths and resistance.) Thus, 25 varieties of potato are identified on the Highlands, including the purple flesh varieties called *Garana* and *Ovy manga*; and of others with white flesh (Washes, Pota, and Meva.) New varieties of *Spunta*, *Avotra*, and *Maharevo* are also available. Concerning beans, 50 varieties are known with at least one major local variety for every producing region: oxblood red varieties in the Northwest, *Ranjonomby* and *Soafianara* in the Highlands, *Ranjonomby* and the *Fotsy* population in the SouthWest, *Soafianara* and the *fotsy* population in the Middle-East, and the marbled red in the South. Three improved varieties are also available: RJ1, RJ5, and RJ5 -3. Eight new lineages of big-seeded pea without "Menamaso" (black dots) are stpored by peasants.

# TRENDS AND FACTORS OF BIODIVERSITY EVOLUTION

## II.4.- TRENDS ON ECOSYSTEMS

### II.4.1.- Forest Ecosystems

Recent data related to forest ecosystem trends have been collected from the report jointly prepared by CI, ONE, and the DGF in 2013.

**Table 9 :** Deforestation Coverage and Rate by Natural Forests Bioclimatic Zone (Period of 2005-2010)

Bioclimatic Zone	Natural Forest Coverage (in ha)		Deforestation Rate (% per yr)
	2005	2010	
<b>Humid</b>	4,702,020	4,658,155	0.2
<b>Dry</b>	2,628,029	2,554,746	0.6
<b>Spiny</b>	2,070,632	2,009,792	0.6

*Source: ONE, 2013*

During the 2005-2010 period, the forest ecosystems of the Western (dry forest area) and Southern (area of thorny scrubs and forests) Ecoregions are subjected to strong deforestation pressures at 0.6% per year. The aridity of these ecoregions, aggravated by climate change in the form of longer dry months, had encouraged the local population to use the forest for livelihood/subsistence farming. Consequently, slash-and-burn agriculture is intensifying and often causing wildfires due to highly combustible materials. Furthermore, deforestation has significantly increased due to charcoal production with forest species, which has grown considerably for a while.

**Table 10 :** Deforestation Coverage and Rate by altitude of Natural forests for the Period of 2005 -2010

Altitude (m)	Natural Forest Coverage (in Ha)		Annual Average Deforestation Rate (%)
	2005	2010	
<b>0 – 400</b>	5,175,077	5,039,150	0.5
<b>400 - 800</b>	1,653,168	1,633,659	0.2
<b>800 - 1200</b>	1,774,067	1,750,470	0.3
<b>1200 – 1600</b>	643,876	639,487	0.1
<b>1600 et plus</b>	172 991	172 786	0.0

*Source: ONE, 2013*

Because of their easier accessibility, natural forests of low altitude (0-400m) underwent a higher deforestation rate, 0.5% per year between 2005 and 2010. These types of forest are especially found along the Eastern and Southwestern coastlines. No significant change happened in mountain forests (from 1,200 to more than 1,600 m) between 2005 and 2010.

For comparison sake, it was noted that, in general, the deforestation rate is lower inside protected areas managed by Madagascar National Parks (MNP) than in the rest of the country. Between 2005 and 2010, the deforestation rate inside protected areas was 0.2% per year, i.e. half of the national rate. In term of areas, the protected areas managed by MNP had lost about 17,000 ha of forests in 5 years, i.e. 3,400 ha per year on average.

## **II.4.2.- Wetland Ecosystems**

The progressive loss of natural habitats areas is increasing, with 80% of marshland because of their conversion into ricefields. For instance, in the Kinkony Lake, there is a gradual decline in fishing products. The natural habitats productivity is reduced due to their degraded ecological and socio-economic functions. The disruption of trophic cycle is not to the fishermen's advantage. There is a risk of disappearance of some species in the wetlands.

The wetland siltation, following the deforestation phenomenon, leads to areas decrease and depth, and to the change in chemical parameters. Some lakes and marshlands had disappeared and others have become temporary or completely dried. This is the case of rivers in the SouthEastern region, of the Sahaka Lake, and the Mangarahara River in the Sofia region in the North. Endemic species are especially the most vulnerable ones.

The Ramsar site of Torotorofotsy, main habitat of *Mantella aurantiaca*, ralles, and snipes (especially, the *Sarothrura watersi*, *Rallus madagascariensis*, and *Gallinago macrodactyla*) is also gradually decreasing.

## **II.4.3.- Marine and Coastal Ecosystems**

The degradation of marine ecosystems in the SouthWest is more pronounced than in the Northeast.

For mangroves, spot studies give an overall trend. In most cases, the degradation phenomenon outweighs that of mangrove reconstruction: mangroves areas are now deteriorating or completely degraded, and tanned/salt flat areas are increasing (Rajerison T., Roger E., and Jeannoda V., 2008; Totozafy S., Roger E. and Jeannoda V., 2008.) However, some mangroves are expanding.

To illustrate, some examples are given below:

- Ambanja –Ambaro Bay/ trends 1990-2010:
  - ✓ Loss of 7,659 ha (23.7%);
  - ✓ Increase of 995 ha (3.1%);
  - ✓ Persistence of 24,669 ha (76.3%)
- Ampasindava mangroves in the Marine Park of Nosy Hara:
  - ✓ 2012: 0.35 ind/m<sup>2</sup>
  - ✓ 2013: 0.38 ind/m<sup>2</sup>

Restoration actions are undertaken without actually reaching the compensation level of these ecosystems degradation.

For coral reefs, the following are noticed:

- a loss of the coral architectural species (Grand Récif of Toliara) (Harris et al, 2009);
- a decrease of 8% of Ampasindava coral cover between 2012 (56%) and 2013 (47%);
- an improvement of 5% of Antsoko coral cover between 2012 (39%) and 2013 (44%).

For Ambodivahibe Bay, an increase in species diversity is noticed.

**Table 11 : Development of Coral Reefs**

Northwest	Northeast	Southwest
According to the RCR rate: relatively in good shape	High rate of coral cover: 48% No specific mortality during the past 10 years	1990-2010: Harris A. et al. (2009) Severe deterioration of the Toliara Grand Récif Almost complete loss of architectural species (replaced by algae) <b>Causes:</b> substantial population increase, lack of any form of management, significant overexploitation, lack of pollution control (wastewaters, sediments, other pollutants)

## II.5.- SPECIES TRENDS

### II.5.1.- Plant Species

Increased efforts on collecting botanical species in Madagascar have allowed counting the number of known species evaluated with certainty, whereas the 4th Report provided only an estimate. The number of inventoried *Pteridophytes* and *Gymnospermes* in the catalogue of vascular plants of Madagascar (Madcat) has significantly increased, and data on the Malagasy bryophites are now available.

Data on Malagasy useful plants are also currently numerous. Particular reference should be made to the work done by the group of Madagascar Plant Specialist or GSPM, in collaboration with Botanic Gardens Conservation International, on wild plants used as food and medicines (BGCI, 2010.) They allow inventorying more than 2,000 species, 1,887 of which are medicinal plants and 237 food plants.

Many postgraduate degree researches or thesis written by students from different Malagasy universities (which cannot be named here in the context of this report) also deal with ethnobotany. These works are generally accompanied by the evaluation of the conservation status of the plants under study.

The evaluation of the conservation status of Malagasy plants has made notable progress since the drafting of the 4<sup>th</sup> Report. Although the number of plants officially registered in the IUCN Red List is still small (about 700 species, including the Malagasy palm trees,) the number of evaluated species is superior to that number. This is the reason why the GSPM published in 2010 a catalogue of threatened plants in Madagascar, and a red List of endemic vascular plants in Madagascar in 2011. The latter contains the status of more than 2,000 plant species which are all threatened. The publication of the IUCN status of 192 evaluated species showed that palm trees are among the most threatened plant groups in the island; 83 % of the species are currently threatened with extinction (IUCN, 2012,) an estimated rate which is four times higher than plants in general (Brummitt & Bachman, 2010.) The types of threats affecting mostly palm trees conservation in Madagascar are those linked to the use of biological resources, such as natural forest clearing, forest products harvesting, but also due to collateral damage due to mining, fires, or urbanization.

Most recently, the Department of Plant Biology and Ecology of the Faculty of Sciences (which is the scientific plant authority of CITES) also evaluated or reevaluated the conservation status of species (Table 12) just listed in CITES Appendix II. The table below shows the number of species in each category of threat.

**Table 12 : Status of Species Evaluated in the Context of CITES (2013)**

Names of Taxa	Conservation Status					
	CR	EN	VU	NT	LC	DD
<i>Diospyros</i>	2	17	57	4		6
<i>Dalbergia</i>	8	18	12		5	
<i>Euphorbia</i>	8	6	3			
<b>Palm Trees</b>	2	2	2			
<i>Aloe</i>		2	2			3
<i>Cyphostemma</i>			1			
<i>Operculicarya</i>				1		
<i>Pachypodium</i>			2			1
<i>Senna</i>			1			

## II.5.2.- Wildlife Species

A large proportion of wildlife species is closely related to specific habitats such as the forest ecosystems and wetlands. Though available information is still insufficient to assess in a tangible and quantitative way the trend of animal populations, different taxa appear to evolve towards a loss of biodiversity.

Due to the interaction of different threats, aquatic food resources (crustaceans and especially fish) continue to decrease. Trends are focused on three main strands: population decline, reduction in individuals' size, and decrease in range of certain species.

Many amphibians and reptiles species are newly described since the last national report (4<sup>th</sup> report.) An increase of 16.80% of amphibians and 5.14% of reptiles was recorded.

Knowledge of the geographical distribution and the natural history of these taxonomic groups improved more thanks to the efforts of national and expatriate researchers, with the Research Permits issued by the competent authorities (DGF.) Consequently, with the creation of New Protected Areas that mainly takes this information on biodiversity into account, nearly all the species, and particularly those classified as threatened, are well represented within the system of conservation areas.

However, with the gradual loss of forest cover and natural habitats, as well as the illicit collection of certain species for international trade, the size of some populations tends to decrease in nature, and for others, the size of their distribution areas becomes more and more restricted.

For sea turtles, hawksbill concentration (green, Loggerhead, olive Ridley, nested) is high in the continental shelf of the West zone with a descending gradient of compliance rate from North to South of the Western Coast. Leatherbacks are found in the continental shelf of the West zone (between Besalampy and Maintirano,) (Van Canneyt et al. 2011.) The green and nested turtles are classified as Critically Endangered while the other three species (olive Ridley, Loggerhead, and leatherback) are in danger of extinction.

As for birds, it is noticed that the majority of the dependent forest species is becoming increasingly confined to specific areas, and tends to disappear locally (Sinclair & Langrand, 2013.) The loss of the forest cover of Bora Special Reserve is a concrete example. It has led to the local eradication of several species of birds, including *Coua caerulea* and *Philepitta schlegeli* (Raherilalao, unpublished data.) In front of this permanent

threat, 48% of the populations are currently in decline and 0.83% is recently extinct according to the IUCN (2013.)

The white pond heron, *Ardeola idea*, is classified as Endangered on the IUCN Red List (2013.) Not only the population is very small but it also decreases gradually related to large scale ecological transformation of its habitat, increased competition with other herons (especially *A. Ralloides*, more common in Madagascar,) eggs and young collection, as well as the disruption of breeding sites.

For the seabirds, the population trends in breeding sites are:

- Stable numbers of seabirds in the Morombe islets known as the only breeding sites of the *Puffinus pacificus* species. The number of couple was estimated at 125 by Appert (1965) and has remained practically the same now, according to Bemanaja (2009.)
- Decreased number of the colonies in some breeding sites such as in the Antaly Be Island (Marine Park of Nosy Hara) where only one adult in reproduction and 7 flying adults of the *Phaethon lepturus* species (tropicbird with a yellow beak) and 4 Caspian terns (*Hydroprogne caspia*) was seen in 2009 whereas it was once rich in seabirds (Bemanaja 2009.)

The *Anous tenuirostris* or Slender-billed Noddi species only reproduce in Nosy Manampaho, but with a very limited number of 5 birds. Many other terns' species, 135 Dougall terns in breeding plumage, 3 huppées terns, and 2 Caspian terns are found there (Bemanaja 2009.)

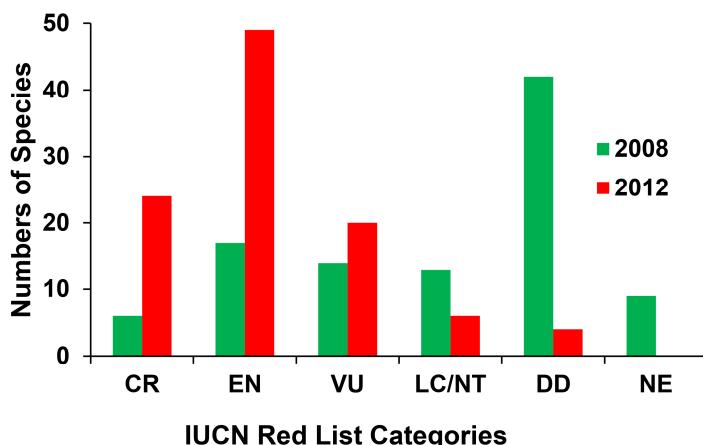
In the **small mammals group**, the species status was evaluated and considered before as *Suncus madagascariensis* but the status remains uncertain until very recently, although it is cited as endemic to the island. According to recent studies, it must be the *S. etruscus* which was introduced into Madagascar from the Indians (Omar et al., 2011.)

Given that information on the small unFlying mammals is insufficient, determining the species trends is still difficult because of various human and natural pressures. Compared to habitat degradation and hunting level, the trend is rather negative and the loss is unrecoverable as the ecosystems restoration is nearly impossible. Besides, the presence of the alien species *Rattus rattus* also contributes to decrease the number of endemic species in areas colonized by this species.

Recent works on distribution and systematic sciences of Malagasy bats have allowed discovering various endemic taxa which are new to science and African species which are not listed yet for the island. Out of 43 bats species currently recognized in Madagascar, 14 were very recently considered new to science and 5 as African taxa which were previously unknown in the island. Therefore, the recent inventories and the systematic studies associated with them had some major influence on the measures of specific wealth and endemism in Madagascar (Goodman 2011.)

13 species of **Carnivora** are currently known in Madagascar: 10 endemic species belong to the Eupleridae family, and 3 others were alien. Recent changes in the taxonomy of the Malagasy Carnivoras consist of the subspecies resurrection, *Eupleres goudotii major*, which is regarded as one separate species and called *E. major* (Goodman, 2012.) No information is available on the population trend of the taxa, but the majority is closely linked to the forest ecosystem and suffers also from habitat loss.

Like most large-sized species that are dependent on the forest to survive, populations of **lemurs** in Madagascar continues to decline, the status of lemurs have changed from Insufficient Data to Vulnerable, from Endangered to Critically Endangered in recent evaluations. However, 5 new species are discovered since 2009 (Radespiel et al., 2012; Rasoloarison et al., 2013.) For some species, such as the *Prolemur simus*, new populations have been found.



**Picture 7 :** Distribution of Conservation Status in Lemurs (Schwitzer et al., in press.)

In the marine mammals group, there was further confirmation of 8 other cetaceans' species, 3 of which are baleen whales species (blue whale, *Balaenoptera bonaerensis*, and Antarctic minke whale,) 5 dolphin species (Cuvier's beaked whale, *Ziphius cavirostris*, *Indopacetus pacificus*, *Feresa attenuata*, *Stenella coerulealba*, and *Kogia* sp.) Very few documents are available on the Southern right whale (*Eubalaena australis*) migration in the coastal areas of Madagascar. The well-known migration zone of this species is in the open sea of the Southern coast of South Africa and the Crozet islands (Rosenbaum et al., 2001.) Between 2009 and 2013, the particular annual observations of mothers with their calves in shallow areas of Sainte Marie could define a new breeding area of this species (*Cetamada*, unpublished data.)

The humpback whale has been classified LC since 2008 while the Dugong still remains Vulnerable due to human activities, namely deliberate hunts and accidental catches (Cerchio and al., 2009.) The maritime zones of Madagascar, especially the Northwest, the Northeast, and the SouthWest are home to a very limited population of dugongs compared to other regional maritime zones (Comoros, Mayotte) when referring to observations carried out between 2010 and 2012 when a total number of 15 individuals has been observed (Van Canneyt et al, 2011, Razafindrakoto & MEF, 2012.)

The representation of 24 out of 37 marine mammal species of the Western Indian Ocean Region (Kizska et al. 2011, Van Canneyt et al., 2011) is confirmed during observation in the maritime zones of Madagascar.

According to the IUCN Red List, there are several threatened **sharks** species:

- The whale shark (*Rhincodon typus*) is listed as "Vulnerable" and included in the Appendix II of the CITES Convention (as suggested by Madagascar;)
- The deep water ray (*Rostroraja alba*) is classified "Endangered" and 17 other species as "Vulnerable" (Séret in Cooke & Brand, 2012.)

Four endemic species are confirmed to date in Madagascar: the blue-spotted sculpin shark (*Chiloscyllium caeruleopunctatum*) (Kizska and al., 2009,) the broad-headed shark (*Bythaelurus clevai*,) the rajidae of Madagascar (*Dipturus crosnierii*) and the dwarf rajidae (*Fenestraria maceachrani*.)

### II.5.3.- Agricultural Species

Trends in the agricultural species group can be estimated from the evolution of the collections owned by FOFIFA and other institutions.

**Table 13 : Loss of Diversity in the ex-situ collections of FOFIFA**

Year	1996	2006	2013	Owner
Peanut	349	275	243	FOFIFA
Wheat	169	Abandoned	-	FOFIFA
Wheat	2,570	352	-	FIFAMANOR
Coffee	1,282	3,300	166	FOFIFA
Sugarcane	338	Abandoned	-	FOFIFA
Cotton	160	912	-	Hasyma
Bean	321	222	108	FOFIFA
Corn			184	FOFIFA
Cassava	330	202	-	FOFIFA
Pepper tree	195	Abandoned	-	FOFIFA
Rice	4,127	6,210	6,210	FOFIFA
Soya	272	Abandon	3 (Ongoing recovery)	FOFIFA
Grapevines	135	98	51	FOFIFA
Voandzou	28	47	47	FOFIFA

Source: DRA /FOFIFA

For coffee, the number of accessions to national collection has sharply fallen, especially since 2009- 2010 because of people illegally living on the FOFIFA's infrastructures, especially the site of Nanisana. Seedlings of coffee trees were all taken off, yet, in this site grow a considerable collection of **Ethiopia**'s wild **Arabica coffee trees**, from which derive all present Arabica coffee trees, popular worldwide, and those of Portugal and South America. However, only three countries in the world had this collection: Madagascar, Ivory Coast, and Cameroon (a small part only;) Madagascar's collection was the most complete. Let's mention also that coffee tree varieties which could resist rust, the main scourge of coffee trees, preserved in this site were decimated.

As for cotton, collection development for this species was made possible through collaboration with Hasyma that kept in situ varieties. At FOFIFA, when the collaboration ended, varieties were especially stored in cool places, but the expenses incurred by electricity use raised concerns.

Concerning the bean and leguminous with edible seeds, due to lack of means made available to FOFIFA to take care of the collection, and despite the expanded efforts, lots of accessions have disappeared. In sum, the budget allocated to preserve the bean had served somehow to cover other speculations.

The 108 still retained accessions do not consider the new varieties of voluble bean seeds (42 accessions being screened) and new varieties of bean rich in nutrients (32 accessions still being screened) that are of interest to Madagascar with respect to nutrition.

## **II.5.4.- Farmed Species**

Generally speaking, the farmed domestic animals are not threatened with extinction in the short-term in Madagascar. Moreover, introducing new breeds (angora and Boer) lead the farming systems towards intensification reflecting thus a slight trend of increase of the small ruminant populations (approximately 70% of the caprines) since 2008.

For the local cattle breed, some authors are pessimistic and very alarmist while predicting extermination within the next 2 years, by taking into account the declining number and the influences of population explosion (Dimisoa, 2012; George, 2012.)

Concerning pigs, instead of the PPA's impact which disturbed the normal geographical distribution, the largest numbers of pigs are in the regions that traditionally produce food crops (MAEP, 2004.) Yet, the swine fever remains the main cause of death in porcine farms and is a source of decrease in number of the national herd of pigs.

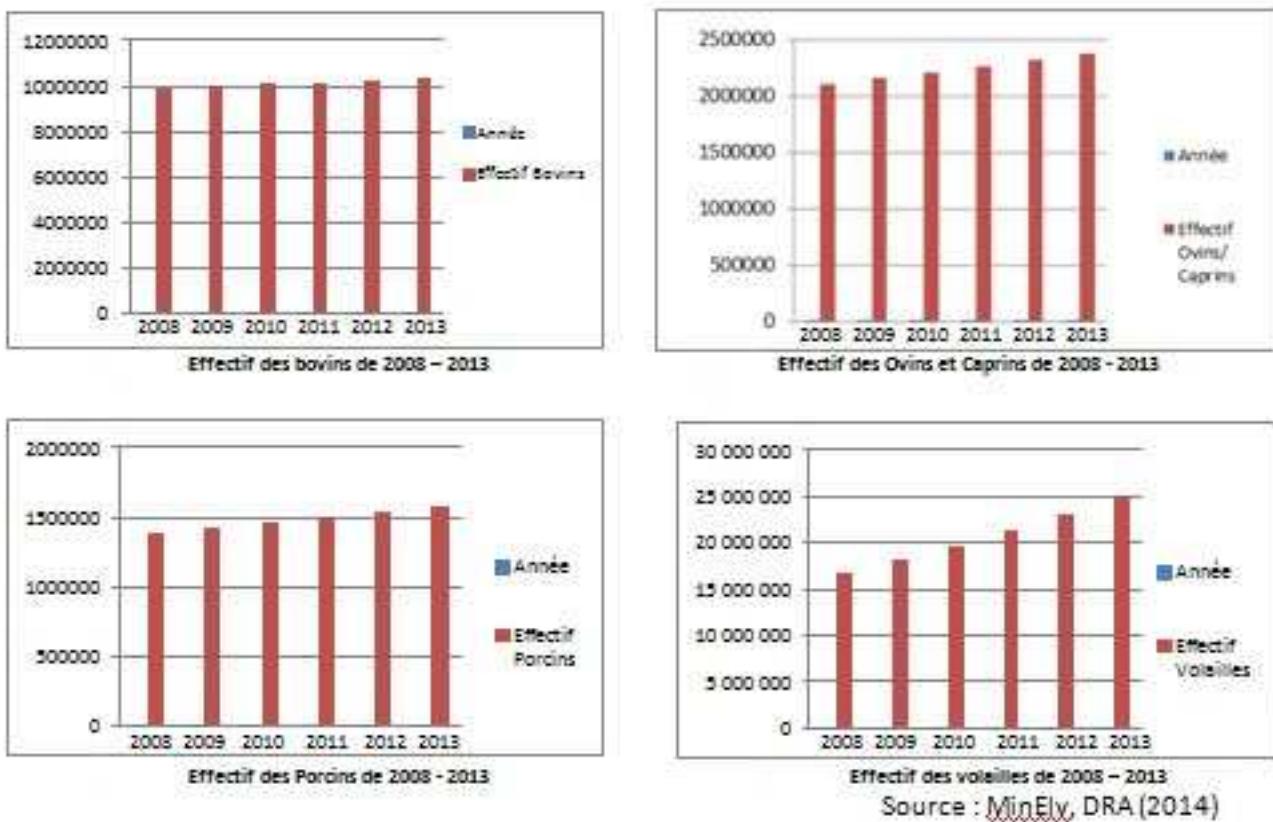
The pig population is still made up about 26% of local breed with low technical and economic performance. Imported frozen seeds were done to improve the races were in 2005 through but now, the lack of specialized structure for the selection and multiplication of performing sires increases the risk of genetic damage due to difficulties in controlling the inbreeding.

The development of the sector is also conditioned by investment difficulties and by livestock inputs availability, especially in matters of food whose prices fluctuation compel farmers to raise but a small number (of pigs.)

The number of poultries has continued to increase since 2008 due to improved chick production.

From 2008 to 2013, the small ruminant population has increasing in spite of the pasture degradation and especially the mismanagement of reproduction.

Some **ostrich** races have disappeared, and the existing breed is the result of recent imports.



**Picture 8 : Evolution of the Domestic Species (2008 – 2013)**

## II.6.- DEVELOPMENT FACTORS OF BIODIVERSITY STATUS

The Malagasy biodiversity is facing different types of threats of various origins (human or natural.)

### II.6.1.- Irrational Exploitation

It affects the ecosystems as well as the biological components. Thus, all ecosystem types are all affected because of irrational modes of operation. It is overfishing beyond the potential of reproduction and perpetuation of the species, a selective operation that takes the best sires at the expense of future generations and concerns also illicit activities favored by the political crisis experienced in recent years by the country.

Plant species traded at CITES level (succulent species such as the *Pachypodiums*, *Euphorbia* or *Aloe*) or food with wild tubers like yams are also overexploited. Some medicinal (*Myrothamnus moschatus*) and ornamental plants, mostly succulents (*Aloe*, *Pachypodium*) and Orchids (*Angraecum*) are very exploited and sold at the local markets and sometimes illegally exported. *Eugenia* and *Evodias* species are threatened by illicit local rum manufacturing.

Since the beginning of the political crisis in Madagascar in 2009 to date, overexploitation of large trees, mainly precious woods like palissander and rosewood, and the rate of biodiversity loss are unprecedented. The 2009 precious wood campaign from Madagascar is at least 52,000 tons of precious wood shots, from 100,000 rosewood and ebony trees that were selectively logged (Randriamalala & Liu, 2010.) More than 500,000 other trees and thousands of vines were cut to facilitate the precious wood transportation. The Northeastern forests of the island are among the areas where these valuable woods are most used, whereas these forests provide preferential natural habitats for a large number of typically forest species with very limited distribution.

Unsustainable logging industry, construction, and especially for charcoals and fuelwoods needs, represents a serious threat. Out of the 13,384,000 m<sup>3</sup> of round wood exploited in 2010 operated in all forests of Madagascar, 13,100,000 m<sup>3</sup> were used for charcoal production (FAO, 2010.) Species such as *Cedrelopsis grevei*, *Givotia madagascariensis*, and *Alluaudia procera* are threatened by selective logging for local constructions (NRPGF, 2010.)

For wildlife, hunting pressures in different parts of the island have important impacts on some populations. For example, sites previously occupied by large colonies of bats are being abandoned or entirely exhausted. In many parts of the island, overfishing is practiced since fishermen do not generally respect the legal catch period. They also use some unregulated meshed nets and are overfishing. They even pick up small fish of any size, because there will, always be takers. These fish are meant either for local and urban consumption or for feed making, which will certainly have catastrophic impacts given that these small fish ensure restocking. The consequences of this excessive catches are already felt in some regions of Madagascar, among others in the NorthWest (Raharisoa & Ralambomanana, unpublished) and in the Centre of the island.

Collection of amphibians and reptiles species for international trade or consumption often occurs in the same easily accessible spots. This results in a rapid local extirpation of many species populations.

Collection of eggs and young reproductive bird colonies is seen in Madagascar, especially *Ardeolas idae* and terns. For the case of terns in the NorthWestern part of the island, though the population in this region is still important, such practice is an imminent threat to them. Older eggs are thrown in the sea and the newly-laid eggs are massively picked when fishermen pass by and they are sold in the markets.

Hunting large-sized bird species such as *Lophotibis cristata*, *Coua* spp., wild ducks, and so forth... is common practice in many parts of the island, among others in the SouthWest of Madagascar (Randriamiharisoa, 2012.)

Members of the Tenrecinae subfamily are widely consumed by riparians as game or bushmeat in different parts of the island, especially *Tenrec ecaudatus* (Ganzhorn et al., 1990; Golden, 2009,) *Echinops telfairi* and *Setifer setosus*. These animals are hunted to meet the daily needs; they are also massively collected and sold alive or grilled in the markets. In the countryside of the island and according to the season, especially in the vicinity of forests, *Tenrec* is commonly served in local restaurants (*hotely*) as dish for the day (Soarimalala & Goodman, 2011.)

In some Malagasy regions, lemurs are hunted as game. Poaching of this group has increased a lot since the 2009 crisis, especially during illicit precious woods logging in several forests of Madagascar, and even within the protected areas.

For marine mammals like dugongs, whales, and dolphins, the main threats are deliberate capture of species for commercial purposes and incidental capture by traditional and artisanal fishing methods.

For sea turtles, they are captured directly using gillnets of "jarifa" type for their meat and shells. Besides, nesting female turtles are hunted and their eggs collected. Holdings of sea turtles are widespread on

the coastal region SAVA, DIANA SOFIA, Boeny ANDROY, ANOSY, and ATSIMO-Andrefana (Tianarisoa T, 2010; Rakotondrazafy et al, 2012; Ramanampampony, 2012; Bourjea et al, 2006.) The problem of by-catch is also a threat to the declining populations of sea turtles.

Concerning the microorganisms and the mushrooms, the destruction of their forest habitats is a serious threat. Actually, some trees like the *Uapaca* spp. species (16 species all endemic in Madagascar,) often associated with members of the Sarcolaenaceae, *Asteropeiaceae* endemic families) and the Ocotea species are strongly associated with the ectomycorrhizian mushrooms. Some mycoflora components may be lost forever even before they are identified. The *Uapaca bojeri* or "Tapia" forests are highly endangered when they are of special formation: they are ectomycorrhizian fungi niches (about 20 edible species,) in addition to their role as natural site for silkworms and as collection site of tapia fruits. On one hand, the phenomenon of crops field extension is at the expense of the forest, and on the other hand, the invasion of exotic tree species like Pines and Eucalyptuses are seen. The highly ectomycorrhizogen nature of these foreign trees pollutes or even reduces the diversity of native mushrooms habitats.

## II.6.2.- Land Use Change

There is an abusive and unregulated exploitation of the lakes watersheds because of deforestation for agricultural purposes and bushfire for grazing. Habitats in wetlands are reduced because of land expansion, namely for rice cultivation. The ecosystems are modified or are altered for other purposes (rice cultivation or aquaculture:) for instance, existence of drainage materials for agriculture in the Torotorofotsy Ramsar Site and the risk of extinction of the site-specific characteristics.

Land clearing and slash-and-burn practices especially pose a serious threat to forests, mostly in the Eastern and Southern regions. This traditional practice is deeply rooted in local populations' customs without increasing their productivity, as the soil fertility is reduced due to repetitive burnings. Hence, the farmers practice the shifting agriculture; they leave the sites that become less fertile after a few years and clear new areas and go on this way.

Intensive loggings are also done in mangrove areas to convert them into agricultural zone.

Recent immigrants attracted by sapphire mining in the West of Ranohira Ilakaka have planted corn and cassava for a decade by cutting the tapia tree bases and burn them to produce charcoal.

For grassy savannah in the Central and the Eastern regions, the agricultural land extension is the primary reason for evident scarcity.

The mountain rainforests in the central and SouthEastern coast of Madagascar are threatened from both ends: in the East threat linked with cash crops, and in the West associated with irrigated rice cultivation (Bois et forêts des tropiques 2003 N 276.)

## II.6.3.- Industrial Development

Mining and oilfields projects and illegal activities have considerably expanded these past years. To name a few, we can mention the Ambatovy Project, Quit Madagascar Minerals, precious stones mining in Ilakaka and Didy, as well as gold mining in Daraina. They represent severe and abusive pressures on the environment: many rare and unique species of the island are directly threatened by the development of these projects and some sensitive areas are threatened by the recent discoveries of gold and precious stones deposits. For example, in the Didy protected area, mass deforestation is ongoing and seriously threatens to

extirpation this region's local biodiversity (Alliance Voahary Gasy, 2013.) It considerably affects, among others, agriculture and freshwater supply of the riparians.

## II.6.4.- Pollution

Aquatic ecosystems (marine and coastal, wetlands and continental waters) are the most affected by pollution. The sources of pollution are various: run-off waters from watersheds, washing areas, garbage and toxic waste (chemical or not) and the lack of latrines (18 millions of Malagasy people do not yet have access to them.)

## II.6.5.- Invasive Species

In general, all human disturbances encourage the presence of alien invasive species which are sometimes very harmful to the biodiversity. They can easily colonize all areas and compete with native plants, especially in terms of ecological niche. Besides, they are generally disastrous and/or parasites drivers. The invasion of the alien species in Madagascar, for example *Rattus rattus*, in natural and anthropogenic habitats (forest, savannah, mangrove swamp, and so forth.,) causes a huge damage on biodiversity. Proliferation of the species in the forest system doesn't work in favor of the native species like species of small mammals, birds, and so forth. especially in forest fragments such as the Special Reserve of Ambohitantely and the massif of Analavelona. As for fish, many harmful alien invasive species are identified in Madagascar, in particular *Channa maculata* and *Gambusia holbrooki* and recently a crayfish species of the *Procambarus* genus. These two alien fish species eradicate the endemic water fauna of the colonized area; and the *Procambarus* not only destroys the water fauna but also the flora, namely rice cultivation. As for birds, the number of *Acridotheres tristis* is significantly increasing; while they were seen only in a small part of the island a few years ago, nowadays, they cover almost the whole country due to its high capacity of adaptation. As far as ants are concerned, the invasive alien species like *Technomyrmex albipes* and *Pheidole megacephala*, and others are a real danger. Studies on the implantation of the *Technomyrmex albipes* invasive species were conducted in the Tampolo forest (Ratsirarson et al., 2005.)

Invasive plants change the physiognomy of various ecosystems (land and water.) Their high reproduction ability hinders the development of other species, especially the native species. Actually, invasive species occupy large spaces and deplete the nutriments available in the soil at the expense of other plants. For example, the genus *Pinus* invading the Tapia forests is very alarming for in situ conservation of *Uapaca bojeri* and of other native species hosted by this ecosystem.

A recent symposium on "Alien invasive species in the Southwestern Indian Ocean Islands: Valorizing the Assets, Identifying the Gaps in Their Current Knowledge and Needs for Their Evaluation and Management" which was held at the Antananarivo University in 2013 provided an inventory opportunity in Madagascar. 110 plants species would be invasive plants (Rabarimanarivo, in press.) During this symposium, some species were the subject of specific communication (*Grevillea banksii*, *Pinus* sp., *Salvinia moklesta*, *Melaleuca quinquenervia*, *Eichornia crassipes*, *Casuarina equisetifolia*, *Psidium cattleianum*, *Dicranopteris linearis*, southern *Acanthospermum*, *Ziziphus mauritiana*, and *Eucalyptus* sp.)

In the case of the marine ecosystem, the coral reef degradation due to intensive fishing induces green algae (*Turbinaria* sp) proliferation preventing the development of corals and spiny sea urchins (*Diadema* sp.) The latter also eliminate predators, and herbivorous fish that eat the algae (REEM, 2012.) Moreover, a boom of some, jellyfish is reported during some periods of the year: this phenomenon consistently occurred during the hot season in Toliara and in 2009 in the Northwest (near Anjajavy.)

## **II.6.6.- Climate Change**

Concerning the marine habitats, the global warming and its impacts are being felt, essentially, in the coral reefs and mangroves. In the reefs, the increasing sea surface temperatures due to natural temperatures variation is very important in the Southwest compared to that in the NorthWest and the SouthEast. Risks of coral bleaching will therefore be higher in the SouthWest than in the Northwest (Maina and Obura, 2008, McClanahan et al., 2009.) This will lead to increase in CO<sub>2</sub> concentrations (that lead to water acidification.)

In the mangroves, the rises of sea level, temperature, rainfalls, and carbon dioxide (CO<sub>2</sub>) is noticed. Thus, change, linked to global warming, in physical-chemical properties of these mangroves (Roger E., 2008) will occur.

Concerning the sea turtles, temperature rise and waters warming may impact on the development of the embryos, and could adversely affect drilling areas, namely for turtles which depend on coral reefs (Rakotonirina, B.P. 2011.) It can reduce or alter the spawning beaches.

The results of the investigations conducted on the herpetofauna revealed an altitudinal move of some amphibian species, probably in response to climate change which affects the mountain areas of Madagascar.

Analysis on some target species, especially *Ardea humbloti*, *Haliaeetus vociferoides*, *Sterna bergii* and *S. capsia*, in the National Park of Nosy Hara and the New Protected Area of Ambodivahibe showed that these birds are sensitive to climate change. In 2009, using the EPA's tools predicting the species vulnerability to climate change, the status of these species varied between highly vulnerable and critically vulnerable (the Peregrine Fund & Asity Madagascar, unpublished.)

Climate change changes physiologically and biologically plants' life. For instance, the SNGF (2013) had noticed that the phenology, the seed productivity and the germination capacity of seeds are affected by these changes. The studies were conducted on a certain number of endemic species in the Eastern rainforest of medium altitude.

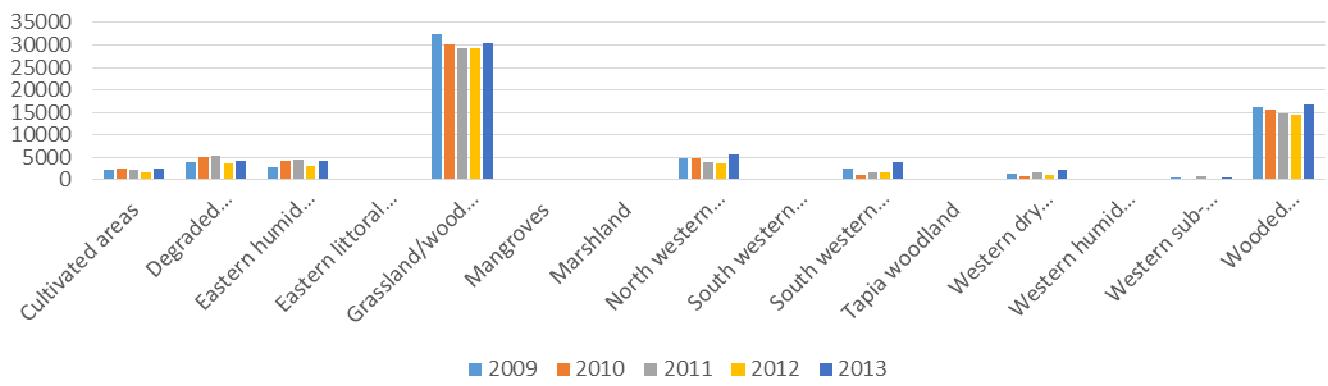
Climate variation is felt in major cities of Madagascar, as it impacts the biodiversity in the sites. The maximal and minimal variation of the rainfall and the temperature is both obvious on human life and on biodiversity life in general. The climate change evolution is proven in Madagascar from 2010 to 2013, according to the General Directorate of Meteorological Affairs (**Graph in the Appendices.**)

## **II.6.7.- Fires**

Repetitive bushfires meant for grazing and slash-and-burn agriculture or willingly provoked continue to destroy thousands of hectares of savannahs and forest areas every year and killed countless species of animals, plants, and microorganisms; a significant part them is not yet known.

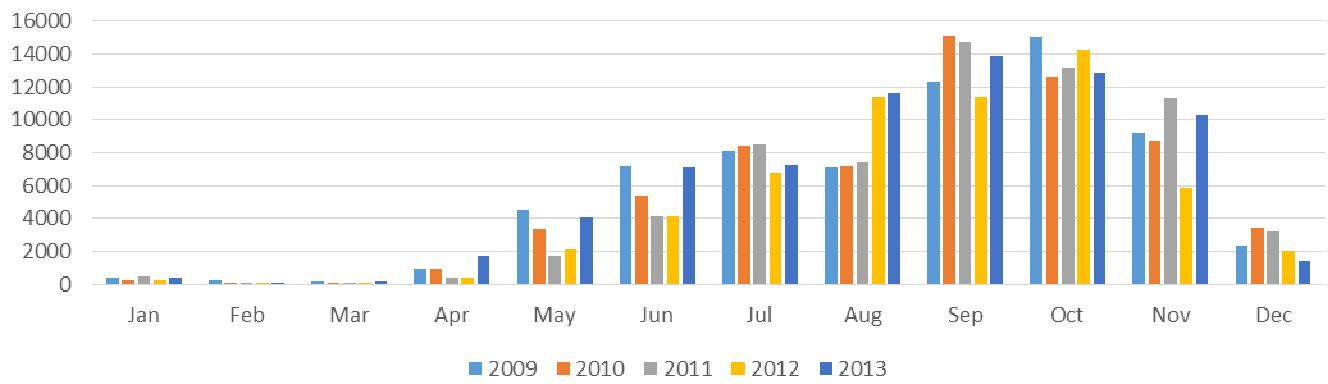
**International Conservation is regularly tracking the development of fires in Madagascar and communicates the related trends.**

### Tendances des feux de brousses par type de végétation: nombre de feux 2009-2013



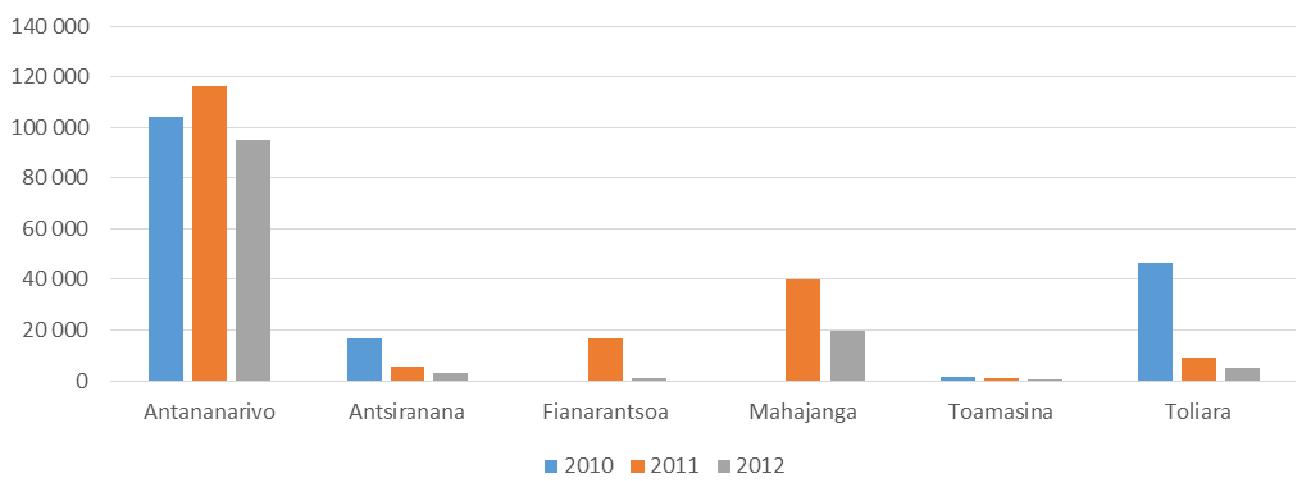
Picture 9 : Wildfires Trends during 2009-2013

### Tendance des feux de brousses : Nombre de feux détectées par mois 2009 - 2013



Picture 10 : Wildfires Trends during 2009-2013

### Tendance de la superficie brûlée (ha) 2010 - 2012



Picture 11 : Burnt Areas Trends (in ha) during 2010-2012

## **II.6.8.- Deforestation**

The alarming level of deforestation in Madagascar negatively impacts various ecosystems, namely the agricultural and water zones. Water erosion leads to the silting of lowland cultivations, especially rice cultivation, the siltation of wetlands, and the sedimentation of the marine and coastal environments. Deforestation is a serious threat for the marine and coastal ecosystems. Barren areas become lavaka (deep holes) and streams carry away a high sediment load which is deposited at and off the mouths (case of the mouth of Betsiboka in the Northwest.) Similarly, the lack of plant cover expands the beach wind erosion and harms the mangroves and reefs.

Sediments certainly stem from the mangroves' expansion toward the sea (case of the bay of Ambaro.) However, excesses of sediments deposited by streams and/or wind (case of mangroves of the SouthWest of Madagascar) lead to either a decline of this ecosystem causing formation of salt flats or their death. The consequences of this ecosystem drop affect the reef health and the regeneration of fish stocks. They also favor coastal erosions.

Over-sedimentation of the coral reefs leads to their deterioration (case of coral reefs in the Southwest of Madagascar.) Along with a selective overexploitation, the phenomenon results in an imbalance in the reef ecosystem in favor of invasive species (sea urchins, star fish, and algae,) one such thing is observed in the SouthWest.

Deforestation leads to reduced distribution area, loss of natural habitat, and eradication of vulnerable native species.

For lemurs, the habitat loss because of deforestation is particularly very critical.

## **II.6.9.- Diseases**

The agent causing bee diseases (*Apis mellifera* of *Hymenoptera* order) in Madagascar is a mite called *Varroa destructor*. Imports of used apiculture materials are probably how it has first arrived in Madagascar. In December 2009, a first suspicion in a hive in the district of Antananarivo Avaradrano was noticed. The presence of the disease was confirmed in four districts, three of which are in the Analamanga Region and another in the Atsinanana Region. The disease has caused enormous damages to bees these past years in such a way that honey production, as well as the yearly income of beekeepers, have decreased a lot during that period.

The risk of contamination by the spread of the pathogenic chytride or *Batrachochytrium dendrobatis* is also a serious hazard for the Malagasy amphibians. The disease is not yet detected in Madagascar, but studies showed that the Malagasy species are very sensitive to this pathogen.

Aquaculture in marine and brackish waters is compromised by diseases. First, there is an increase in larval death rate due to microbial growth (Razafimamonjison, 2011.) Then, there are various pathologies like the risk of anoxia and the white muscle disease (Randriamiarinarivo, 2012) and nutritional diseases (green head phenomenon) (Ramahazo, 2003.) In addition, predation and commensalism really endangers shrimp farming

(Ratsimanarisoa, 2000.) Moreover, considering the global situations, the Malagasy shrimp-farms are significantly threatened by the White Spot Syndrome Virus. Necessary measures should be taken by the concerned bodies.

Some tree species seem to have become more vulnerable and lose their ability to adapt to a long period of extreme drought. As a result, diseases caused by pathogenic agents like the psylle of the Eucalyptuses inflict severe damage over large areas, especially in the central highlands.

## **PART II: INTEGRATING BIODIVERSITY INTO NATIONAL STRATEGIES AND ACTION PLANS – IMPLEMENTING THE CONVENTION**

The Environmental Charter, pursuant to Law 90-033 of 21 December 1990 and Law 97-012 of 6 June 1997, defines the basic implementation framework to enforce the Environmental National policy in Madagascar. It gives priority to the mobilization and participation of all stakeholders at all levels, with particular emphasis on local communities that must be take the responsibility in the protection and management of their territory. Periodic national plans have made of the environment and conservation an engine for sustainable and population-centered development. Several objectives of this national policy concern the sustainable management of natural resources.

### **Chapter I: The National Strategy for Biodiversity Sustainable Management for 2002-2012**

Based on the objectives of the Convention on Biodiversity which are the conservation of biodiversity, the sustainable use of its resources, and the equitable sharing of benefits arising from the use of genetic resources, the National Strategy for Sustainable Biodiversity Management has drawn up his own based on the combination of conservation and valorization, on the one hand, and ecology and economy, on the other hand, to ensure effective management.

Madagascar's National Strategy for Sustainable Biodiversity Management (SNGDB) and its current action plans have been developed for 2002-2012. The action plans are developed for each of the six provinces of Madagascar. While intrasectoral aspects and the recommended working groups were implemented, information on overall realizations is missing.

#### **I.1.- OBJECTIVES AND STRATEGIC PRIORITIES**

The 2002-2012 SNGDB's guiding principles is to contribute to the improvement of population's livelihood in fighting against poverty, based on the traditional knowledge and considering the future ones. It is based on the various conventions and treaties that Madagascar has signed (such as the Convention on Biodiversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora,) the Convention on Wetlands of International Importance, especially as waterfowl habitat, the Convention for the Protection, Management, and Development of the Marine Environment and Coastal Region of Africa.)

The SNGDB is focused around three strategic axes: biodiversity conservation (ecosystems, genetic resources of wild origin, and genetic resources of agro-biodiversity,) sustainable biodiversity valorization (improving knowledge on the values of biodiversity resources, enhancing sectors of undervalued and under-used biodiversity products, and ecotourism development,) and reduction of pressures on biodiversity resources (improving the population's behavior vis-à-vis the biodiversity resources, enforcing existing laws and regulations, developing alternatives to destruction of natural and timber resources, reducing biotechnological risks and biosecurity development.)

The implementation of strategic actions as defined during the drafting of the SNGDB focus on implementing the structures and development plans, strengthening the human resource capacity, transferring the biodiversity resource management, strengthening monitoring and evaluation actions, developing a national

policy on access and benefit-sharing (APA) and its implementation structure, and on streamlining the legislation to the SNGDB, developing partnership and funding mechanism to sustain funding.

This Strategy and National Biodiversity Action Plan is expected to be updated by the end of 2014. The main stakes is the adaptation of this strategy with regard to the 2011-2012 Strategic Plan and the Aichi objectives, although this 2002 SNGDB does not differ much from the afore-mentioned strategic plan.

### **I.1.1.- Biodiversity Conservation**

Biodiversity conservation is mainly ensured through the protected areas and collections.

#### **I.1.1.1.- Protected Areas System in Madagascar**

A Commission for Protected Areas System in Madagascar, pursuant to the Ministerial decree 52004/2010 of 20 December 2010, is in charge of supporting the Administration in the realization of Madagascar's commitment to increase the area of protected areas to 6 million hectares until 2012, in coordination with other sectors and stakeholders; ensuring the convergence of national and local interests in matters of conservation and development, and supporting the management of Protected Areas System.

The purpose of the Protected Areas System of Madagascar (SPAM) is to preserve the biodiversity while contributing to poverty reduction and to country development. The SPAM includes the Network of National Parks and "New Protected Areas" (NAP,) the latter aims to supplement the representativeness and to ensure the sustainability of biodiversity while maximizing other associated economic, natural, and cultural values.

The SPAM considers six categories of management and several types of governance. Its implementation takes into account the Malagasy specificities with regard to i) **biological aspects** (exceptional wealth in biodiversity-megadiversity, ecological regional diversity and endemicity, global priority (hotspot) because of the threat of extinction; ii) **social and cultural aspects** (omnipresence of traditional structures, consideration of social and traditional values, important role of natural elements and ecosystems for rituals, and for the Malagasy cultural identity, and iii) **economic aspects** (deep poverty, high dependence on natural resources and ecological services, especially on water.)

In 2011, 311,143 ha of protected areas have been created or expanded, and now, 10 new Ramsar sites are being created. 2 million ha out of 5.2 million hectares of SPAM are supported by the Foundation for Protected Areas and Biodiversity of Madagascar (FAPBM.)

Despite their poverty, local communities truly involve in strengthening protected areas (categories I to IV) by providing a protective belt around them and jointly-managing the protected area with the recently-mandated agency. This recently-adopted strategy ensures better conservation effectiveness through the SPAM. The participation rate in joint-management continues to grow through the Local Parks Committee (CLP,) COSAP, COBA, and Associations.

#### **I.1.1.2.- Conservation Through Collections**

Madagascar has several collections to keep samples of existing or extinct Malagasy plants.

##### **A.- Ex Situ Conservation**

Ex situ collections serve as species identification tools at the end of any floristic inventory work or to designate new species discovered in Madagascar. The first herbarium designated under the symbol "TEF" at the Department of Forestry and Fish Farms (DRFP) Research has 70,000 specimens, mostly woody species (trees, shrubs, and lianas,) and the second, called "TAN" at the Tsimbazaza Botanical and Zoological

Park (PBZT) has 130,000 specimens consisted of monocotyledons, dicotyledons, gymnosperms, pteridophytes, and bryophytes. Other smaller herbaria also exist in the country: at the Department of Biology and Plant Ecology, Faculty of Sciences - University of Antananarivo, the National Forest Seeds Silo, the Missouri Botanical Garden, and at the Royal Botanical Garden Kew.

TEF has a xylotheque (collection of native wood) composed of approximately 2,000 specimens and a **carpothèque??** (conservation of flowers and fruits in an alcoholic solution) of approximately 1000 species.

## **B.- In Vivo Collections**

The in vivo floristic collections are essentially botanical gardens, arboreta, conservation area, and seed banks.

### **i.- Botanical gardens**

The Tsimbazaza Botanical and Zoological Park (PBZT) is created to form a living collection of flora and fauna species. It is organized into several thematic zones: the Malagasy rock plants (more than 500 plants of 30 families, 55 genera, and 70 species;) the palm grove (6 endemic genera in Madagascar, 2 from Africa and 10 introduced genera;) the Arboretum (169 individuals grouped into 31 families, 57 genera, and 74 species;) the Malagasy medicinal plants grouped according to their healing properties; the wild plants relatives of cultivated plants exhibiting the taxa of CWR project (Wild Relative Crops,) the most harvested or grown plants like *Coffea*, *Vanilla*, *Citrus*, *Moringa*, *Musa*, *Encete* and *Solanum*, and *Dioscorea*.

Other uninventoried privately-managed botanical gardens exist in different parts of the country. They are on a smaller scale.

### **ii.- Arboreta**

The oldest arboreta date back from the 1950s and consist of 300 exotic species, 80% of which are hardwood. The most represented genera are *Eucalyptus* (more than 180 species,) *Acacia* (more than 60 species,) and *Pinus* (about fifty species.) Due to lack of monitoring and maintenance, these arboreta have been in a very poor condition for over a decade. Only stands selected for seed production by the SNGF are maintained to improve their genetic quality.

Meanwhile, new arboreta stands were recorded namely the arboretum of PBZT, Ranomafana, CNARP, Antsokay (Toliara,) and of SNGF. The purpose is to observe the potentiality of endemic forest species and to have living specimens.

### **iii.- Plots Conservation**

Conservation plots were established as part of the tree species genetic improvement programs and seed orchard installation to keep the entire genetic heritage of manipulated species. *Eucalyptus* and *Pinus*, *Liquidambar styraciflua*, *Anacardium occidentale*, *Gmelina arborea*, and *Khaya madagascariensis* genera are involved by these plots. Some endemic species have been tested, adapted, and/or regenerated for preservation. These are 58 species in Ranomafana, the *Aloe suzanae* in the Mahafaly Plateau, 4 species of endangered orchid species in the dense dry forest of Ambalakida, and the forestry species at Arivonimamo.

### **iv.- Forests Seedling Bank**

Madagascar has a seed center, the SNGF (National Forest Seed Silo) to supply users working in reforestation, agroforestry, brushwood, or ornamentation. But the collections are also dedicated to maintaining reserves of genetic resources, particularly for the rare, threatened, and useful species. Therefore, these reserves are forms of *ex situ* conservation of forest genetic resources.

The SNGF works within the Millennium Seed Bank Partnership (MSBP) to conduct ex situ conservation of phytogenetic resources in accordance with the Global Strategy for Plant Conservation. Priority is given to rare, threatened, and useful species. Emphasis is put on global plant life facing extinction threat and on the most useful plants for the future.

Since the action is implemented in Madagascar (September 2000) until January 2014, the SNGF has held 3,477 collections, distributed over 1,861 species, 635 genera, and 146 families. Collections are from different ecological regions of the country including arid, semi-arid, and sub-humid regions where seeds species are of orthodox type and therefore they can be stored with low quantity of water, low temperature, and this, for the long term (more than 10 years.) Research on seed physiology to control continued viability technology and seeds germination are conducted at the SNGF. It's worth noting that duplicate collections are also kept at the headquarters of the MSB in the United Kingdom.

### **C.- In Situ Conservation**

In situ conservation of plant species is first carried out in protected areas. However, many threatened species of endemic families' species in Madagascar are not yet placed in these areas.

**Table 14 :** Species Belonging to the Malagasy Endemic Families That Are Not Yet Included in the SAPM

<b>Family</b>	<b>Species</b>
Sphaerosepalaceae	<i>Dialycerasdiscolor</i> J.-F. Leroy
Sphaerosepalaceae	<i>Rhopalocarpusmollis</i> G.E. Schatz & Lowry
Sarcolaenaceae	<i>Leptolaenaraymondii</i> G.E. Schatz & Lowry
Sarcolaenaceae	<i>Perrierodendroncapuronii</i> J.-F. Leroy, Lowry, Haev., Labat& G.E. Schatz
Sarcolaenaceae	<i>Perrierodendronrodoense</i> J.-F. Leroy, Lowry, Haev., Labat& G.E. Schatz
Sarcolaenaceae	<i>Rhodolaenamacrocarpa</i> G.E. Schatz, Lowry & A.-E. Wolf
Sarcolaenaceae	<i>Sarcolaenahumbertiana</i> Cavaco
Sarcolaenaceae	<i>Schizolaenacapuronii</i> Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf
Sarcolaenaceae	<i>Schizolaenamilleri</i> Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf
Sarcolaenaceae	<i>Schizolaenaraymondii</i> Lowry & Rabehetra
Sarcolaenaceae	<i>Schizolaenaviscosa</i> F. Gérard
Sarcolaenaceae	<i>Xyloolaenaspeciosa</i> Lowry & G.E. Schatz

### **I.1.1.3.- Reducing the Pressures**

#### **A.- Community-Based Management of Natural Resources**

Madagascar's traditional local communities (*Fokonolona*) maintained sites and resources as a community heritage of social or cultural interest, which is transmitted from generation to generation, based on social conventions. This responsibility has been formally recognized in the current legal system through the Natural Resource Management Transfer (TGRN) to grassroots communities (pursuant to the Law 96-025 and its implementing decree, and the decree on Contractual Forests Management) to reduce pressure on natural resources and encourage their participation in the natural resources management and conservation. The TGRN is based on three fundamental principles: subsidiary, voluntary service, and non-discrimination. At this time, a thousand management contract transfers of about 1 million ha of forests and other natural resources are signed. Despite the willingness with which the communities do conservation, issues related to their abilities and especially economic incentives remain.

With the commitment of local communities to maintain a protective belt around each protected (categories I to IV) area and the sustainable management of resources on their lands, the landscape approach is defined in terms of shared and organized management (categories V and VI) under transfer management system, and allows naturally managing and governing the community's resources from their particular heritage (community protected area.)

The period of political turmoil has been in favor of natural resources rushes, which has exacerbated the local environmental conditions, the good practices of natural resources management, and even regulations in force, are forgotten / or disregarded. It is in this context that some communities' network have been created: the MIHARI network (Locally Managed Marine Areas - LMMA,) grouping together 134 coastal communities established in January 2012 with support from international NGOs (namely, Conservation International and WCS) and the TAFO MIHAAVO network of some 500 local communities (*fokonolona*) of 18 out of the 22 regions of Madagascar, established in May 2012 with support from national institutions, also networking. The latter, during its general assembly issued a statement, the *Anja Declaration for efficient governance and sustainable management of natural resources based on the values of fokonolona*, already communicated during a parallel session of the COP in Hyderabad.

Moreover, thanks to the LMMA network, marine conservation areas, including MPAs, represent 7% of the Exclusive Economic Zone of Madagascar (Source: Conservation International.)

### **B.- Sustainable Forest Plantations**

Sustainable forest plantations include reforestation, restoration, forest enrichment, brushwood planting, agroforestry, and ornamental planting. The national policy and strategy here have included all actors and stakeholders in the implementation: the Government and the decentralized authorities, NGOs, associations, and schools. Promoting reforestation actions is a priority: mobilizing all stakeholders to participate. Planning at a decentralized level consists in integrating environmental component in the development references at the local, municipal, and regional levels.

Areas of sustainable forest management have been established in various regions of Madagascar. Among them, a score of large forests were identified and woodlots were awarded to operators. It aims to secure economic operators adhering to the approach to legal wood supply of the national and international markets. In addition, dozens of woodlots were awarded as part of good forest governance.

### **C.- Making Investments Compatible with the Environment**

The environmental impact studies aim, among other things, at preventing and mitigating potential negative impacts on the environment and biodiversity resources. The application of the Decree on Making Investments Compatible with the Environment (MECIE) has declined since the political crisis, particularly in terms of compliance with the specifications.

It should be noted that while some operators/investors are committed and contribute to restore and manage sites of interest in terms of biodiversity in accordance with their environmental management plan, even beyond their operating sites, others infringe the national legislation requiring environmental permits before any operation. The most well-known cases are mining that should operate only with exploration license.

### **D.- Anti-Erosion Fight Program**

The PLAE, launched in 2004, continues to be implemented. To date, more than 40,000 hectares of land are protected against erosion and 13,000 farmers have benefited from this program (source: [www.agriculture.gov.mg](http://www.agriculture.gov.mg)) This program aims at protecting the soils and affects positively the agricultural biodiversity, that of the wetlands, and continental waters.

## **I.1.2.- Clearing House**

In February 2012, Madagascar published its Clearing House National Strategy and Action Plan on Biodiversity Convention.

The Clearing House's mission (Clearing House Mechanism - CHM) and overall objective is to contribute significantly to the implementation of the Convention on Biodiversity and its Strategic Plan for 2011-2020 Biodiversity at the national level by promoting and facilitating communication, technical and scientific cooperation between all stakeholders involved in the management and conservation of biodiversity (the scientific community, government departments, NGOs, and groups of professionals,) at the national and international levels. Specifically, it aims to serve as decision-making tools in national and thematic policies and strategies related to biodiversity.

The basic principles consist essentially of universal access to information related to the implementation of the CDB in Madagascar, the participation of all in making information available, sharing broadly the system, and sustaining it.

*Site web:* <http://mg.chm-cbd.net>

## **I.2.- BIODIVERSITY GOVERNANCE**

The illicit logging of precious wood (rosewood and ebony) has been in the world news for 20 years and continues to increase every time a political crisis occurs. For several years, the Forestry Department has begun to develop a set of tools for the natural forests sustainable management: forest zoning, inventories, development of detailed management plans, public and competitive award of mining permits, and timber traceability system and certification. Until this system becomes operational, the precious wood logging was banned ten years ago by the national legislation. However, sustainable development plans have never been produced, and some loggers have obtained exceptional logging and export permits of these products though forbidden.

The political crisis since 2009 has allowed unprecedented scale of illicit logging: an estimated exports of precious wood of USD 200 million, they generated approximately USD 20 million of income to the Government, a negligible amount compared to the turnover of nature tourism industry (USD 1/2 billion,) and compared to the prospects of emerging carbon industry. As for the civil society, despite its ability to draw attention to this issue in national and international forums, its attempts to sue the brains behind those crimes were relatively unsuccessful.

### **I.2.1.- Principle**

Madagascar has adopted the ecosystem approach as basis for the implementation of the Biodiversity Convention, regarding biodiversity conservation and sustainable and equitable use.

Decisions relating to environmental management and use of biological natural resources are guided by laws, regulations, action and management plans, management collaboration agreements in officially protected areas.

### **I.2.2.- Institutional Implementing Structures**

In accordance with the various laws and administrative practices, the responsibilities, capacities, and functions are organized in two management levels: the strategic level and the operational level. In addition, specific institutions are entrusted with key roles in achieving the conservation objectives.

### **I.2.2.1.- Ministries of Natural Resources**

The ministries in charge of the natural biological resources (Environment and Forestry, Fisheries, Marine Resources, Agriculture, and Livestock) and the Ministry of Water, in charge of water and sanitation, are responsible for developing the policy and legislation relating to the overall management of their sector and for ensuring commitment in order to achieve the common objectives in priority areas for biodiversity conservation and sustainable use. Their decentralized bodies ensure the organization of biodiversity management and the implementation of conservation measures, in declining strategic objectives into operational objectives within their jurisdiction.

### **I.2.2.2.- Environmental Units**

The Environmental Unit is a structure created within each Sector Ministry to ensure the integration of environmental dimension into the respective Sector policies and, in the perspective of sustainability, the implementation of legal texts relating to environmental management (national environmental policy,...) and the coordination of environmental actions resulting from the responsibilities of its Ministry (a better use of renewable natural resources, identification and prevention of risks of environmental degradation risks, development of technical tools to fight against pollution, nuisances, and waste caused by activities, environmental education activities, control and monitoring of the environmental aspects of activities, management of complaints and all environmental issues...)

It participates in the works of different committees or other environmental focus groups, represents its Ministry within the *ad hoc* Technical Evaluation Committee (CTE) responsible for the evaluation of Environmental Impact Assessment (EIA) files or the Environmental Commitment Program (PREE) under the control of their Ministry.

It is in charge of disseminating environmental information within the Ministry and to other authorities and partners involved in environmental management, and sees to promote communication synergy between the sector and other entities concerned with environmental management.

Coordinating Environmental Units outside of their respective Ministry activities is the responsibility of the Ministry of the Environment in charge of setting up an Environmental Unit Platform. The latter acts as the interface and provides support /advice to environmental authorities, other Sector ministries, decentralized structures, operators, and other partners on environmental issues under the control of the concerned Ministry.

### **I.2.2.3.- Decentralized Territorial Communities**

To better guide the implementation of conservation projects on sites, the Decentralized Territorial Communities (CTD) are supported both by the public authority responsible for conservation, other concerned public sectors (SAMIFIN<sup>1</sup>, CSI<sup>2</sup>, VPDAT<sup>3</sup>), the Civil Society (ONESF<sup>4</sup>, Alliance Voahary Gasy, MNP<sup>5</sup>, Tany Meva Foundation) involved in strategic partnerships. Within the framework of the implementation of the conferral management, more and more municipalities become managers and major users of natural resources.

To make governance structure operational at the local level, negotiation and communication are carried out using a cross-cutting approach

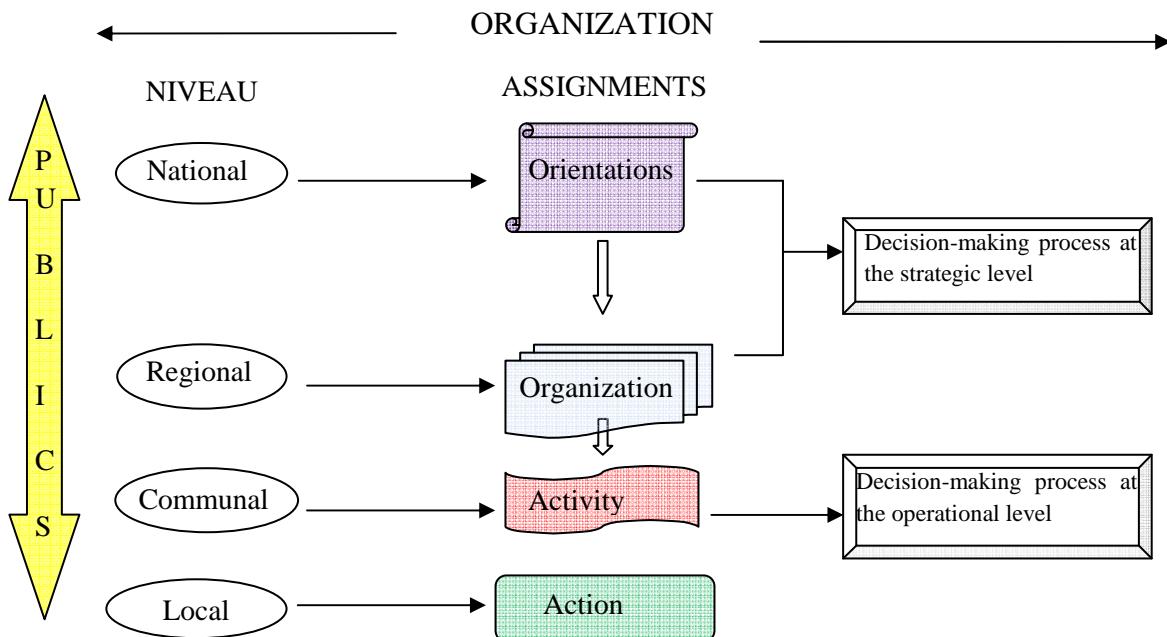
<sup>1</sup> SAMIFIN: Sampan-draharaha Malagasy Iadiana amin' ny Famotsiambola (Malagasy Financial Intelligence Unit to Fight Against Money Laundering)

<sup>2</sup> CSI: Committee for the Safeguard of Integrity

<sup>3</sup> VPDAT: Deputy Prime Minister's Office in charge of Land Development and Territory Planning

<sup>4</sup> ONESF: National Observatory of Environment and Forest Sector

<sup>5</sup>MNP: Madagascar Parks National



**Picture 12 : Organization of Responsibilities, Capacities, and Functions of the Administration**

The Green Guide is developed to allow local authorities taking appropriate measures and initiatives for sectors with environmental incidence including biodiversity.

#### I.2.2.4.- Various Commissions and Committees

Interministerial committees are created to facilitate synergy across activities and in the decision-making process:

- CIFF (Comité Interministériel Forêt - Foncier et Protocole de collaboration DGSF et DGF= Forest-Land Interministerial Committee, and DGSF and DGF Collaborative Protocol;)
- CHEF (Commission Hydrocarbure – Environnement – Forêt = Hydrocarbon - Environment - Forest Commission;)
- Precious Wood Steering Committee (gathers entities such as the Ministry of Environment and Forests, other entities such as the Ministry of the National Police, the Ministry of National Security, the Ministry of Justice, and the Secretariat of State in charge of the Gendarmerie, the Ministry of Finance and Budget, the Madagascar National Parks, and the Alliance Voahary Gasy;)
- CIMF (Commission interministériel Mines – Forêts = Mines – Forests Interministerial Commission.)

Various other structures to ensure better governance in the forestry sector are set up and /or revitalized: a steering committee responsible for the management and cleaning up of precious wood sector; the structures for dialogue on forest governance.

At the local level, joint natural resources management committees and community observers networks in six forest governance hotspots (SAVA, Boeny Atsinanana, Alaotra Mangoro, Menabe, and Haute Matsiatra) are set up.

To reduce illegal logging, mechanisms of vigilance to prevent and detect suspicious and other financial transactions relating to money laundering in the forestry sector provided by the SAMIFIN and a system of maritime control and satellite-based surveillance of areas affected by rosewood trafficking are set up. The Judicial Police Officers are trained about the species listed in the CITES Appendices.

### **I.2.2.5.- National Office for the Environment**

The National Office for the Environment, established in 1990, is governed by the Decree No. 2008-600 which **gives it the status of an Industrial and Commercial Public Establishment (EPIC.)** Working in close collaboration with the relevant Directorates and Services of the Ministry of Environment and Forestry, it is responsible for:

- *The prevention of environmental risks in public and private investments and the fight against pollution.* To this end, it must ensure that economic activities would not be detrimental to the environment through the enforcement of the Environmental Compliance of Investments (MECIE.) Thus, the ONE is the one-stop-shop for environmental assessment. It is also mandated to promote the Strategic Environmental Assessment (SEA) and may call for assistance from public or private, national, or foreign structures;
- *The management of Environmental Information System, Monitoring and Evaluation of Environmental Status* to support environmental assessment and for a better decision-making process at all levels. It ensures the availability of national and regional environmental scoreboards and the reports on the status of environment in Madagascar. It develops environmental monitoring systems, including the Observatory for the State of the Environment;
- Labeling and Environmental Certification.

### **I.2.2.6.- Madagascar National Parks**

Madagascar National Park (formerly ANGAP) was established in 1990. This association under private law ensures the conservation, sustainable and rational management of Madagascar's national network of national parks and reserves. This almost multidisciplinary conservation mission implies environmental education, promotion of ecotourism and science and the equitable sharing of benefits generated by protected areas with the neighboring population.

Actually, the conservation and management of natural resources are now heavily dependent on political will, on the emergence of a strong and sustainable ecotourism rather than on an involvement of the population. In carrying out its mandate, the association is recognized as "an auxiliary to the public authorities to promote biodiversity management policy and to implement conservation and development strategy in protected areas.».

### **I.2.3.- The Regulatory Mechanism : MECIE**

All investments in Madagascar are subject to the MECIE Decree on the Environmental Compliance of Investments. Several tools are designed to ensure the implementation of this decree, including the General guidelines for conducting an environmental impact study, the Environmental Assessment Guide, the Guide on Compliance (MEC,) the Environmental Audit Guide, the SEA Guide (for Sensitive Areas and Wetlands,) the Guide for the Decentralized Territorial Communities, and the various sector guides for conducting an

EIA: for tourism projects, Protected Areas projects, industrial plants, road projects, Aquacultures, upstream oil exploration, forestry and open-pit mining, and so forth... Two new guides were developed in 2012: the Methodological guidance on the integration of environmental dimension for sustainable investment; the Environmental integration guide for the Agriculture Sector.

The Strategic Environmental Assessments (SEA,) a voluntary integration process of environmental considerations into the programs, and the national and sectoral policies are particularly accompanied. Such was the case in the prioritization of conservation sites to be integrated into the Madagascar System of Protected Areas and in the elaboration of the Anosy region development scheme.

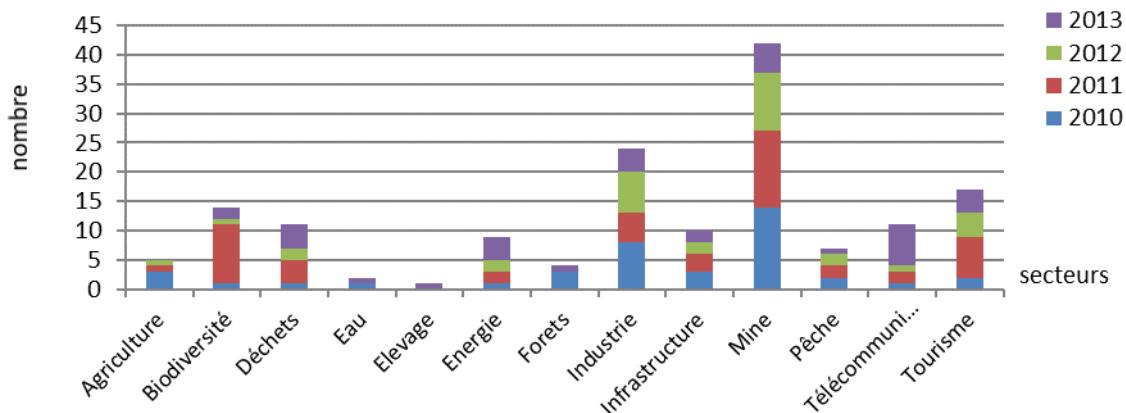
The number of investors complying with legal requirements relating to the environment is steadily increasing as evidenced by the environmental permit applications submitted to the National Environment Office (ONE) for environmental impact assessments (EIA) as well as for compliance sake (MEC.) The following table summarizes the applications and delivered permits between 2010 and 2013.

**Table 15 :** Evolution of Submitted Applications and Delivered Licenses

Year	Number of Submitted Applications		Number of Delivered Licenses	
	EIA	MEC	EIA	MEC
2010	64	48	40	8
2011	53	39	49	12
2013	47	43	32	5
2013	52	43	36	7
TOTAL	216	173	157	32

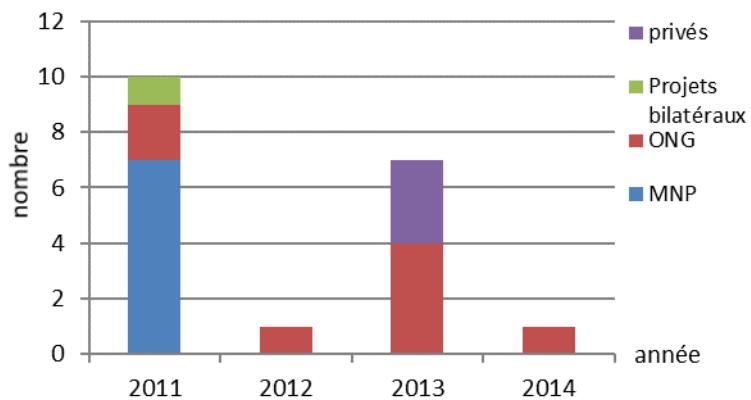
Source: ONE, 2014

The number of applications for environmental evaluation received decreased during the socio-political crisis that the country has gone through (2009-2013,) but was back to normal in 2013.



**Picture 13 :** Environnementaux licenses delivered Per Sector from 2010 to 2013 (Source: ONE, 2014)

The most common cases concern mining. For protected areas, obtaining an environmental permit is a must for the release of their final decree of creation. 19 NPAs have been subject to EIA since 2011.



**Picture 14 : Environmental Assessment and Monitoring of the Social and Environmental Management Plans of New Protected Areas (Source: ONE, 2014)**

Investors are required to submit reports on the implementation of the Social and Environmental Management Plan (PGES) and Environmental Specifications (CCE) on the basis of which the Environmental Monitoring Committee will proceed with monitoring. 66 cases were monitored in 2012, and other 55 in 2013.

The application of the MECIE Decree through the Environmental Unit within all Ministries, the granting of Environmental Permits or environmental authorization reinforce the integration of environmental considerations into the policies, strategies, programs, and development projects in each sector.

#### I.2.4.- Achievements

The implementation of the ecosystem approach required partnerships and allowed all stakeholders intervening at different levels in biodiversity conservation. The following achievements are attributed to programs and projects initiated as part of this institutional strategic partnership.

The Civil society (Alliance Voahary Gasy) has established a national vision and policy of resources governance. For their part, communities (TAFO MIHAAVO) have defined the vision and the strategy for governance and sustainable community management of natural resources for development.

To facilitate the access of conservation and development stakeholders to information, a debate on environmental governance was held in May 2012. A Charter for the promotion of access to information was established in strategic partnership with other public and private institutions. A help line, the 512, is now available to all to facilitate report to Alliance Voahary Gasy and inform them of illicit acts concerning exploitation of natural resources, including, among other things, rosewood.

With regard to ecological monitoring, a standard protocol for the marine area was established with the support of an international expert in April 2013. Local community capacities in environmental monitoring (lemurs, birds) of the Beza Mahafaly Special Reserve have been strengthened. The fight against invasive plants covered 253ha in the protected areas network.

Local community capacities as regards community-based natural resources management (Vohibe dry forest and Lake Ihotry) are strengthened. The communities have also carried out reforestation activities for carbon sequestration (e.g. 1,000 ha in Ankotrofotsy Miandrivazo,) and for restoration purposes.

*Dyospiros* sp species and *Dalbergia* sp are included in Appendix 2 of CITES.

## I.3.- OTHER STRATEGIES AND ACTION PLANS AND THEIR IMPLEMENTATION

### I.3.1.- National Action Plans for Particular Species Conservation

Madagascar has a number of specific national action plans for highly sensitive species conservation:

- *The 2006-2011 Action Plan «Sahona Gasy»* for the implementation of the «Strategy for the Conservation of Madagascar Amphibians.» The evaluation of its implementation shows full realization for 29%, partial for 33%, and with no obvious progress for 38% (Andreone et al.) (2012;)
- *The Golden Mantella Frog (*Mantella aurantiaca*) Conservation Strategy*, established in 2010 for five years (Randrianavelona et al., 2010;) the mid-term evaluation conducted in 2013 identified several actions;
- *The Belalanda chameleon Conservation Strategy (*Furcifer belalandaensis*)* established in 2011 for five years, has five goals and eight objectives. 48 identified actions are to be carried out;
- *The Antanosy gecko (*Phelsuma antanosy*) Conservation Strategy* developed in 2012 has three goals and 10 objectives (Randrianantoandro et al., unpublished.) Over 90 actions are identified and their implementation depends on the validation of this strategy by competent authorities;
- *The Madagascar Pond-Heron National Action Plan (*Ardeola idae*)* developed and implemented since 2010. The main objective of this action plan is to improve the conservation status and basic knowledge on the species in the next 10 years;
- The Dwarf Flamingo (*Phoeniconaias minor*) Action Plan implemented since 2009 with regular monitorings/ follow-ups;
- *The 2011-2014 Action Plan for the conservation of migratory and sedentary species*, particularly the *Falco concolor* and *F. eleonorae* to maintain the diversity and abundance of these raptors and to reduce the heavy pressure on their populations;
- *The Action Plan for the Conservation of Aythio Inotata* (Scaup of Madagascar;)
- *The Lemur Species Preservation Plan*: Review of the species status, elaboration of a conservation strategy for three years, from 2013 to 2016 (30 action plans for 30 priority sites identified for various lemurs conservation,) reinforcement of the team of the IUCN/SCC – the Primate specialists Group for Madagascar- for 2012-2016 counting 51 members, of which 22 out of the 400 members are Malagasy;
- *The Strategy and Management Plan of the Crocodiles in Madagascar*: a report on the implementation of this strategy has already been published;
- *The Global Action Plan on the Management of Turtles in Madagascar: a specific action plan for Astrochelys yniphora was developed*; and
- *The Strategic Plan on the prevention and the fight against the introduction of Chytrid in Madagascar*.

Other national action plans/ management plans are under discussion (on dugong and seagrass - GEF Dugong and Seagrass projects-, sea turtles...)

Madagascar implements various National Plans of Action on Flora. It essentially focuses on conservation actions. Among these is the *Conservation Strategy for Grandidier Baobab (Andansonia grandidieri)* in the Menabe region.

### **I.3.2.- National Action Plan on Desertification**

The National Action Plan (PAN) to combat desertification was adopted by Decree 199-03 of 11 March 2003. Taking into account the context in different regions, some areas were prioritized: all the Southwestern part of the country, the Deep South, the Middle West (Menabe and Northern Menabe,) and the Southern tip of the Southeast (part of the Anosy region.)

The PAN still needs to be aligned with the ten-year Strategic Framework Plan, which aims to enhance the implementation of the Convention (2008-2018,) the strategic objectives of which are to improve the livelihoods of concerned populations, to improve the state of concerned ecosystems, and to generate general benefits associated with the effective implementation of the Convention. The data required for this alignment are already available pending the upcoming validation session.

### **I.3.3.- Climate Change Adaptation National Action Plan**

In the context of implementing the United Nations Framework Convention on Climate Change, Madagascar has issued a decree providing for the reform of the Designated National Authority for Clean Development Mechanism Projects (CDM) of the Kyoto Protocol as well as other carbon markets in Madagascar - (February 2010,) prepared its National Plan to Fight Against Climate Change (2011) and set forth the carbon projects approval procedures, and the establishment and management of national carbon registry in Madagascar through a decree (July 2012.)

In terms of efficiency, adaptation strategies are deficient during extreme disasters events (cyclones, floods, drought, and hail, and so forth...) Data required for this alignment are already available pending for the upcoming validation session.

### **I.3.4.- National Strategy for Clean Development Mechanism**

Being party to the United Nations Framework Convention on Climate Change and to the Kyoto Protocol, Madagascar takes part in the international effort to combat climate change while simultaneously focusing on its own sustainable development. The National CDM Strategy has four objectives: to improve the sustainable development governance, build national capacities, strengthen institutional synergies, and to improve environment database.

Currently, the portfolio of the CDM project in Madagascar has more than thirty projects covering five priority sectors: renewable energy, afforestation/reforestation, waste management, energy substitution, and energy efficiency.

### **I.3.5.- National Policy for the Integrated Management of Coastal Zones**

The National Policy for the Integrated Management of Coastal Zones and its National Action Plan (2011-2015) are established and the National Committee on Coastal Zones (CNGIZC) is set up. Regional committees are operational; however, due to lack of fundings, the implementation of actions envisaged in the field remains limited.

### **I.4.- SITUATION OF MADAGASCAR WITH REGARD TO INTERNATIONAL TREATIES**

Having adhered to many international treaties, Madagascar honors its commitments through various activities. A summary table of the country's situation with regard to these treaties is in the Appendices.

## **Chapter II: SECTORAL AND INTERSECTORAL INTEGRATION OF BIODIVERSITY CONSIDERATIONS**

The effort to integrate environment into other sectors is one of the most advanced actions undertaken by the country in favor of sustainable development. The application of the MECIE decree, leading to the granting of an Environmental Permit or an environmental authorization, and strengthening environmental dimension consideration has fostered respect of the environment by investors.

Furthermore, the creation of an Environmental Unit within each Ministry is supposed to guarantee the consideration of the environment in the policies, programs, and projects of the sector. However, it was noted that the effectiveness of the Environmental Unit depends, to a large extent, on the importance attached to it by the concerned ministries. Actually, consulting them in the development of sectoral policies is not to be taken fully for granted yet. Compared to the educational system, the integration of the environmental dimension is effective through the introduction of environmental module in the curriculum.

### **II.1.- CONSIDERATION OF BIODIVERSITY IN SECTORAL ENVIRONMENTAL ASSESSMENT**

#### **II.1.1.- Economic Sector**

The Malagasy economy depends heavily on the exploitation of natural resources, namely mining, forestry, and marine resources. It is also characterized by the predominance of the primary sector based on small-scale farming.

##### **II.1.1.1.- Economy and Industry**

The crisis has affected the areas of economic development in different ways. Diffuse effects are noticed in the primary sector, with important consequences on the livelihoods of rural populations, causing pressure on the natural resources on which they depend.

Unlike the primary sector, the crisis effects on the secondary and tertiary sectors are immediate (e.g. closed free-zone enterprises, especially textile ones.) The resumption of growth in the secondary sector (2.3% in 2011) is due to the two large mining projects: the ilmenite mining in the South (QMM) and in Ambatovy.

The sector orientations are mainly: the Economic and social development policy, and the enforcement of environmental laws and regulations (including MECIE, the Water Code, and the law on industrial pollution,) especially in activities relating to water treatment and industrial waste, safety of industrial sites, bringing product quality and industrial process control up to standards, and the environmental control and monitoring of industrial pollution jointly undertaken with the MEF, ONE, and local authorities.

The Ministry of Economy and Industry is responsible for designing, coordinating, monitoring, and assessing the implementation of the State policy in the economic and social development and economic forecasts, on the one hand, and on private sector development, in particular the industry development, technology transfer, competitiveness and integration of Madagascar into the global economy, on the other hand. Its Environment Preservation Service (SPE) is in charge of studying environmental issues and delivering (in collaboration with the relevant ministry) certifications regarding the environmental component.

### **II.1.1.2.- Agriculture**

The current challenges of the agricultural sector from the social and environmental point of view are focused on improving agricultural productivity, food security situation (especially for the most vulnerable people,) and the establishment of adaptation strategy related to the effects of climate change.

From 1992 to date, the Malagasy agricultural policy is marked by a series of action plans and national programs: the Action Plan for Rural Development (PADR) in 1999, the Policy Paper for Rural Development in 2004, the National Rural Development Program (PNDR) in 2005, the Sectoral Agricultural Program (PSA) in 2008, the Comprehensive Africa Agricultural Development Program (PDDAA) in 2009, and the Agriculture, Livestock, and Fisheries Sector Program (PSAEP.)

Concrete actions are oriented towards improving the sector's contribution to natural resources sustainable management, maintenance of ecosystem services through watersheds protection, carbon sequestration, and maintenance of soil fertility.

Various researches have been undertaken to improve quality and agricultural productivity, in particular the use of Plant Genetic Resources for Food and Agriculture (PGRFA.) The approach adopted for the program design takes into account existing strategies and intersectoral orientations such as the adaptation of techniques and agricultural practices to climate change, and the integration of a Strategic Environmental Evaluation in the identification process of large investment zones (CEPF, 2013.)

Many actions to promote sustainable agriculture are carried out: actions to eliminate slash-and-burn agriculture or «Tavy» (from 2013,) the substantial increase of irrigated and lowland ricefield surfaces, and the development of rainfed rice-growing systems, the dissemination of agro-ecological techniques and Conservation agriculture, and the support to the producers' organization (especially for management of irrigation perimeters) in parallel with activities to preserve the environment.

Specialized agencies and research centers have conducted varietal selections on vegetables and leguminous crops, cereals, oilseeds, forage crops, tubers, tobacco, cotton, barley, and sugar cane...

Within the scope of implementing the International Treaty on Phytogenetic Resources for Food and Agriculture (ITPGRFA,) information exchanges based on the access to and technology transfer, capacity building, and support to small farmers have been undertaken.

### **II.1.1.3.- Animal Husbandry**

Animal husbandry is an activity rooted in the life of the Malagasy population, involving nearly 71.7% of households (83.8% of farm households.) Madagascar has significant assets to develop the sector which is characterized by a large and varied livestock (cattle: Malagasy zebu, sheep, goats, poultry, bees, silkworms, and so forth...) variously distributed over the national territory. It is also characterized by a zoo-sanitary condition free from major infectious diseases (bovine plague, foot-and-mouth disease, and avian flu...) a favorable natural environment and vast pasture areas.

The Ministry of Livestock aims at improving animal productivity while preserving the environment through several action programs.

Since 1998 to date, the Ministry has developed several successive tools: National policy on genetic improvement of domestic animals (1998;) Livestock Sector Development Policy Paper (2003;) Decree

to enforce the Animal Husbandry Law (2006) providing for the organization of domestic animals genetic improvement, (2010;) definition of a policy framework for the development of Malagasy zebu sector (2012;) Recovery plan for beekeeping in Madagascar (2013;) Policy paper supporting the PSAEP (2013;) and National strategies on climate change concerning the Agriculture, Livestock, and Fisheries Sectors.

The sector has already put livestock policy in synergy with other sectoral policies.

#### **II.1.1.4.- Fisheries and Fishery Resources**

The fisheries sector contributes to the country's economic growth. With the largest Exclusive Economic Zone (ZEE) of all the coastal SADEC countries (1,140,000 km<sup>2</sup>,) Madagascar has important marine and coastal resources.

The Ministry of Fisheries and Marine Resources is also responsible for aquaculture and fisheries control and monitoring. The Agricultural Sectorial Program (2008,) including the fishing sector, aimed at modernizing the sector for future growth and transition from subsistence economy to market economy.

With support from the FAO, a sustainable aquaculture development plan was developed in 2005. All aquaculture operations are subject to environmental impact studies. In addition, to meet the market requirements, companies are labeled (Ikizuki Label, Label Bio) in their breeding operations and product processing (Source: REEM, 2012.)

The Fisheries Monitoring Center (CSP) ensures compliance with laws and regulations by all vessels operating in the Malagasy national waters and by all the economic operators in the fishing and aquaculture sectors. Its monitoring, control, and surveillance activities on traditional, industrial, and commercial sectors contribute to the protection and conservation of fisheries and aquaculture resources.

The implementation of CSP fits within the scope of the Global Earth Observation System and Systems (GEOSS) implementation. The African Monitoring Environment Sustainable Development / Indian Ocean Commission (AMESD/ IOC) has developed maritime surveillance stations for regional partners and installed a satellite dish, at the CSP of Ampandrianomby-Antananarivo in 2011.

Mangrove reforestation campaigns (e.g. in Maromandia, in February 2011) were performed in order to increase spawning and rearing sites.

#### **II.1.1.5.- Mining**

The discovery of mineral resource deposits in conservation sites, in particular in protected areas and forest areas, has attracted many illegal operators. Since the beginning of the socio-political crisis (2009,) many protected areas have been the target of unsustainable exploitation. The encroachment of protected areas with mining potential areas becomes a real threat to biodiversity. A special effort has helped to limit biodiversity loss.

The main strategic documents in the extractive industry sector aim to significantly increase production. Despite the size of the Malagasy underground deposits, the sector currently contributes only to 1% of GDP (CEPF, 2013.) The Mining Code, Law No. 99-022 of 19 August 1999, was developed following the adoption of a new mining policy by the Government of Madagascar in 1998.

The Ministry raised the awareness of Regional and Local Authorities and mining operators on the procedures and environmental regulations in force, and inserted in the legal texts the mining operators' obligation to respect the rights of traditional occupants and usufructuaries, the usages and customs of the region, and the establishment of protection zones. It supports them in drafting the EIA or PREE documents. Mining activities are subject to environmental monitoring.

Mining companies are required to use alternative materials to wood as energy source and to revegetate sites after their activities. Compliance with these provisions is specifically controlled. Also, large mining companies have replanted and reinstated sites when their operation ended; which is not the case for most artisanal mining sites. In addition, private protected areas for biodiversity protection are established and managed by large mining companies (cases of QMM and Ambatovy.)

### **II.1.1.6.- Energy**

Madagascar has significant potential for solar energy, wind energy, and bioenergy production. But currently, the share of renewable energy except for wood energy in the country's economic and social development still remains modest. More than 90% of the population still used wood resources as a source of energy in 2012. On the annual wood consumption of 22 million m<sup>3</sup> per year, 80% goes to energy, i.e. 17.6 million m<sup>3</sup>/year (Source: CEPF, 2013) which is well above the replenishment rate of the forest cover. The increase of the distance between the supply and the consumption sites reflects the increasing scarcity of resources around the consumption sites.

The energy security in Madagascar is currently in an unstable situation and the country will have to face the increased and variable prices of fossil fuels and the exhaustion of its natural resources (water, forests.)

The national energy strategy is oriented in the short term to the rapid development of micro-hydro facilities, accompanied by various alternative energy sources, and in the long term, on the gradual establishment of a national electric grid supplied by hydroelectric facilities.

The sectoral energy policy developed in 2009 is focused on strengthening sector good governance, rural electrification expansion, promotion of renewable energy, and the sustainable satisfaction of energy needs.

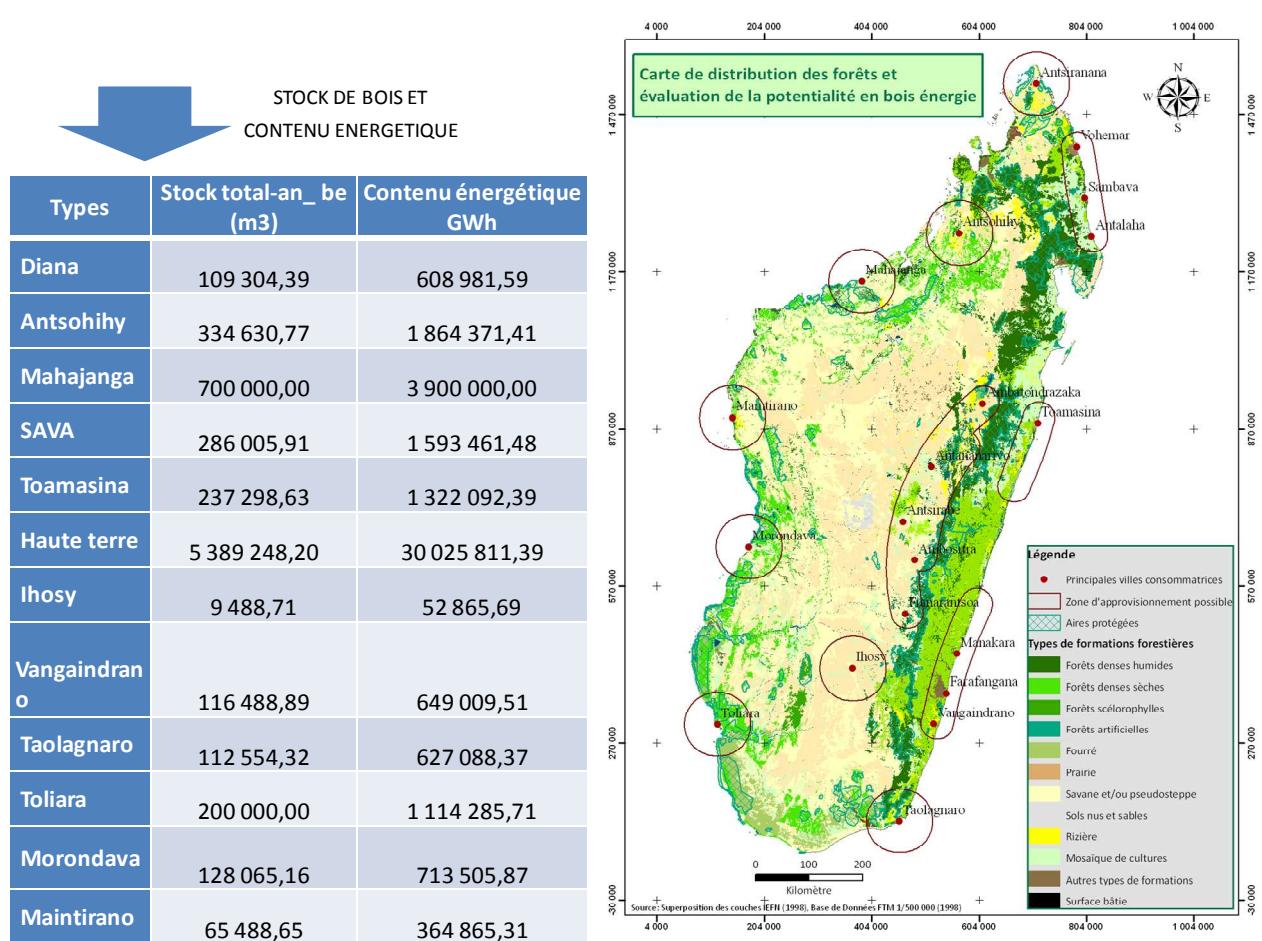
More innovative and environmental-friendly actions were developed while updating Policies and Strategies related to local renewable energy exploitation. In the case of the wood energy sub-sector, local/ regional strategies to supply large urban centers in charcoal were developed (CEPF, 2013) in addition to the National strategy for reforestation developed in 2004, which needs to be updated. The Strategic and policy framework to promote local natural resources exploitation for electricity production (especially for rural areas) still remains limited.

The bio-fuel sector is still at start-up stage. About 16 million ha are estimated fit for exploitation. 20 investment projects (12 for agro-biofuel, 8 agro-ethanol) are provided for 1.4 million ha, but the actual implementation of these projects in 2011 covered only about 58,000 ha with a low success rate (WWF, 2011.)

Currently, the Ministry supports and develops the production and promotion of new more economical and environmental-friendly energy sources.

**Forest products:** firewood and charcoals, hot briquette, and wood chip.

The production and the distribution of charcoal employ thousands of people along the value chain. The energy supply in Madagascar is dominated by wood energy (92%). Therefore, actions were focused on planting fast-growing species: 140,000 ha of *Eucalyptus* in small farms in the Central Highlands, 65,000 ha of industrial pine plantation, and *private* natural or state forests exploitation, primarily in Mahajanga, Tolagnaro, Antsiranana, Toliara, and Morondava.



(Source: AIDS; 2012; based on FTM/BD 500 in MdE, 2012)

### Agro-Biodiversity:

The agrodiesel is derived from *Jatropha curcas*. The objective is to produce motor fuel and fuel for household lighting and cooking. Thus, 12 projects of 462,000 ha with an estimated 544,000 m<sup>3</sup> production forecast are developed, 57,125 ha of which are already completed. (MdE, 2012.) The seeds of *Jatropha curcas* and *mahaefaliensis* are collected from plantation in the wild.

The Agroethanol is derived from sugarcane and cassava. The objective is to produce an alternative fuel to gasoline or fuel for cooking in households. Eight industrial plantation investment projects covering 35,000 ha of sugarcane, with a production forecast of 105,000 m<sup>3</sup> of agroethanol, are underway.

Agricultural waste recovered for energy purposes are groundnut shells, corn cobs, rice hulls for hot briquette manufacturing (e.g. rice hulls in Anjajaja, Boeny region, and in Amparafaravola of Alaotra Mangoro region,) and sugarcane bagasse for electricity production in sugar refineries (Ambilobe, Namakia, and Brickaville.)

Two thermal power stations use biomass for rural electrification.

## **Water Resources**

To supply hydroelectric plants, Madagascar has 7,800 MW of potential power (documented,) 160 MW of which are currently being exploited, corresponding to 55% of the electrical energy produced (MdE, 2013.)

To better manage the country's energy resources, the Ministry of Energy is implementing a development-oriented Renewable Energy policy, mainly through various reforestation programs for energy purposes or for the protection of the watersheds (Antelomita, Mandraka, Antanifotsy.) The Wood Energy Planning Strategy in the city of Toliara (ABETOL) has been revised. A Synergy Energy Environment project in the Southwest of Madagascar (SEESO) is being implemented.

Mass awareness for energy conservation is conducted while alternative fuels are already produced in the Region of Menabe and solar cookers are distributed.

### **II.1.1.7.- Hydrocarbons**

Madagascar has significant oil and gas potential (both onshore and offshore.) Several exploration projects are underway and 26 oil blocks are under contracts with international oil companies.

The Petroleum Oil Companies Code requires holders of a mining title to take all measures to protect and safeguard the environment. The Petroleum Contracts are subject to MECIE Decree and to the best practices of industry.

During operations, operators must: prevent pollution, ensure the conservation of fisheries, vegetation, marine life, manage the risks and dangers inherent in carrying out exploration activities, comply with HSE standards, manage waste at the exploration sites, remedy deficiencies and the effects of possible breaches of environmental regulations, and take the necessary measures in case of accidents and emergencies. At the end of operations, they are required to proceed to demobilization and site reinstatement.

The Ministry for Hydrocarbons, through its Environmental Unit, monitors oil companies' compliance with the provisions of the specifications (implementation of the quality, safety, and hygiene plans,) and in collaboration with the OLEP for the fight against oil spills at sea, and with ONE for the environmental monitoring and assessment, and the monitoring of various pollutants related to onshore and offshore oil activities; the enforcement of regulatory texts, environmental management plan, and international ISO 14001 standards (the international reference for environmental requirements.)

### **Office of National Mines and Strategic Industries (OMNIS)**

OMNIS participates in the awareness campaigns of oil companies, key sectors, and representatives of local communities affected by mining and/or oil exploitation with the ONE; and it also ensures, as a member of the CTE, the compliance of oil companies with the provisions of environmental specifications. It is responsible for ensuring that all oil projects operating in Madagascar hold an environmental permit. Currently, oil companies meet 70-80% of the measures prescribed in the specifications and 90-95% oil projects are subject to environmental monitoring every year. (Source: ONE, 2014.)

### **II.1.1.8.- Tourism**

For a decade, Madagascar has accommodated an increasing number of tourists. Tourism is one of the major sources of foreign currencies for the country. Since 2009, the sector has negatively suffered from the socio-political crisis (insecurity, degradation of tourist sites, including protected areas...) It is also exposed to the consequences of natural disasters causing damage to infrastructure and degrading resources.

Despite the relative importance of tourism in the economy, the «Madagascar Destination» is still rather sparsely-visited, compared to the neighboring islands. Despite all its natural assets, its spectacular fauna and flora, its landscapes and specific sociocultural aspects, the performance of the sector appears to be mixed. Several reasons account for it, including the insufficiency of transportation, communication, and accommodation infrastructures, insecurity and political instability which spoil the country's image on the international scene (MEF, 2012.)

The Ministry of Tourism has undertaken to promote tourism and ecotourism industries based on the integrity of the natural environment and the sociocultural identity of the Malagasy people. The National Tourist Plan, adopted in 2005, aims at supporting the growth of the sector. Among its specific objectives is to make tourism, and especially ecotourism, a lever for direct and sustainable benefits for village communities while preserving the environment.

The Tourism sector program developed in 2008, defines the development of a national policy that integrates the concept of sustainable tourism and the national strategy for ecotourism inside and outside protected areas as priorities (Ministry of Tourism, 2008.)

The Ministry of Tourism, in collaboration with the ONE, has developed and promoted the environmental «Green Label».» Supports are provided to tourist operators in the EIA and PREE processes to obtain environmental permit, as well as in the implementation of the specifications.

21 tourist land reserves, for a surface area of 8,700 ha, were set up (Ministry of Tourism, 2013.) The activities planned in the tourist interest zones (ZIT) aiming at facilitating the implementation of tourism projects, raising operators' awareness on environmental protection and developing the areas around the reserves, have been restarted. In selected priority areas (North and Southwest,) economic development and social approach were reconciled with the respect for the environment.

### **Malagasy National Office of Tourism (ONTM)**

ONTM's mandate is to promote Madagascar as a tourism destination, to assess training needs, to ensure private-public dialogue, and to represent private sector in the relation with partners.

Given the degradation of biodiversity in protected areas, the ONTM carried out communication campaigns by means of posters to raise public and decision-makers awareness on the conservation and valorization of the country's natural and touristic wealth. The developed slogan was: «Tourism generates wealth for Madagascar.» Awareness campaigns for the use of Renewable Energy and for water sustainable management in Antsiranana and in Antananarivo have also been conducted.

#### **II.1.2.- Social Sector**

##### **II.1.2.1.- National Education**

According to national statistics, more than 14% of youth are without instruction, about 42% have not completed primary school, and 34% cannot finish secondary school. Finally, only 2.3% proceed into higher classes. (Source: INSTAT, 2009)

The majority of actors in the environment field agree that the world of education is the most favorable environment to develop environmental reflex and that environmental education should be developed early in life.

For this reason, the Ministry of Environment has worked out a Guide on Environmental Education, by integrating environmental modules in the national schools curricula (2011,) teaching resource kits, and

educational materials conveying environmental themes (Illustrated tales in Malagasy, for example, IMANANKASINA.)

Various environmental educational programs and projects have been jointly carried out by some environmental institutions (national, international) and by NGOs working in the field of education.

Since 2009, the Office of Mass Education and Citizenship (OEMC) has conducted awareness campaigns on environmental protection through the Environmental Education Cultural Centers (CCEE,) in schools, and during the World Environment Day. Regional trainers in environmental education, as well as teachers and military personnel, were trained to strengthen Environmental Education Cultural Centers in the 22 regions.

Training modules on Environmental Education (ERE) have been used, including «The concept of natural resources sustainable management», «Environmental Issues,» «Teaching lessons based on the use of teaching materials,» «Creativity through papier-mâché figurines», «Use of MAD'ERE kit in formal and informal Education,» and «Making a MAD'ERE kit.»

The environmental dimension has been incorporated into school curricula: curricula, manual and guidebooks on environmental education (from November 2009 to January 2011.) In addition, the OEMC has developed new curricula on citizenship education on topics relating to environmental conservation and valorization for the primary and secondary schools. Related educational and training materials for pupils and teachers have been prepared: 24,000 handbooks, 7,200 curricula books, 11,000 supporting documents, 6,000 didactic guides, and 15,500 environmental educational kits (Source: REEM, 2012)

In the context of the IOC pilot project of Regional Support to the Promotion of Education for Environmental Management (ARPEGE,) in which Madagascar participates, awareness tools designed by the Ministry of the Environment were brought into general use: 20,000 posters on citizenship for schools (2012) and 15,500 environmental educational kits (KEE) to develop environmental reflex.

In the partnership between the Ministry of Education, the other ministries, and different organizations, the National Action for Sustainable Development Education (ANEDD) was created in 2012. It came out of the harmonization and capitalization workshops on environmental education, sustainable development education, and integration of the concept of biodiversity and education for sustainable development in school curricula.

The decree establishing the **National Educational Policy Related to Environment for Sustainable Development** (ANEDD) was approved by the Government Council in December 2013.

### **II.1.2.2.- Health**

Biodiversity provides products and services that are essential to population welfare, especially to health. Acknowledging such provided health-relative service constitutes a decision-making tool for the sector, and a means to valorize biodiversity conservation. The traditional pharmacopoeias are among the basic medicines in the public health facilities.

The Ministry of Health has developed and implemented different policies, plans and programs: (National Policy on Hospital Waste Management and Universal Precautions, National Health Policy and Health Sector Development Plan) with chapters addressing environment-related diseases, National Sanitation Policy and Strategy, National programs on the fight against malaria, tuberculosis, emerging and re-emerging diseases, leprosy and plague.

A text governing the production, exploitation and sale of medicinal plants, and a manual of procedures on the registration of medicinal plants have been developed, a National Advisory Committee on traditional medicine set up, and a herbal monograph completed.

In the process of implementing the Libreville Declaration on Health and Environment, the biodiversity and human health component was integrated into the Joint Action Plan on Health and Environment. The inter-sectoral and multidisciplinary working group on Health and Environment (GTSE) developed the document of Situational Analysis and Needs Assessment in Health and Environment (ASEB) in 2010, and the National Policy in Health and Environment in 2011. (Source: REEM, 2012.)

### **II.1.2.3.- Population**

The rapid growth of population brings about strong pressure on natural resources. An imbalance in the population spatial distribution causes land saturation in densely populated regions. The Ministry of Population implements the following policies, strategies and plans: National Population Policy, National Policy for the Advancement of Women (2000,) National Gender and Development Action Plan (2004,) Risk Management Strategy and Social Protection (2005,) Social Protection and Risk Management (2006,) and the World Bank policy PO 4.12 on involuntary resettlement of population.

The associations were sensitized to and mobilized around the preservation and fight against natural resources misuse, especially in the MPAS intervention sites (MPAS community villages: immigration sites, Groups, Associations, NGOs, DRPAS, and so forth...)

The Gender approach in environmental management and in development programs like the National Gender and Development Action Plan, which integrate environmental management, aim at dealing with environmental issues for specific target groups (women, aged people, and handicapped people, and so forth...)

### **II.1.2.4.- Culture and Heritage**

Madagascar's cultural heritage is composed of intangible (166 classified sites and monuments) and tangible (six museums objects,) cultural heritages (list of the 39 PCIN) and underwater cultural heritage (sites, structures, buildings, artefacts and human remnants, as well as their archaeological and natural context...)

The various elements of that heritage are of a social, cultural, and spiritual importance. The degradation of the natural environment disturbs social and cultural practices, involves the loss of traditional knowledge and know-how, the devalorization of cultural sites, the lack of learning, and the loss of know-how transfer that characterize the country.

The National Cultural Policy stipulates in its article 4 that «The protection of the national heritage, tangible as well as intangible, is a national priority.» The objective consists in «rehabilitating an historic site into an ecological model while making it operational (to reforest with culturally adaptable species, to re-work with older technologies, to organize traditional or modern cultural events and to use the local human and technical potentials for the protection and the safeguard of the heritage.)»

Thus, some endemic species of *Phyllarthrions madagascariensis* (Zahana,) *Dracaena sp.*(Hasina) were regenerated on the Royal Hill of Ambohimanga Rova, and some species of historic and cultural value *Ficus trichopoda* (Aviavy,) *Ficus baroni* (Amontana,) *Cinnamomum camphora* (Ravintsara) at Ilafy Rova. Medicinal plants of the Zafimaniry village and endemic plants of Zoma in Isandra were also identified.

A book on the preserved culture of the Zafimaniry, on the people and the cultural heritage of the Fianarantsoa district, is published, and an awareness campaign on conservation of traditional knowledge (PCI) undertaken. The PCI International Day is celebrated to inform on traditional knowledge.

A convention on sharing of artefacts collected during the search for wreckage in the Ambodifotatra bay in 2000 and 2010, and a concession contract with a company to explore shipwrecks in Sainte Marie Island

were signed in December 2012. A partnership agreement with the Ministry of Higher Education for the accessibility to archaeological material is currently being worked out.

### **II.1.3.- Croos-Cutting Sectors**

#### **II.1.3.1.- Scientific Research**

The Ministry of Scientific Research aims at making national research a pillar of social progress and economic development, respectful of the environment. It has just developed the National Strategy of Scientific Research in Madagascar (2013.)

Presently, the research carried out in the national research centers covers practically all areas.

In the field of **environment**, a priority for the country, three national research centers have looked into the natural resources knowledge and management, those of marine environment and resources, and pollution management: the National Oceanographic Research Center (CNRO,) the National Research Center on Environment (CNRE,) and Tsimbazaza Botanic and Zoological Park (PBZT.)

Concerning **technology and agronomy**, which are also priority areas for the development, agricultural production and rural development issues are addressed by FOFIFA or CENRADERU, the manufacture of animal vaccine by the Malagasy Institute of Veterinary Vaccines (IMVAVET.) As for the National Industrial and Technological Research Center (CNRIT,) it was created to support works related to the development of new and renewable energies, of adequate and appropriate technologies; while the National Institute of Nuclear Sciences and Techniques (INSTN) deals with nuclear applications in the agricultural, environmental, and health fields.

**Public Health** is the focus of the National Center for Pharmaceutical Research Application (CNARP) which works on medicinal plants (some of its research products have received marketing authorizations.)

The Ministry of Scientific Research also has a Scientific and Technical Documentation and Information Center (CIDST) which gathers the various publications in the following fields: biological sciences, social and human sciences, and technological and medical sciences.

#### **II.1.3.2.- Water**

The Statement on Water and Sanitation Sectoral Policy (1997) and the National Sanitation Policy and Strategy (2009) outline the main strategic policies of the Ministry of Water. Their implementation is set out by the Water Code (Law n° 98 029 of 27 January 1999) and its implementing decrees, the manual of procedures/ standard office procedure (SOP) and the National Program for Access to Drinking Water and Sanitation (PNAEPA) (2008 -2012.)

Legislation provides for taxes for all water withdrawal, but as of now, they do not contribute yet to the management of watersheds or protected areas.

The Law on the Industrial Pollution Management and Control Policy (Law n° 99 021) creates the polluter pay principle, especially applied to water pollution (*Source: CEPF 2013.*)

The policy related to the Integrated Water Resources Management and the socio economic development of Madagascar, the National Water Sector Strategy and Planning, the integration of biodiversity conservation in water resource management at all levels, the water management bodies for watersheds are being restructured.

### **II.1.3.3.- Public Works**

In the environmental preservation policy and action plans, the Ministry of Public Works and Meteorology (MTPM) has set as goals the integration of the environmental and social dimensions in all road projects initiated by the MTPM, in synergy with the general State policy as regards road infrastructures and environmental protection and the implementation of a “sustainable transport” system by combining roadworks and environmental and social safeguards.

The main activities of the Public Works sector, which have negative effects on environment, result especially from the impact of forest clearing and fragmentation, and air, water and soil pollution.

184 people (representing the Decentralized Technical Services of the Ministry and the Decentralized Territorial Units spread over 9 targeted regions (Alaotra Mangoro, Analamanga, Boeny, Haute Matsiatra, Bongolava, Itasy, Vakinankaratra, Betsiboka and Vatovavy Fitovinany) were trained on the procedures manual concerning the management of environmental impact of road works.

The Ministry's technicians and community authorities (regions and municipalities) have been made aware of the Road / Environment / Development issues and trained in environmental and communication techniques geared at giving them an environmental reflex culture as actors and leaders in transferring knowledge to their organizations of membership and to the population.

As regards technical assistance to environmental protection works, the Ministry has restored 31 abandoned and degraded sites (on NR44, NR2 Alaotra Mangoro, MAIN ROAD 3B SAVA, NR7 Andavabato Vakinankaratra, Morarano, a track toward Mahaela Anosibe Anala and Morarano Analamanga) and has reforested 4 sites (Ambatoharanana and Tsimahabeomby) with a total surface of 5 hectares.

Despite financial resources insufficiency which has been declining since the 2010 political crisis, the Ministry has tried to meet its environmental commitments. These last years, the Ministry has used only its own internal resource (RPI) to fund its environmental action programs.

### **II.1.3.4.- Transportation**

The main mission of the Ministry of Transportation consists of managing an administration for the public interest by promoting a safe and secure, efficient and environmentally friendly transportation network in accordance with a sustainable development policy.

The Ministry of Transportation is in charge of designng, implementing, monitoring, and coordinating the State Transportation Policy. It ensures the implementation of guidelines defined by the State, in its area of competence.

The three international airports managed by the ADEMA (Ivato, Toamasina, and Nosy Be) were the subjects of Environmental compliance. The rehabilitation project of Nosy Be port and Ankify boat landing (emergency works) also has been environmentally assessed.

In respect of the international standardization, the preservation of the marine physical environment in collaboration with regional partners is linked to the implementation of international conventions and especially those linked to marine pollution risks surveillance (ISPS, MARPOL,) the introduction of anti-pollution devices, stations and equipment.

#### **Case of the Madarail Company**

As part of its HSE commitments, Madarail S.A., as an advocate company for sustainable development, has focused its environmental approach on the following aspects:

*Waste Management:* Since 2009, Madarail S.A. has begun to sort and treat (recycling, valorization, incineration, re-use) special waste. Only biodegradable waste is sent for landfill purposes. Dangerous waste is sent to special centers (medicines, waste oil, acid, and so forth...) Domestic waste is reused or recycled.

*Water Management:* Putting in place an oil remover in the three deposits of Madarail S.A. prevents the pollution of public sewage system. The company regularly checks the waste water discharge into these channels.

*Carbon Footprint:* Madarail S.A. has performed a first approach to carbon footprint. In this context, the company continues to reforest railway rights-of-way in order to offset its discharges. These actions are limited, given the context in Madagascar where eco-organisms specialized in special waste treatment are virtually non-existent. The lack of clear and controlled regulation is not conducive to continuous improvement or an exchange of experiences.

*Fight Against Erosion:* Given the increase of slash and burn cultivation and erosions, satisfactory results in vetiver planting have led Madarail S.A. to keep this technique to reinforce civil engineering works (retaining wall, gabionade.)

*Forest Preservation:* Awareness campaigns to communities living by the railway line are continuing. Reforestation actions also should continue by integrating company's employees or tourism/ environment activities.

### **II.1.3.5.- Trade**

The impoverishment affecting up to 72% of the population entails pressures on natural resources (INSTAT, 2013.) Illegal trade of precious woods is listed as one of the largest plague on biodiversity. Modern biotechnology also presents risks for our biodiversity through contaminations and dependencies on the LVM/GMO seed suppliers.

The environmental unit of the Ministry of Trade was instituted as a Service of the Trade and Environment in 2010.

As regards environment, the Ministry has particularly focused *on the promotion of the sustainable trade*. Initiatives for setting up a fair trade system have been undertaken (2011.) An Inter-ministerial Committee of Support to Equitable and Interdependent Trade was created (Order n° 28861/2011 of 5 October 2011.) The National Association of Interdependent and Fair Trade of Madagascar (ANCESM) was created in 2013, and it counts currently 2,566 members from different sectors. The Equitable and Interdependent Trade (CES) contributes to sustainable development, particularly through the reinvestment of the partial profits in the local communities and in environmental compliance obligations. The certification and labeling of fair and biological products contribute to safeguard the environment against soil pollution and contamination by LVMs/GMOs (bio requirement.) Thus, CES stakeholders and the Ministry's technicians were trained and made aware of the basic techniques in Bio-Agriculture.

Concerning forest governance, the Ministry of Trade works with international bodies (FAO, NGO, and so forth...) to improve governance and the marketing of precious woods.

The Ministry works with other sectors in developing policies, strategies, action plans relating to preservation, including works on the consistency of the legal and regulatory texts on implementing the CITES, and so, forth... It takes an active part in monitoring the implementation of regulations on forest products exports, the fight against precious wood and CITES products trafficking.

Its contribution in *climate change* encompasses the follow-up of the traceability of refrigerants, refrigerating appliances or equipment and halons pursuant to article 23 of decree n° 2007-327 of 24 April 2007 with on-

site inspections of Special Import Authorizations and purchase invoices (in concert with the Ozone National Office.)

As regards *biosafety*, the Ministry of Trade is among the sectors involved in the implementation of the Cartagena and Nagoya Protocols. Thus, two officials from the Service of Trade and Environment have been introduced to the Biosafety Clearing House (ECPBR) in 2011. 12 of the 22 Malagasy regions were trained and made aware of these two protocols.

### **II.1.3.6.- Decentralization Sector**

The Ministry in charge of Decentralization aims to make all the actors (Decentralized Territorial Communities) accountable for natural resources good governance and for the reduction of related threats. It supports income-generating activities (IGA) to compensate for the restrictions of access to resources through collaboration from the public and private sectors.

The Ministry is also involved in monitoring the EIA's realization in order to ensure a better environmental integration of the different projects and an involvement of all concerned public and private sectors.

### **II.1.3.7.- Ministry of Interior / Home Ministry**

The Ministry of Interior contribute to raise awareness and to social mobilization at the territorial level through the Heads of District who will mobilize for this purpose the Heads of Administrative Arrondissement, the Mayors, the police force, and the officials in their respective constituencies to raise awareness on the importance of biodiversity and population behavioral change. They carried out actions aiming at sharing the importance of biodiversity, combatting soil clearing, poaching, deforestation, and abusive practices which go against sustainable management of natural resources.

It ensures the compliance with the various legal texts concerning environmental preservation. The activities carried out are geared towards the rational management and good governance of natural resources.

It aims at setting up a peaceful, viable, livable and equitable social environment: to ensure the participation of each citizen in the procedures prior to making decision likely to be prejudicial to environment, at managing risks and disasters, and informing and educating the population as regards natural resources management.

### **II.1.3.8.- Development and Town and Country Planning**

The general objective of the National Town and Country Planning Policy (PNAT) is to develop the national economy by promoting an export-oriented market economy for goods and services with the respect for people, regions complementarity, and environment conservation. The PNAT outlines programs focused on the elaboration of operational tools at all territorial levels: SNAT, SRAT, PUDi / BAG, and PUDe.

The development of the National Plan for the Town and Country Planning (SNAT) is among the VPDAT's main objectives. The SNAT is a guiding document intended to present a coherent vision of territorial development, by placing immediate options in a long-term prospect.

In its undertakings, the Town and Country Planning uses innovative approaches, such as:

*Spatial approach* to understand the logics on how the territory functions and how it is structured by framing actions within time and space;

*Highly Participatory Approach* of the CNAT, CRAT to CMU: the different territorial stakeholders are represented in a permanent dialogue structure. The dialogue ends up with a design of joint projects by the various stakeholders for their territory;

*Prospective approach:* by combining scientific and participatory methods, they assess the long-term evolutions and changes in order to monitor the positive dynamics and to inflect unwanted changes.

The VPDAT has committed itself to develop a National Policy in synergy with other sectoral policies to secure the effective implementation of the General Policy for the Development of the Country:

- National Policy for the Town and Countryplanning (PNAT) (MPDRAT, 2006)
- Urban Master Plans, Environmental Requirements (ONE, 2006)
- National Plan for the Town and Country Planning (SNAT)
- Regional Plan for the Town and Country Planning (SRAT)

The VPDAT ensures the compliance with the various regulations relating to the exploitation of natural resources by the State and the decentralized and deconcentrated structures. It supports the reinforcement of the normative valorization of waste and recent job creation.

The VPDAT has also helped with the development, finalization, and enforcement of the National Sanitation and Waste Management Policy as well as the by-laws and regulations. To this end, significant efforts have been deployed at the local level in order to mobilize the different stakeholders, including the Central Government, donors, bilateral partners, the private sector, the decentralized co-operation, and so, forth... With regard to the increase of household waste by approximately 10% per year, the VPDAT works with the decentralized structures to remedy to the poor sanitation and hygiene problems.

Within the framework of land tenure security efforts, the VPDAT has initiated various actions relating to land reform: technical and regulatory reforms, decentralization of land management; National Land Manager Training Plan. A collaborative protocol between the Directorate-General of Land Services (DGSF) and the Directorate-General for Forestry (DGF) was signed to help secure protected areas (2013.) In partnership with the Ministry of Environment and Forests, the Land/Forest Interdepartmental Committee (CIFF) was established by an inter-ministerial order (2013.) This committee ensures the synergy of interventions of the VPDAT and the Ministry of Environment and Forests, especially in activities aiming at securing conservation sites (protected areas.)

Economic and physical planning tools relating to decentralization have been developed: PNAT- SNAT; PRD-PRDR-SDR-SRAT; PCD-PUDi-PUDe- PSU-SAC.

### **II.1.3.9.- Environment and Forestry**

In accordance with the principles and provisions of the Environmental Charter and International Conventions relating to environmental protection ratified by Madagascar, the Ministry of Environment and Forests (MEF) is responsible for designing, coordinating, implementing, and for the monitoring and evaluation of the State policy concerning environment and forest resources. The Ministry of Environment and Forest has set the objective of «protecting the unique environment and natural resources for the benefit of the Malagasy population and the country's sustainable development.»

The Ministry also exercises administrative and technical supervision over some organizations such as the Madagascar National Parks (a national association which manages a network of 52 protected areas

of the categories I, II and IV,) the National Environment Office (ONE) which serves as the one-stop-shop for environmental impact assessments in Madagascar, the National Association for Environmental Actions (ANAE) and the Service of support to the Management of the Environment (SAGE) which is mandated to promote local natural resources management. These two national associations are involved in the fields of environment, the development, and capacity building of communities.

*As far as the protected areas are concerning*, the areas of conservation sites (under legal protection status pursuant to inter-ministerial decree 9874 of 6 May 2013) is currently of 6,909 million hectares. Thus, Madagascar's pledge in Durban for 6 million of hectares is met.

The decrees providing for the final creation of the 4 new protected areas (NAP) (Nosy Hara, Mikea, Nosy Tanikely, Makira) are issued. The change in the status of the two protected areas of Lokobe (with marine extension) and Bemaraha is made official. Contracts of temporary management delegation of the New Protected Areas (NPAs) are being prepared with a view to get them fully-implemented.

To secure land in the protected areas, a collaborative protocol between the General Directorate of Forests and the Directorate-General of Land Services is signed.

*As regards laws and legislations*, the Bill recasting the COAP, after adoption by the two Parliaments in 2008, has obtained a Notice of Compliance from the High Constitutional Court (HCC.)

A draft decree providing for the transfer of forest resources management was completed.

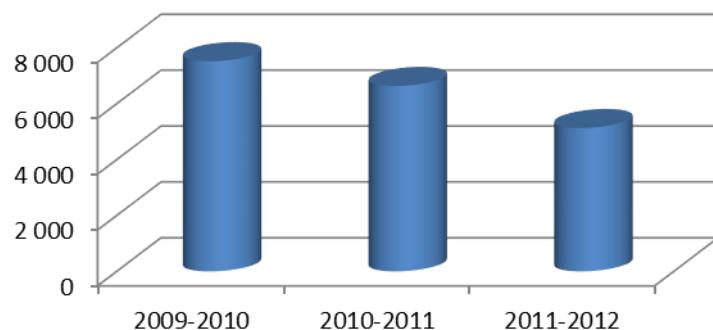
Contracts for the carbon credit sale from the new protected areas of «Corridor Ankeniheny Zahamena» and «Makira» are signed.

Some precious woods and Southern succulent plants are enlisted in the Appendix II of the CITES.

*The traceability system* of woods and other non-timber forest products is gradually set up in decentralized services.

Madagascar has officially joined the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES,) an independent intergovernmental body, and the Taxon Advisory Group on Prosimians. Besides, Madagascar has also adhered to the Mountain Partnership through the MEF. This membership brings added value to the Government's efforts in developing mountainous regions, both in biodiversity and in mountains-related fields.

Regarding *reforestation*, the reforested areas have declined between 2010 and 2012, as shown in the figure below.



**Picture 15 : Evolution of Reforested Areas from 2010 to 2012 (Source DVRN, 2014)**

Concerning the *fight against infringements*, 556 tortoises were seized from 2010 to 2013. The stocks of rosewood and ebony wood (all categories) seized in different Districts of Madagascar are evaluated at 14,612 rosewood logs (1248,23 m<sup>3</sup>;) 6,800 rosewood plates (90,49 m<sup>3</sup>,) 1,688 ebony wood logs (30,22 m<sup>3</sup>) from 2011 to 2012 (DCAI, 2014.)

## II.2.- PRIVATE SECTORS

A large number of private sector companies/ organizations are involved in biodiversity conservation, voluntarily or as determined by their environmental specifications. This is illustrated by the cases of ESSA-Forest, QMM, Ambatovy project, and Tany Meva Foundation, entities which differ from their actions and obligations relatively to environment, as shown below.

For the large mining projects of QMM and the Ambatovy project, their environmental commitments, both regulatory and voluntary, have led to the creation of conservation sites, implementation of the Environmental Management Plan, realization of ecological restoration and reforestation activities, and to the consideration to include social integration in their areas of operation. For this purpose, a program that compensates biodiversity loss (BBOP: Business Biodiversity and Offset Program/ Biodiversity Offset Program) is provided in the project's areas of operation with a view to develop a framework for effective implementation of offset activities, especially focused on local community's livelihood improvement.

### II.2.1.- QIT MADAGASCAR MINERALS (QMM)

Efforts have been made by QMM towards an effective implementation of biodiversity preservation actions as specified in the Regional Strategy for Natural Resources Sustainable Management. The activities mentioned below are used for illustrative purpose:

- Development of a Strategic Plan for the conservation of *Phelsuma antanosa*, a diurnal species of gecko listed among the Critically Endangered species in the IUCN Red list;
- Raising the awareness of employees and Tolagnaro's population to develop an environmental reflex through various environmental education programs: Bird Watching, Arovy ny Sahona (Protect the amphibians,) environmental events (WED, JMZH, JMOM, JMDB,) educational and scientific papers, films, training and sharing on cultivation methods, building an ecological research center and mentoring student researchers in biodiversity ;
- Contribution to the development of the Regional Territorial Planning; Community Management of Fisheries Resources in the Lanirano-Anosy lagoon system.

Within the scope of the implementation of the Environmental Management Plan and the Social Safeguards Plans: creation and management of protected areas in mining zones (Mandena, Petriky) as well as financial and technical support for the establishment of protected areas outside of mining areas (Saint Luce, Ambatotsirongorongo;) reforestation of 1,000 ha as carbon stock; rehabilitation of mining sites; waste management (recycling of waste, waste water, and dust) – receiving ISO 14001 and 9001 certifications;) capacity building for the Natural Resource Management Committees (in the past 10 years;) and fishermen (improved fishing techniques;) training on the use of the Biodiversity Clearing House Mechanism (CHM) with the participation of the Network of Conservation Professional Educators; specific actions essential for conservation: establishment of DINA and the marine PAG of the Fausse Baie de Galions; ethno botanic use of plants, promotion of fish farming in a controlled environment (closed basins;) and inventory of the sacred and cultural sites in and around protected areas.

## **II.2.2.- Ambatovy Project**

The fundamental environmental objective of Ambatovy is to ensure that all of its activities do not degrade Madagascar's natural capital. In order to achieve the expected results in environment conservation, the project endeavours to focus its interventions on:

- Implementing adaptive environmental management plans based on the most recent scientific, social, and environmental knowledge to ensure conformity with national and international standards during the project's phases of construction, operation, and closing;
- Minimizing all residual impacts through the implementation of good practice and compensation programs;
- Managing environmental risks by promoting the involvement of all stakeholders through timely and convenient public access transparency, ongoing consultation, and sending feedback on emerging environmental issues;
- Monitoring operational performance and radiation emissions in order to ensure respect of the levels of compliance and optimal functioning of the operational control system.

Ambatovy works closely with the ONE, particularly in the field of project environmental monitoring.

Since 2006, the Ambatovy's offset programs have met the quality requirements of a pilot project against BBOP standards. The average annual cost of the Ambatovy project BBOP program is estimated to be between USD 250,000 and 300,000.

## **II.2.3.- Water and Forest Department at the Higher school of Agricultural Science, at the Antananarivo University**

The integration of the environmental dimension in the ESSA-Forest activities can be assessed through the following programs and projects:

- Environmental education through training and research programs in the application sites of Tampolo (East,) Mandraka (transition between Highlands-East,) Ambohitantely (Highlands,) and Bezà Mahafaly (South) ;
- Permanent conservation program in partnership with local actors, and a long-term ecological and economic follow-up program;
- A degree training (Engineering/ Masters/ Doctorate) addressing major issues in natural resources management in Madagascar. «Free choice» curricula training for future professionals and decision-makers ;
- Permanent on-site monitoring programs, backed by the dissemination of research results.

## **II.2.4.- TANY MEVA Foundation**

Les interventions de la Fondation sur la conservation de la biodiversité sont des plus variées et concernent la mise en œuvre des 20 objectifs d'Aichi, notamment:

- Support to a network grouping together almost 500 community-based organizations, located in 18 regions (2012;) to management committees of built or rehabilitated infrastructures, such

as irrigation channels, wells, picohydroelectric power stations which have allowed managing rationally water resources in the concerned sites;

- Incentive policy: financial support for women's associations which produce rock salt around the Bezà Mahafaly Special Reserve;
- Support for the production and popularization of new efficient energy-saving fuel stoves among centers ranked among the biggest consumers of charcoal and firewood;
- Mentoring local communities to improve the production of fry and fish, rice/fish farming as well as the production and conservation of endemic fish species in the concerned regions;
- Building the capacity of local communities in ecological monitoring (sifaka, lemurs, birds monitoring...) in the Beza Mahafaly Special Reserve and its extensions; strengthening the community-based management of the Vohibe dry forest (300ha,) and Lake Ihotry (8ha,) and support for the promotion of various sectors in the village of Tongobory, in the Rural Commune of Betioky Atsimo;
- Support to conservation activities in Toliara II, Southwestern region of Madagascar: agricultural development and sustainable use of natural resources in the Higher Beheloka area; community conservation of the Mafay dry forest (5,000 ha) and of the Lake Basibasy, by developing farming sectors over 100ha of mocha in Basibasy ;
- Support to the communities of Toliara II, Southwestern region of Madagascar: formalizing the development of the community conservation area in Andatabo Nord and St. Augustin (5,980 ha;) sustainable management of the mangroves (43 ha) as well as marine and coastal ecosystems of Lower Andrevo, Andrevo, and Manombo Sud; community-based management of the Ampatiky dry forest (600 ha) and of the Lake Analodolo by valorizing the mocha of Vondraky Ampasy (100 ha,) Andaboro, and Analamisampy ;
- Support to restoration activities: restoration of the forest spaces of Vinany Nord and Andriakely; Tsiaziompaniry (500 ha;) reforestation for carbon purpose at Akotrofotsy Miandrivazo (1,000 ha;)
- Development with local communities of various funding mechanisms such as revolving fund, matching fund, and sustainable community-based funds.

## **Chapter III: INITIATIVES AND THEIR EFFECTIVENESS**

### **III.1.- LARGE-SCALE NATIONAL, REGIONAL/ INTERNATIONAL PROJECTS**

#### **III.1.1.- The MRPA Project (Mitantana Rakikare-Paritra Arovana or Managed Ressources Protected Areas)**

With the support of its partners, the UNDP and GEM, the Ministry of Environment and Forests (MEF) has promoted this project to support a new vision in Protected Areas creation that has evolved and become a tool for reducing poverty and improving population's welfare, i.e. to ensure an efficient biodiversity conservation and to foster economic growth. 5 sites are directly supported by the MRPA project: Mahavavy Kinkony Complex(CMK) managed by Asity, Ambohimirahavavy Marivorahona managed by the World Wild Fund for Nature (WWF MWIOPIO,) Ampasindava Galoko-Kalobinono managed by Missouri Botanical Garden (MBG,) and Menabe Antimena and Loky Manambato, managed by the NGO Fanamby. They are New Category V Protected Areas (protected Landscape/Marine landscape) and Category VI (Protected Area with natural resources sustainable use.)

The year 2013 marked the launching of the project and consisted in replicating and adapting background documents and key-tools such as the PAG, PGES / PSSE to a common vision on these New Protected Areas, especially for Categories V and VI.

The MRPA project starts its 2nd year of implementation and this will continue until 2017.

#### **III.1.2.- The GEF UNDP PEIII Project**

This is a support project of the UNDP/ GEM to the Environmental Program III, (PE III) which supports the protected area network and the strategic areas. It started in June 2005 and ended in 2012.

The Madagascar PE III corresponds to the third five-year phase of the Malagasy Government's National Environmental Action Plan (PNAE.)

This project specifically covered 4 support zones to PAs (ZAAP) managed by Madagascar National Parks, namely Lokobe/ Nosy Tanikely and Sahamalaza/ Radama Islands in the North and Mikea and Nosy-Ve/ Androka in the South. It focuses on 13 reference sites which represent the 3 existing ecosystems in these 4 ZAAP, namely coral reefs and lagoons, mangroves, and dry and spiny forest.

Efforts on integrating the environmental dimension into the development planning at the communal level have been made out at the start of the project, but not pursued. Inter-communal platforms for dispute resolution purpose representing a link in the decentralized natural resources management system are not currently operational and require some technical and financial supports.

Various supports were provided to develop the sustainable fishing industry in 12 out of the 13 reference sites. In spite of the adoption of improved techniques in fishing by the fishermen beneficiaries and the increase in catches and in economic gains resulting from these fishing practices, the lack of adapted fishing materials represents a constraint on the replication of these techniques. Traditional fishing techniques prevail in the practices of the local population. The other sectors supported within the reference sites, in particular carpentry and agroforestry at the forest sites level, should yield benefits to the grassroots communities and groups of beneficiaries.

Overall, 43 processes of Forest and Fisheries Resources Management transfer to the grassroots communities in the ZAAP have been supported with a significant community accompaniment. The impact of this decentralized management is mainly observed in the condition of the mangrove and reefs ecosystems in the North reference zone sites, the health status of which has remained unchanged. The grassroots communities multiply mangrove reforestation initiatives with other partnerships outside of the project.

A knowledge management system has been set up but is not fully functional for the moment. It needs to be strengthened in order to identify and replicate the right approaches in terms of GDRN.

The products and results achieved through this support contribute to meeting some of the MDG Objectives: Objective 1 (Reduce extreme poverty and hunger,) 2 (Promote gender equality,) and 7 (Protect the environment.

### **III.1.3.- The Self-Assessment of Capacities to be Reinforced Project (ANCR) for Environmental Management**

The «Self-Assessment of Capacities to be Reinforced Project (ANCR) for Environmental Management» or ANCR, financed by the Global Environment Facility/ United Nations Development Program (GEF/ UNDP,) aims at strengthening capacity-building initiatives and developing a holistic and transversal approach of relevant capacity-building in environmental management, while preventing resources waste.

The main objective of the ANCR project is then to define the capacities which need to be strengthened in priority to protect the global environment. This exercise is held within the context of a dialogue process carried out on the country's initiative. In the process of implication of key stakeholders, three thematic working groups dealing with climate change, biodiversity, and desertification will be constituted and will include representatives of key institutions to generate ideas.

The ANCR project lasts between 12 and 18 months and adopts a participatory approach to ensure the review/ inventory of existing data and information, the thematic and cross-sectoral analysis, the development of a strategy and capacity-building action plan, the production of documents as a tool for resource mobilization, and the preparation of an ANCR national report.

Since the project launch in October 2013, a good part of the review/ inventory of existing data and information has been carried out at the national level and around the three themes (biodiversity, desertification, and climatic change,) and the analysis of constraints related to capacity building has been done.

By the end of 2014, in partnership with the Ministry of Environment and Forests, the project will focus on various analyses that allow defining and giving priority to capacity-building initiatives in Madagascar to yield better impacts in biodiversity protection, fight against desertification, and adaptation to climate change.

### **III.1.4.- Projects Within the Context of Climate Change**

The direct impacts of climate change on species are described: migration of species in altitude likely to lead to the extinction of endemic species living in very narrow ecological niches; reduction of lemurs productivity, on the basis of research conducted in the Southeast of Madagascar (Dunham and al., 2010) and Southwest (Beza Mahafaly) (Gould et al., 1999, 2003.)

Indirect impacts include diversified income sources for many farmers, in particular through fishing or forest product exploitation, especially mangroves charcoal production. Such a situation is due to reduced agricultural products that resulted from delayed or poor rains and water shortage (WWF, 2012.)

Therefore, the Diana Region, in the far North of Madagascar, suggests implementation of successful climate change adaptation models that can be scaled up for high-value conservation areas throughout Madagascar. A series of workshops and capacity-building of regional actors have been developed to enable them to design and implement adaptation policies with a view to strengthen the resilience of priority coastal and marine conservation areas. Thus, the adaptation to climate change has been integrated in the Diana region development plan, and the lessons learned from this region are shared at the national level.

### **III.1.5.- REDD Carbons Credits Sales**

The carbon credit is still poorly exploited funding sources in Madagascar, although it was presented three years ago in the Madagascar's policy note on Clean Development Mechanism (CDM) as an opportunity to finance sustainable development. While at the global level, the market represented some USD 30 billion in 2006, Madagascar sold 40,000 credit units which generated USD 200,000 at a rate of USD 5 per ton and as part of a voluntary trading market to establish the Makira new protected area (based on the concept of avoided deforestation, outside of the CDM scope.) The corridor reforestation project, corresponding to 3,020 ha of reforestation and supposed to restore the Eastern corridor connectivity, is projected to generate approximately USD 1 million with the first instalment in 2009. The Malagasy Government also intends to sell 9 millions tons of carbon over 30 years in exchange for the Ankeniheny-Zahamena corridor protection. Inter alia, a pilot project, the FORECA Project has been initiated for some years now to fight against deforestation and forest resources degradation integrating the approach of forests dedicated as carbon pools.

### **III.1.6.- TEAM Initiative: A Global Network for Environmental Status Monitoring**

The TEAM initiative (Tropical Ecology, Assessment, and Monitoring) has been operating in Madagascar since 2009. The purpose is to make consistent data on the status of global biodiversity available to international scientific community. TEAM intends to develop on a global scale a network of research stations, on tropical forest ecosystems key sites that will equally benefit researchers, universities, and national and international research centers. Madagascar is among these key sites, because of its rich biodiversity, most of which are endemic but undergo severe pressure. Valbio Center hosts the first site in Madagascar and works in cooperation with Madagascar National Parks.

Common standard scientific protocols are applied to monitor biodiversity health.

### **III.1.7.- Projects on Marine and Coastal Ecosystems**

#### **III.1.7.1.- Agulhas and Somali Current Large Marine Ecosystems Project (ASCLME)**

Agulhas and Somali Current Large Marine Ecosystems Project (ASCLME) is focusing on two large marine ecosystems (LME) of the western region in the Indian Ocean. It refers to the Somalia current LME - which extends from the Comoros Islands and the Northern tip of Madagascar up to the horn of Africa – and the Agulhas Current LME which extends from the Northern end of the Mozambique Channel to Cape Agulhas. The ASCLME project is financed by the Global Environment Facility (GEF) and is implemented by the United Nations Development Programme (UNDP.) It aims to ensure the sustainability of the ASCLME region living resources by introducing an ecosystemic approach to resource management. Its intervention

themes address the evaluation of high sea ecosystem, larval transportation, marine pollution, invasive marine species, marine and coastal activities, including coastal communities' livelihood and commitment, artisanal coastal and subsistence fisheries, and governance.

The project run from September 2007 to October 2013, during which period it set out to acquire sufficient baseline data to assist in the management of the LMEs of the Agulhas and Somali currents through an ecosystemic approach, to produce a Transboundary Diagnostic Analyses (TDA) and a specific policy agenda (SPA) for the two LMEs of the Agulhas and Somali currents. The SPA put particular emphasis on issues relating to i) water quality degradation; ii) habitat and community alteration; iii) living marine resources depletion; and iv) environmental variability and extreme events.

Like other countries in the region which cooperate for its implementation, Madagascar has stated its intention to ratify the SPA.

### **III.1.7.2.- South West Indian Ocean Fisheries Project (SWIOFP)**

SWIOFP is an ambitious multinational research project with the overall objective of sustainably managing and using Western Indian Ocean marine resources to the benefit of the countries bordering the region. The project lies within the scope of the Large Marine Ecosystem (LME) approach and receives funding from the Global Environment Facility (GEF) as a contribution to its program on international waters, and implemented by the World Bank. It has particularly examined the coastal and deep-sea commercial fisheries associated with the Western Indian Ocean Large Marine Ecosystems. It was held in parallel and complementarity with the ASCLME project (above,) from 2008 to April 2013, and jointly produced with this entity the Transboundary Diagnostic Analysis (TDA) and the Strategic Action Plan (SAP) for managing sustainably the Western Indian Ocean large marine ecosystems.

### **III.1.7.3.- The Western Indian Ocean Marine Ecoregion Project (WIOMER)**

The Marine Protected Areas Network project (RAMP) is a project of the Indian Ocean Commission with the overall objective of preserving biodiversity and the marine and coastal resources of the Western Indian Ocean marine ecoregion, through an efficiently managed and coherent regional network of protected marine areas. This project ran from the period 2006 –2010. It included four main components: development of a regional strategy for biodiversity, marine resources management through an ecological approach, support to the existing and newly created protected marine areas (PMA,) and development of a Regional Forum for PMA's managers and outreach program on the importance of PMA.

In Madagascar, the support from the project allowed good development to the process leading to the Protected Marine Area (PMA) creation which spreads from Saint-Augustin to Tariboly (Southwest of Madagascar.) The management and zoning plans are also established for the community-based MPA of Velondriake in order to progress towards a final protection status. Within the framework of a responsible tourism development and valorization of potential economic fallouts to the Nosy Tanikely's MPA (Northwest of Madagascar,) support was provided for investments in tourism infrastructures (ecological toilets, terrestrial tracks, cabins, information boards, and ferries...) and for the marine park delimitation.

### **III.1.7.4.- Indian Ocean - South-East Asian Marine Turtle Memorandum of Understanding (IOSEA MoU)**

The IOSEA MoU is a non-binding intergovernmental agreement that aims to protect, preserve and recover the marine turtles and their habitats in the Indian Ocean and the Southeast Asia regions, and signed by

Madagascar in April 2003. It falls under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (article IV, par. 4)

Sea turtles conservation receives priority attention in the conservation efforts and the protection of their habitat also contributes to the protection of numerous other marine species. Thus, a fishermen association for the protection of sea turtles in the Ranobe Bay in the Atsimo Andrefana region (Toliara) (FI.MPA.MI.FA: Fikambanana Miaro ny MPaniriky Fano) receives funding in January 2014, to build capacities aiming at preserving Vezo culture and traditions, while implementing fisheries management strategies to protect sea turtles and their associated habitat.

### **III.1.7.5.- The ISLANDS Project**

The ISLANDS project, the first phase of which took place from August 2011 to September 2013, endeavors to contribute to sustainable development for the Small Emerging Island States (SEIS) of the African Eastern and Southern and the Indian Ocean regions (AfES - IO) by improving the social, economic, and environmental conditions as well as a better regional integration. Thus, it aims at accelerating the implementation process of the Mauritius Strategy (MS) in the Indian Ocean region.

The project activities consist of:

- Designing and developing a monitoring and evaluation system for the MIS implementation on a national, regional, and international level;
- Setting up four flagship projects which contribute to mitigate Small Island Developing States Vulnerability (SIDS);
- Supporting the SIDS in the Indian Ocean area and in Eastern and Southern Africa (ESA-IO) in developing and building capacities in order to identify additional supports and fundings on the 4 topics of result 2;
- Developing and enhancing international partnerships as well as identifying fundings to achieve the MS in the Indian Ocean area and in Eastern and Southern Africa (ESA-IO);
- Operationalizing a Regional Platform on Coral Reefs (RPCR);
- Assessing field capacities to implement financial protection mechanisms against climate change risks and natural disasters; and supporting the implementation of these mechanisms;
- Supporting the development of national sustainable development strategies; and
- Operationalizing coastal initiative on climate change in the Indian Ocean.

### **III.1.8.- The Crop Wild Relatives Project**

Madagascar is among the five phytogenetic diversity centers for the conservation of wild species related to cultivated species chosen by the International UNEP/ International Bioversity.

Five genera are first selected: *Coffea* sp., *Dioscorea* sp., *Oryza* sp., *Vanilla* sp., and *Musa* sp. for the number of their endemic species and their economic importance. The project has defined the list of *Dioscorea* species. The *Dioscorea* genus would have about forty species in Madagascar, 90% of which is endemic because of the very old geographical isolation of the island (Burkill and Perrier de la Bathie, 1950.)

The wild *Dioscoreas* (*Mascarodioscorea*) and the *Mascarocoffeeas* are thus classified as flagship species. (RANDRIAMBOAVONJY T., 2010.)

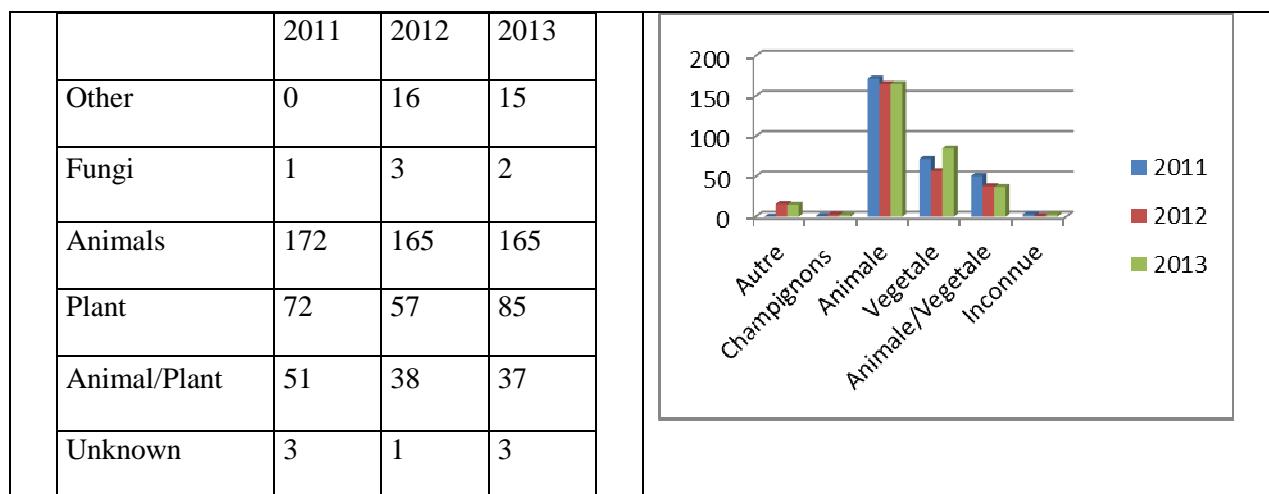
## III.2.- STUDIES, RESEARCH, AND SPECIFIC ACTIONS

### III.2.1.- Studies and Scientific Research

Research activities are carried out on specific Fauna and Flora species with a view of acquiring knowledge in ecosystem management and genetic resources.

Statistics on research from 2011 to 2013 (on the basis of research authorizations issued within the DCB.SAP/DGF, the only authority entitled to deliver such authorizations,) are summarized in the table below:

**Table 16 :** Statistics on Research Authorizations from 2011 to 2013



On the other hand, some studies and specific research are worth mentioning.

The mycorrhization technique to develop the growth of regenerated plants like *Khaya madagascariensis*, *Dalbergia*, and *Uapacas bojeri* species are being investigated by the CNRE. *Dioscorea* species are the subject of research by various institutions involved in the "Crop Wild Relatives" project coordinated by the FOFIFA. The SNGF has especially worked on the *Dioscorea bemandry* seed physiology. The sexed reproduction of food timber species in the arid areas of Madagascar has been studied by the SNGF in the prospect of their future domestication (*Salvadora angustifolia*, *Terminalia Monoceros*, *Tamarindus indica*, and so forth...)

The multiplication tests on precious wood species are so far conclusive. It concerns species of two genera *Dalbergia* and *Diospyros* in the site of Masimanga in Ranomafana Ifanadiana.

Patterns of growth are established on endangered Palm trees species in Madagascar and serve as a decision-making support tool for resources management, both in terms of species and habitat.

In the field of genetic improvement, programs are more focused on alien species and oriented towards the comparative study of origin characteristics. *Liquidambar styracifolia*, *Tectona grandis*, *Eucalyptus* spp, and *Pinus* spp are concerned by these programs.

Many other forest species belonging to various biological types such as the lianas (e.g. *Cynanchum mahafalense*), mangrove watery plants, succulent species (e.g. *Aloe* spp, *Uncarina* spp,) and sclerophylles species (*Uapaca bojeri*)... have been the subject of ecological study.

**Table 17 :** Endemic Species, Subject of Biological, and/or Ecological Studies (non exhaustive list)

Species	Studies Subjects
<i>Dioscorea bemandry</i> (food tuber)	Germination and juvenile growth
<i>Dalbergia spp</i>	Germination and juvenile growth
<i>Diospyros spp</i> (precious wood)	Use in restoration testing
<i>Cynanchum mahafalense</i> (liana)	Invasion dynamics
<i>Uncarina spp</i>	Extinction Risk Assessment
<i>Albizia spp</i>	Dendrochronology
<i>Uapaca bojeri</i>	Seed Physiology Habitat management Improving regeneration through mycorrhization
<i>Faucherea</i> <i>Callophyllum</i>	Consequences of host fragmented forests
<i>Prunus Africana</i>	Monograph of species and management strategy
<i>Dalbergia monticola</i>	Biology and genetic diversity
<i>Foetidia asymetrica et F. retusa</i>	Biology and breeding ecology
<i>Adansonia spp</i>	Biology, Physiology, Ecology, wood anatomy
<i>Ocotea spp</i>	Biology, Ecology and Physiology
<i>Schizoleana tampoketsana</i>	Biology, Ecology and Conservation
<i>Albizia androyensis</i> , <i>Dupuya (Dupuya) madagascariensis</i> , <i>Commiphora spp</i> , <i>Hymenodictyon sp</i> , <i>Givotia madagascariensis</i> , <i>Neoboguea mahafaliensis</i> , <i>Hazomalania voyroni</i> , <i>cedrelopsis grevei</i> , <i>Capurondendron spp.</i> , <i>Grewia cyclea</i> , <i>Gyrocarpus americanus</i> , <i>Dalbergia spp</i> , <i>Stereospermum euphoroides</i> , <i>delonix adansoniiades</i> , <i>Albizia spp</i> , <i>Zanthoxylum spp</i> , <i>Poupartia sylvatica</i> , <i>Terminalia spp</i> , <i>Colvillea racemosa</i> , <i>Berchemia discolor</i> , <i>Breonia perrieri</i> , <i>Hildegardia sp</i> , <i>Pachypodium spp</i> , <i>Alleanthus greanus</i> , <i>Colubrina decipens</i>	Biology, Phenology, wood anatomy
<i>Canarium madagascariensis</i>	Forestry production behavior
<i>Khaya madagascariensis</i>	Genetic improvement, Seed Physiology

(Source: SNGF, Symposium, October 2011)

### **III.2.2.- Specific Actions**

#### **III.2.2.1.- COP 4 AEWA 2008**

Madagascar hosted the fourth Conference of the Member Parties to the Convention on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) from 15 to 19 September 2008 in Antananarivo. The topic was "Action on Seabirds Migratory Routes: Review of the Past, Vision for the Future." The more than 180 representatives from non-governmental organizations, representatives of the European Union and the African Union, 80 water birds experts discussed the urgent and necessary conservation needs to stop the decline of many waterbirds species along the Africa and Eurasia migratory routes.

#### **III.2.2.2.- Workshop on the Lemurs IUCN Red List in 2012**

Lemurs have always fascinated researchers and attracted tourists. The endangered species rate has increased up to 94% and this is because of the political crisis. The threat leading causes for lemurs are habitat loss and hunting. Madagascar has established the status of all lemur species which is a three-year strategic plan, from 2013 to 2016, by compiling new ideas which will certainly contribute to avoid / prevent the species extinction.

## **Chapter IV: FUNDING MECHANISM AND RESOURCE MOBILIZATION**

By endorsing the global commitment for the **Millennium Development Goals** (MDG,) Madagascar is committed to ensure a viable environment in order to integrate the principles of sustainable development into the country's policies and programs, to reverse the current trend of biological biodiversity degradation, and to contribute to alleviate target population poverty by reconciling development with the conservation of our natural resources.

Millions of dollars are being lost in terms of direct and indirect tax revenue due to the difficulties associated with the Malagasy forest management. The regulatory framework for investment in the forest carbon sector has not yet been developed. Technical support to the Climate Change Department is needed so that it can effectively contribute to the development and the implementation of a policy and a legislative structure that meets international market requirements.

### **IV.1.- STRATEGY**

In front of the biodiversity degradation resulting from the interactions between the production system and the ecological dynamics, the financial resource mobilization strategies, and the funding mechanism should focus on:

- promotion promoting sustainable funding;
- supporting communities and local structures as well as conservation; and
- managing sustainably the protected areas.

### **IV.2.- RESOURCE MOBILISATION APPROACH**

Des approches intégrées sont adoptées de manière à:

- to strengthen awareness, information, and education activities geared towards widened and diversified targets, in particular relevant parties in protected area management;
- to promote synergy among various sectors, programs, and conventions to integrate biodiversity in different fields, in order to manage issues and more especially cross-cutting ones in a concerted way; and
- to encourage local communities development and involvement by implementation and monitoring of social safeguard projects, promotion of ecotourism, conservation and securing of protected areas in a participatory manner (ecological monitoring, control and surveillance, water management, income generating activities...) Including biodiversity in the strategies, sectoral and intersectoral plans, and programs leads thus to the implementation of specific actions.

## **IV.2.1.- Resource Mobilization Principles**

The principles governing biodiversity integration in resource mobilization and funding mechanism rely on:

- the assurance of sustainable actions, the application of good governance rules,
- the development of private and public partnerships at both national and international levels,
- the progressive reduction of dependence on donors, the promotion of synergy between the various sectors, conventions, national programs at intervention sites, and more particularly in the protected areas, and
- the participation and capacity-building of communities and local structures according to the subsidiarity and participation principles, especially in the decision-making process.

## **IV.2.2.- Implementing Structures and Modalities**

Madagascar has gone through a series of unprecedented crisis which affect the conditions of international cooperation and the assistance from developed countries to the poorest countries. Moreover, it seems that the environment is not included among the priorities. Sustainable funding still remains at a very early stage and the funding potential is limited. However, some donors have always continued their financial contributions.

The main fundings for conservation can be summarized as follows:

### **IV.2.2.1.- The Malagasy Government's Funding**

The Public Finance Law proposed by the Government and adopted by the National Assembly determines the budget allotment for each entity as well as the modalities of public finance management. Priorities are set according to the political orientation and programs adopted by the Government.

The Ministry of Environment and Forests (MEF) is the main structure responsible for implementing projects or programs related to biodiversity integration at the national level, and works with various public, private, and civil sectors.

### **IV.2.2.2.- External Funding**

The related funding mechanism operates in such a way that resources allocated by multilateral and bilateral donors are entrusted to an implementing agency or an entity assigned to coordinate and manage the funds. The disbursements are based on the Annual Work Plans approved by the project Steering Committee, according to the guidelines and the requirements of the donors.

#### **A.- Bilateral Donors**

They are the United States, France, Germany, Norway, Switzerland, and Japan through their respective development cooperation agencies. They generally provide support through national and international non-governmental organizations. About forty NGOs working in the field of biodiversity are known. However, since 2009, the United States has suspended their support until a democratically-elected President is elected in Madagascar (see Appendices.)

## ***B.- Multilateral Donors***

The European Union, the World Bank, the United Nations agencies, and the Fund for Global Environment Facility (GEF) are the principle multilateral partners.

In Madagascar, the UNDP and the World Bank are the GEF's direct implementing agencies. Madagascar also receives funding from the GEF's Small Grants Fund Program (SGP.) Since the SGP was implemented in 2006, 141 micro-projects are funded with a grant totaling more than three million US dollars.

With an aim of preserving the initial investments as part of the implementation of the three phases of the Environmental Program in Madagascar (1992 to 2011) and of avoiding the risks that the current political situation could generate (increase in illegal logging, poaching, illegal mining,...) Madagascar has received additional funding in a total amount of USD 59,2 million, including 52 million USD from the IDA/ GEF, and the rest from co-financing partners such as: the Foundation for the Protected Areas and Biodiversity of Madagascar (FAPBM,) the Madagascar National Parks (MNP,) Conservation (CI,) and the Wildlife Conservation Society (WCS.)

## **IV.2.2.3.- Funds from Foundations**

### ***A.- FAPBM***

The Foundation for Protected Areas and Biodiversity (FAPBM) of Madagascar is a Malagasy private foundation created in 2005 and recognized to be of public utility. It is the largest environmental foundation of the entire African region with a capital of slightly more than USD 50 million. FAPBM aims to promote sustainable financing for biodiversity conservation and protected areas management.

### ***B.- Tany Meva Foundation***

The Tany Meva Foundation is the first Malagasy environmental community-based foundation dedicated to mobilize and manage financial resources in order to promote environmental sustainable management involving local communities' participation.

### ***C.- Foreign Foundations***

Some foreign foundations also work as financial partners like HELVETAS, Liz Claiborne Art Ortenberg Foundation (LCAOF,) and Mac Arthur Foundation (see Appendices.)

## **IV.2.2.4.- Private Funding**

### ***A.- Private Company***

Contribution from the private sector is not yet significant. The two large mining projects (Ambatovy and QMM) and Air France Company are the main contributors.

In the context of biodiversity offsets in Madagascar in the two large mining projects, QMM and Ambatovy, a compensation program for biodiversity loss, BBOP (Business and Biodiversity Offset Program/ Biodiversity Compensation Program) has been established. The operating costs of the Ambatovy project BBOP program are estimated at on average between USD 250,000 and 300,000 per year.

Air France contributes to the Holistic Conservation Program for Forests to the profit of AFD/ Etc/ WWF up to EUR 3.5 million, i.e. approximately USD 4,73 of scheduled spending for years 2013-2016.

## **B.- International Non-Resident NGOs**

The funds shares from parent NGOs or international non-resident NGOs are not negligible and further reinforce the outstanding position of the non-residents in the NGOs funding sources in Madagascar.

### **IV.2.3.- Sustainable Funding Mechanism**

In order to ensure the funding sustainability of protected areas and biodiversity management, this mechanism is based on three pillars: the development of Foundations, the promotion of ecotourism, and the payments for environmental services.

#### **IV.2.3.1.- Establishing Foundation**

Foundations including the FAPBM, the Tany Meva Foundation, and International Foundations play a central role in the financial sustainability of conservation activities insofar as they raise funds to constitute capital and make them generate interests.

##### **A.- FAPBM**

###### **FAPBM Dynamics:**

*The contributors consist of multilateral and bilateral agencies, foundations, private sectors, and some individuals. These contributions are paid as a financial investment.*

*These financial investments are managed by JP Morgan Switzerland and BNI Bank Madagascar on behalf of the Madagascar (FAPB) Foundation.*

*The revenues thus generated are redistributed to beneficiary protected areas selected on the basis of prioritization criteria through an annual process. The criteria defining the conditions of resource allocation to Protected Areas recipients are: - Acquisition of status (temporary or permanent,) - the level of threat – the absence of funding or the opportunity presented by the protected area, particularly in carbon potential, biodiversity wealth, especially in terms of habitat diversity and in flora and wildlife diversity, the level of threat, and the absence of funding.*

## **B.- TANY MEVA FOUNDATION**

### **Tany Meva Foundation Dynamics**

*The revolving fund is a financing obtained from income generated by the activities funded by projects supported by the Foundation. The communities pay monthly contributions set on a basis accepted by all voluntary members. Then, in turn, contributing members can borrow from the collected fund, but according to specific rules and procedures, to improve their economic activities; they repay the loan according to a payment schedule defined together in the fund's regulations.*

*The Matching Fund is a mechanism that evolves from the principles of the revolving fund and consists of establishing start-up funds from member communities; thus, the Tany Meva Foundation leverages as twice or 3 times as much the collected amount. Contributing members can borrow like in the case of the revolving fund, but the operations should focus on activities with positive impacts on natural resources. Truly*

*community-based actions, such as wells, channels or health center, or other actions dedicated for the fokonolona are also eligible to this funding.*

*Sustainable community fund is a fund collected from communities' contributions and sponsoring partners like Tany Meva, like the case of the matching fund, which comes partly from percentages of revenues from funded economic activities in projects sponsored by Tany Meva and its partners.*

#### **IV.2.3.2.- Promoting Ecotourism**

Ecotourism generates national benefits consisting, first, of Entry Fees in Protected Areas (DEAP) collected by Madagascar National Parks (MNP,) and by the national added value (transportation, hotels, restaurants, crafts, and guidance.) Therefore, local communities can benefit directly from it. A portion of these proceeds goes to local communities to implement social projects in the protected areas' (PAs) peripheral zones.

#### **IV.2.3.3.- Payment of Environmental Services (PES)**

Carbon offsets generate "carbon credits" the income of which will go to local communities. Tools have been developed to improve the carbon quantification methodologies and techniques that should be harmonized and adopted by all for a better price.

As part of mitigation, it should be noted that Madagascar plans to develop the REDD + mechanism that provides an opportunity for both forest conservation and biodiversity and for socio-economic conditions improvement. However, the funding for the REDD+ preparation by the Forest Carbon Partnership Facility mechanism could not be granted to the Government further to the political crisis. Some international NGOs have played an important role in developing pilot projects, and begun negotiating the sale of carbon with international buyers such as Mitsubishi, Air France, or Dell. However, these transactions are largely achieved without a national regulatory framework. Moreover, given the growing interest of forest countries in this emerging market, and despite the interest in the Malagasy forests due to their premium biodiversity asset, the country has already certainly lost other potential investors because of this absence of regulatory framework. The establishment of a forest carbon market could also be jeopardized by the lack of involvement of local communities, which is a key to its emergence success in the international level. Indeed, the experience of these past twenty years shows that despite the development of ambitious policies, their application by involving local people in forest management is not a real priority in Madagascar.

The concluded Global Partnership for WAVES can be a lever to promote payment for environmental services (PSE) to the extent that resources will now be valued and accounted for in a National Accounting System; and that budget allocations will be proportional to the values of created natural capital.

### **IV.3.- ACHIEVEMENTS**

Achievements tend to maximize the impacts on biodiversity conservation and to promote the mechanism of financial sustainability. Some examples of outstanding achievements are:

#### **IV.3.1.- Funds from Foundations**

##### **IV.3.1.1.- Foundation for Madagascar Protected Areas and Biodiversity (FAPBM)**

Since 2010, when the FAPBM began to grant funds from the interest generated by its capital, the amount of the granted funds and the number of covered protected areas are increasing every year. In 2011, the FAPBM

granted funds for Madagascar's Protected Areas and Biodiversity in the amount of USD 850,000 for a total area of 1,5 million ha in 11 sites, including 6 national parks and five new protected areas. For 2013, the FAPBM invested 1,300 million for 21 Protected Areas, including 12 PAs on Capital income, and 5 PAs on sinking fund, and 4 NPAs from funds received from the Helmsley Charitable Trust Foundation. These funds are allocated to 11 parks managed by MNP and 10 New Protected Areas managed by WCS, Asity Madagascar, the Peregrine Fund, Missouri Botanical Garden, the Arongampanihy Culture Communication Environment, the Royal Botanic Gardens Kew, the National Museum of Natural History in Paris, and the Support Service for Environmental Management. Ranomafana and Andohahela are PAs historically sponsored by GEF-IDA and managed by MNP, they also benefit from the FAPBM funding in 2013.

From now on, the FAPBM sponsors 2 million hectares of Protected Areas; 7 of the 21 parks funded are of global importance. It is estimated that 1,040,000 people are dependent on Protected Areas.

#### **IV.3.1.2.- TANY MEVA Foundation**

As for the Tany Meva Foundation, it injects nearly USD 1 million per year to support local communities in the implementation of community projects that contribute to achieving the objectives of the 3 major international conventions (CBD, CCC, and CLD,) 70% of which are found in the Southwest of Madagascar.

In addition, different types of funding mechanism have been developed, operated or still under discussions with local communities, such as the revolving fund, the matching fund, and sustainable community funds.

#### **IV.3.2.- Exports Earnings**

Revenues are generated by royalties collected by the Forest Administration on forest products. These products concern timber and non-timber forest products (PFL and PFNL,) CITES and non-CITES products.

**Table 18 :** Summary of the Evolution of Exports Earnings of Forests Products (in Ariary)

Type of Products	Royalties Collected in 2010	Royalties Collected in 2011	Royalties Collected in 2012
CITES and Non-CITES PFL and PFNL	251,223,523	143,437,551	97,015,200

*Source: Direction de la Valorisation des Ressources Naturelles/DGF*

In 2012, 27% of the collected royalties come from export revenues from wildlife and flora, and 44% from essential oils and medicinal plants.

#### **IV.3.3.- Revenues from Entry Fees in Protected Areas (DEAP)**

Part of the income from Entry Fees in Protected Areas (DEAP) is given to local communities to promote community projects such as the construction and rehabilitation of social infrastructure in PA outlying areas.

**Table 19 :** Evolution of the DEAP Revenues in Ariary (2009 – 2013)

Year	2009	2010	2011	2012	2013
DEAP Revenues	1,023,123,250	2,354,207,000	2,834,685,600	3,014,119,800	2,947,720,700

64% of the revenues in 2013 were collected at seven national parks: Andasibe, Ankarana, Bemaraha, Montagne d'Ambre, Nosy Tanikely, Isalo, and Ranomafana. It is worth noting that the revenue collected by

Nosy Tanikely (co-managed by MNP, the Nosy Be municipality, and the Nosy Be regional tourism office) will ensure its self-financing henceforth.

#### **IV.3.4.- Payment of Environmental Services (PSE)**

##### **IV.3.4.1.- Carbon Sale**

The recent socio-political situation in the country resulted in slowing down the REDD+ mechanism process. WAVES Partnership is at the stage of setting up the implementing structure. Recruitment of an international expert in environmental accounting and national accounting is underway.

### **IV.4.- MOBILIZATION OF RESOURCES AND CONSERVATION ACTIONS**

Financial resources are mobilized around specific actions contributing to the APs' conservation and sustainable management. They particularly include:

#### **IV.4.1.- Securing PAs**

To protect the initial investment carried out within the scope of the implementation of the three phases of the Environmental Program in Madagascar (1992 to 2011,) to avoid the risks entailed by the current political situation (increase in illegal logging, poaching, illegal mining,...) Madagascar has received additional funding (i) to ensure the supervision of 33 protected areas and the implementation of social and environmental safeguards activities and (ii) to support the creation of sustainable funding mechanisms and the promotion of community development in the long term.

These 33 protected areas cover a total area of 2.8 million hectares, 30 of them are part of the MNP's network, and three are New Protected Areas (NAPs): The Forest Corridor of Fandriana – Vondrozo (COFAV,) the Ankeniheny-Zahamena corridor (CAZ,) and the Makira corridor. These protected areas are selected because of the high threat level from illegal logging (Masoala, Makira) or their high potential to generate carbon revenues (CAZ.)

#### **IV.4.2.- Implementing Social Safeguards Plans and Support to Local Communities**

The development and implementation of social safeguard subprojects to supplement loss allow the population affected by the project (PAPs) better knowing the existing potential likely to be developed, strengthening their capacity in various areas for biodiversity conservation, and especially reducing the pressure on resources through alternative generating income activities

Madagascar National Parks ensures the realization of 571 compensation subprojects for 13,457 persons affected by the Project (PAPs) provided in the Safeguard Plans of the 10 parks which are in setup process or are part of the network extension. 7 subprojects intended for 180 beneficiaries called "Aboriginal population" of the future Mikea National Park. For COFAV, 12,501 PAPs are identified.

43,892 households in the MNP's Network are targeted as direct beneficiaries of the AGR community projects which are being diagnosed and implemented.

Ecosystems that provide essential services, especially water, contribute to human health and well-being. Within the scope of the Ranonala Project, 10 municipalities in Mananara Nord, Ambatovaky, and Marotandrano have benefited from it.

#### **IV.4.3.- Preservation of the Ecosystems**

Through its funding, the FAPBM helps preserve more than 24 types of ecosystems: tropical rainforests (about 800,000 hectares,) dry forests (300, 000 ha,) coastal forests (13,200 ha,) lakes (95,960 ha,) marine parks (32,500 ha) including coral reefs, phanerogam meadows, and mangroves (35,136 ha.) Thus, by their existence, the PA allows approximately 972,400 people to survive.

#### **IV.4.4.- Funding Trends**

The majority of fundings is devoted mainly to protected areas which are meant for international NGOs, and have received 77% of the total funding. With reference to funding from the United Nations, 98% of the funds goes to NGOs/International associations and the rest is granted to national NGOs/ National associations. In the field of environment, donors are more likely to fund international NGOs (CI, WWF, WCS, Durrell, TPF, BCM, MBP, MBG, Birdlife, Blue Ventures, and so forth...) as project and program direct promoters, while national/ local NGOs often act as "subcontractors".

Fundings are focused on the 33 PAs called "flagships" including 30 MNP Network and 3 NPAs. Only the Ambohidray PA is just the recipient of funding from the FAPBM. There are protected areas belonging to the MNP's Network, for which it is more or less difficult to mobilize more funds - like Zombitse-Vohibasia and Manongarivo. Protected areas dedicated primarily as research sites like Beza-Mahafaly, Tampolo, and Ambohitantely could also fall into this category even if activities in these sites can continue to rely on the dynamism of the Higher School of Agricultural Sciences (ESSA.) Moreover, the funding of research activities remains low, including applied research that are essential to the planning, implementation, and evaluation of conservation policies.

As for the 93 new protected areas (NPAs,) the 47 under creation or in preparation benefit for now from sponsors and donors' support. Others in the temporary protection status do not benefit from substantial aid yet.

The funding needs for the management costs of the 141 protected areas are estimated at USD 20 million per year, at a rate of 03 dollars per hectare (Source: "Madagascar, Agenda Towards Economic Reform" - World Bank, 2010.)

## **PART III: EVALUATION OF PROGRESS AGAINST THE AICHI TARGETS IN THE GLOBAL BIODIVERSITY STRATEGIC PLAN**

### **III.1. EVALUATION OF PROGRESS**

Madagascar is in the process of updating its national strategic plan for biodiversity in accordance with the Aichi Targets of the CBD. However, many actions in the implementation of the Convention have already been undertaken, are underway, and will be considered. An assessment of the level of effectiveness of these actions compared to the Aichi Targets is carried out to assess the progress and draw lessons for the future.

Most actions have an average level of efficiency, especially for Targets 1, 2, 4, 5, 6, 9, 12 and 19. Progress can be observed but at low level for Targets 3, 4, 7, 8, 10, 13, 16 and 20; and very low for Targets 14 and 15. The best performance of the activities is recorded for Target 18 on traditional knowledge although efforts still need to be multiplied.

**Table 20 :** Evaluation of the Effectiveness of Actions Compared to the Aichi Targets

Aichi Target for Biodiversity	Conducted Activities	Effectiveness
<b>Target 1 – Increased awareness:</b> By 2020 at the latest, people will have been aware of the value of biodiversity and the steps they can take to conserve and use it sustainably	<ul style="list-style-type: none"> <li>• Environmental education at different levels (school, college, high school, students, local communities, local authorities, policy makers, government departments)</li> <li>• Organization of various events for the celebration of world days: biodiversity, wetlands, water, migratory birds, environment, forest, and so forth...</li> <li>• Mass awareness to fight against the proliferation of invasive species (eg <i>Procambarus</i>)</li> <li>• Organization of awareness workshops on the CBD (Convention on Biodiversity,) the Nagoya Protocol on ABS (Access and Benefit Sharing) and the Cartagena Protocol on Biosafety on Biodiversity (UNEP, GEM.)</li> <li>• Updated information on the CBD clearing houses, and events related to biodiversity</li> <li>• Awareness activities, information and communication for the development of environmental reflex at different levels for the conservation and valorization of natural resources, the use of renewable energies, conservation of traditional knowledge and the production of alternative fuels (to woodfuel)</li> <li>• Active awareness campaigns of the ministerial departments concerned with the improvement of precious wood sector (rosewood and ebony)</li> <li>• Lobbying and awareness action in the media geared towards different target categories: emission of radiation, documentary, and articles by civil society</li> </ul>	Average
<b>Target 2 - Integration of the biodiversity value:</b> by 2020, at the latest, biodiversity values will have been integrated into the national and local strategies and planning processes of development and poverty reduction, incorporated in the	<ul style="list-style-type: none"> <li>• Finalizing the WAVES Projects: Project concerning the consideration of the value of biodiversity and ecosystem services into the national accounting [Accounting and Valuation of Ecosystem Services (WAVES) to incorporate the value of Madagascar's nature in the national accounts]</li> <li>• Integration of environmental aspects and biodiversity values in the National Territory Planning Scheme.</li> <li>• Drafting the National Strategy for Madagascar's coastal and marine areas sustainable development (CN GIZC GE,) GIZC National Action Plan (2012-2016,) such as the revitalization of the dialogue platform for the Sustainable Development of Antongil Bay (PCDDBA)</li> </ul>	Average

<p>national accounts as appropriate, and in the reporting systems.</p>	<ul style="list-style-type: none"> <li>• Establishing SAPM and SAPM Commission (December 2010,) Revitalization and relaunching of the Central Environmental Units in the Ministries signatory of the Interministerial Decree 52005</li> <li>• Making operational various interministerial committees (CIFF, CIMF, CHEF, and Steering Committee for Precious Woods...)</li> <li>• Integrating biodiversity values in communal development plans and the QMM integrated development projects.</li> <li>• Integrating regional and national territory management into any planning: Malagasy Land Reform, SRAT and SNAT / PNAT, PRD,... ; Land tenure security for protected areas (Collaborative Protocol between the Directorate General of Forests and the General Directorate of Land Services)</li> <li>• Recasting of regulatory texts on environmental management and sustainable tourism and the Tourist Code (in progress,) application and implementation of national plans and strategies and actions in the Tourism Master Plan developed in 2005, granting of ecotourism concession in and around protected areas, environmental label " green label" in sustainable tourism</li> <li>• Strategic Environmental Assessment of major national programs and projects, including regional development projects with sectoral projects</li> <li>• Integrating gender approach and integration of environmental management in development programs: the PANAGED: National Gender Action Plan.</li> <li>• Adhesion of Madagascar within the Inter-governmental Platform on Biodiversity and Ecosystem Services (IPBES,) an independent inter-governmental body.</li> <li>• Developing the Strategic Plan for Biodiversity and the Compensation Plan for communities (Ambatovy Project)</li> </ul>	
<p><b>Target 3 -</b> By 2020 at the latest, incentives including subsidies harmful to biodiversity will have been eliminated, reduced gradually or reformed in order to minimize or avoid</p>	<ul style="list-style-type: none"> <li>• Developing contracts with local communities to involve them in the conservation of protected areas biodiversity in exchange for benefits</li> <li>• Funding development activities through the NODE project</li> <li>• Sharing profits from carbon sale (eg WCS Makira carbon project) at the levels of communities and regional and local authorities.</li> </ul>	<p>Insufficient</p>

<p>negative impacts; while positive incentives for the conservation and sustainable use of biodiversity will have been developed and applied consistently and in harmony with the provisions of the Convention and with relevant international obligations, taking into account the national socio-economic conditions.</p>	<ul style="list-style-type: none"> <li>• Developing a land development and management plan, of specifications to ensure natural resources sustainable, ecological monitoring plan, water resources management plan (eg the Pangalana channel)</li> <li>• Supporting the development of an endemic fish farming to generate incomes and enhance natural populations [Activity report of Wetlands promoters and managers]</li> <li>• Supporting the implementation of reforestation program for energy purposes with a view to protect watersheds (Antelomita, Mandraka, and Antanifotsy)</li> <li>• Strengthening Income Generating Activities in exchange for access restrictions to and use of natural resources: a social and environmental safeguards measure (target: population affected by the creation and management of new protected areas ; implementation of offset projects related to park access restriction and non-utilization of natural resources, 571 offset projects for Madagascar National Parks)</li> </ul>	
<p><b>Target 4</b> - Sustainable Consumption and Production: by 2020, at the latest, Governments, business, and stakeholders at all levels will have taken steps or have implemented plans to ensure sustainable production and consumption, and will have kept the use of natural resources within safe ecological limits.</p>	<ul style="list-style-type: none"> <li>• Promotion of Integrated Water Resources Management (GIRE) with Ministries and stakeholders</li> <li>• Implementation of sustainable land management strategy (including the sustainable management of aquatic resources.)</li> <li>• Promotion of the use of alternative materials to wood as energy sources: production of alternative fuels (diesel agro, agro ethanol, agricultural waste)</li> <li>• Promotion of a sustainable agriculture policy</li> <li>• Provision of the data needed for developing a policy to promote improved management of marine fisheries</li> </ul>	Low
<p><b>Target 5</b> – Loss of habitats is reduced: By 2020 at the latest, the rate of impoverishment of all natural habitats, including forests, will have been at</p>	<ul style="list-style-type: none"> <li>• Reinforcement of site management with the involvement of the communities in management. (Case of SR Torotorofotsy)</li> <li>• Sustainable forestry plantations : afforestation, reforestation, forestation, ecological rehabilitation, rehabilitation of mine sites, to maintain the quality of critical species habitats with the involvement</li> </ul>	Average

<p>least cut by half, and where feasible brought close to near zero; and degradation and fragmentation will have been significantly reduced.</p>	<p>of all actors (bamboo cultivation in the Lake Kinkony)</p> <ul style="list-style-type: none"> <li>• Improving the management of Protected Areas, capacity building (REPC,) efficient and adaptative management capacity,</li> <li>• Building the lessons from REDD+ across the two corridors for the development of the national REDD+ strategy</li> <li>• Monitoring mangrove health</li> <li>• Monitoring coral reefs health by keeping forest zones upwind the coral reef areas in order to protect the aquatic habitat quality;</li> <li>• Preparation of plans and development planning of sites, corridors and territories: PAG (preparation and update,) monitoring plan of Protected Areas.</li> <li>• Preparation of the Erosion Control Program (PLAE)</li> <li>• Development of rain-fed rice-growing with a view to discontinue slash-and-burn agricultural practices;</li> <li>• A substantial increase of the surfaces of irrigated and rainfed lowland lowland rice</li> <li>• Obligation to conduct a SEIA for the projects of creation of protected areas, in sensitive areas;</li> <li>• Updating the ABETOL strategy (Management of Wood Energy of the city of Toliara)</li> <li>• Implementation of the SEESO project (Synergy Energy Environment in the Southwest Madagascar)</li> <li>• Environmental monitoring in the mining sector</li> </ul>	
<p><b>Target 6</b> – Sustainable management and harvesting: By 2020, all stocks of fish and invertebrates and aquatic plants will have been managed and harvested sustainably, legally and by applying ecosystem-</p>	<ul style="list-style-type: none"> <li>• Local management of a Marine Protected Area network, identification and respect of environmentally vulnerable areas by industrial fishing vessels;</li> <li>• Definition of AMP and wetlands management objectives: <ul style="list-style-type: none"> <li>◦ Preserve, protect and manage the AMP's natural resources;</li> <li>◦ Promote sustainable development of fishing and tourism;</li> <li>◦ Manage conflicts resulting from the use of natural resources in the new and existing AMP;</li> </ul> </li> </ul>	<p>Average</p>

<p>based approaches, to avoid overfishing; recovery plans and measures will be in place for all depleted species, fisheries will not have had significant adverse impacts on threatened species and vulnerable ecosystems; and the impacts of fisheries on stocks, and species, and ecosystems will have been within safe ecological limits.</p>	<ul style="list-style-type: none"> <li>○ Protect common interests in the field of AMP</li> <li>○ Improve community life conditions in the field of AMP</li> <li>○ Set up an ecosystemic management of fisheries resources with the establishment of temporary and permanent fishing stocks within the new and existing AMP</li> <li>○ Collection monitoring</li> <li>○ Installation of spawning areas and integral conservation zones;</li> <li>○ Reinforcement of fishing surveillance;</li> <li>○ Test on determining quota of catches</li> <li>● Adopt an ecosystemic approach (Integrated management of fishing areas)</li> <li>● Active participation of Madagascar in major projects on EMCs: WIOMER, ASCLME, SWIOFP, ISLANDS...</li> <li>● Community management of fisheries resources : implementation of the DINA and marine PAGS;</li> <li>● Capacity-building for management committees and training of fishermen on improved fishing techniques</li> <li>● Strict enforcement of the laws relating to fishing</li> </ul>	
<p><b>Target 7 – Sustainable agriculture, aquaculture, and forestry:</b> By 2020, areas dedicated to agriculture, aquaculture and forestry will have been managed sustainably so as to ensure biodiversity conservation.</p>	<ul style="list-style-type: none"> <li>● Village aquaculture (seaweed and sea cucumber farming)</li> <li>● Strengthen public and private captive breeding in-situ</li> <li>● Develop fish-farming in protected areas</li> <li>● Develop fish-farming in parks (Tsimbazaza, Ivoholona...)</li> <li>● Set up a SSP program (Species Survival Program) engaging informal efforts that has already been undertaken by public aquaria, zoos and private individuals in Europe and North America to secure the survival of Malagasy endemic fish;</li> <li>● Promote aquarium farmings</li> <li>● Agricultural intensification via agroforestry</li> </ul>	<p>Insufficient</p>

	<ul style="list-style-type: none"> <li>• Systemic approach in land use (via zoning)</li> <li>• Implement endemic species fish-farming, especially species in danger of extinction but being currently extended (in Andapa and Toliara with APPA): improvement of income through the sale of 75% of production and enriching population living in species natural habitats with the remaining 25%.</li> <li>• Implementation of the activities recommended in the PAG: implementation of strategies linked to agriculture and animal production ; sustainable Agriculture (environmental farming or conservation agriculture)</li> <li>• Ecological monitoring in aquaculture industry zones;</li> <li>• Promotion of community reforestation performed by FID</li> <li>• Integrate reforestation efforts in the specifications relating to the transfer of management of natural resources to local grassroots communities.</li> </ul>	
<b>Target 8</b> – Reduced pollution: by 2020, pollution, in particular from excess nutrients, will have been brought to levels that are not detrimental to ecosystem function and biodiversity.	<ul style="list-style-type: none"> <li>• Implementation of the Nairobi Convention, the Manilla Declaration, the National Pollution Management Strategy, and the Water Code</li> <li>• Cleaning of beaches affected by pollution</li> <li>• Maintaining pollution-fighting exercises by the OLEP</li> <li>• Carry out large-scale actions against the practice of open defecation (SDAL) with the FAA, and UNICEF (2013-2018)</li> <li>• Regulations enforcement on water treatment systems</li> <li>• Environmental monitoring implementation by the various sectors</li> <li>• Management of various sources of air, water, sea and soil pollutions as well as intradomiciliary pollution related to the agriculture sector</li> <li>• Implementation of the GIDS Project (Integrated Solid Waste Management) at the level of decentralized territorial units</li> <li>• Implementation of the Environmental Management Plan and the responsibilities set forth in the environmental specifications by all investment projects</li> </ul>	To be encouraged

	<ul style="list-style-type: none"> <li>• Development of green spaces in urban areas</li> </ul>	
<b>Target 9 – Invasive Alien Species:</b> By 2020, invasive alien species and their introduction pathways have been identified and prioritized, priority species will have been controlled or eradicated, and measures will have been in place to manage pathways to prevent the introduction and settlement of these species.	<ul style="list-style-type: none"> <li>• Organisation Organization of research, survey and awareness-raising activities to address invasive alien species</li> <li>• Holding of a regional workshop on invasive species in November, 2013 to communicate the importance of dealing with these species in Madagascar and in the neighboring islands (Global Islands Partnership) : sharing information on activities carried out (against the introduction of new species and on campaigns against existing ones)</li> <li>• Control of aquatic ecosystem alien invasive species (one of the topics at the Regional Workshop in Madagascar in November, 2013)</li> <li>• Intensive communication to prevent, control and eradicate the species by working closely with the media (case of <i>Procambarus sp.</i>)</li> <li>• Creation of the IRAAC project national platform (Agro ecology Climate Change Regional Initiative) and of a national action plan on integrated pest management - Fruit and vegetable flies and solanaceous crops bacterium</li> </ul>	Average
<b>Target 10 – Pressures on vulnerable ecosystems are reduced:</b> By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable marine and coastal ecosystems affected by climate change or ocean acidification will have been reduced to a minimum, so as to maintain their integrity and functioning.	<ul style="list-style-type: none"> <li>• Coastal and marine areas management plan and integrated management</li> <li>• Protection of coral reefs through mangrove conservation</li> <li>• Contribution to Sustainable Management (CSM) of mangroves and marine and coastal ecosystems</li> <li>• Diagnostic analysis of marine environment with major projects on Marine and Coastal Ecosystems.</li> </ul>	Low

<p><b>Target 11</b> – Protected Areas: By 2020, at least 17 % of terrestrial and inland water areas, and 10 % of coastal and marine areas, including areas of particular importance for biodiversity and ecosystem services, will have been conserved by means of networks of ecologically-representative and well-connected protected areas that are effectively and equitably managed and by other effective conservation measures by zone, and integrated into the broader landscapes and seascapes.</p>	<ul style="list-style-type: none"> <li>• Improvement of Protected Areas management, strengthening the capacity of site managers</li> <li>• Update of the legal background and management tools of the SAPM, (texts providing for the protection of protected areas in the course of final installation: interministerial decrees of 2013)</li> <li>• Identification of 6 marine ecoregions in the marine space of Madagascar (RAMP/COI)</li> <li>• Creation of 3 marine protected areas: Ankarea ((1,737 km<sup>2</sup>, located at 50 km north east of Nosy Be, Ankivonjy (1,967 km<sup>2</sup>), located at 50 km south of Nosy Be, including Nosy Iranja, the most important nesting site for green turtles in Madagascar, Soariake MPA (927 km<sup>2</sup>), at 80 km North of Toliara.</li> <li>• Inclusion of Ramsar sites in the SAPM</li> <li>• Preparation of the New Protected Areas permanent status</li> <li>• Implementation of Work Program on Protected Areas (POWPA/CDB: policy, management, research and monitoring, integrity of Protected Areas)</li> <li>• Creation of new protected areas</li> <li>• Local community involvement through participatory and co-management of Protected Areas</li> <li>• Protected areas creation and management in mining zones (Mandena, Sainte Luce, Petriky); Contribution to protected areas creation and management outside mining operations (Sainte Luce, Ambatotsirongorongo)(off-sets)</li> <li>• Final establishment of New Protected Areas</li> <li>• Creation of the FAPBM Foundation to help protect more than 2 million hectares of protected areas out of the 5,2 million hectares of the SAPM.</li> </ul>	<p>Average</p>
<p><b>Target 12</b> – Prevented extinction of threatened species: By 2020, the extinction of known threatened species will have been avoided and their conservation status, particularly of those</p>	<ul style="list-style-type: none"> <li>• Comprehensive periodic assessments of the species to know their conservation trend and status according to threats and pressures and evaluation of preventative efforts conducted towards them; a list of threatened endemic plant species was published (2012)</li> <li>• Alignment of legal and regulatory texts on the implementation of the CITES: updating of the texts, reorganization of the CITES FAUNA management body</li> <li>• Conservation in situ (protected areas) or ex situ (species management in the botanical and zoological</li> </ul>	<p>Average</p>

<p>mostly in declines, will have been improved and sustained.</p>	<p>parks)</p> <ul style="list-style-type: none"> <li>• Ecological monitoring of target species in Protected Areas (MNP and NAP networks)</li> <li>• Participatory research and approach protocols undertaken by associations, NGOs, research centers and universities</li> <li>• Elaboration of the « GEF Dugong and Seagrass Project » (Search for financing for conservation purposes)</li> <li>• Methodology development and analysis of certain species vulnerability (lemurs, birds, and turtles...)</li> <li>• Updates and assessment of the statuses of certain aquatic taxa and development of action plans to save endangered species</li> <li>• Review of all lemur species statuses: realization of a three-year strategic plan, from 2013 to 2016 in order to avoid/ prevent species extinction</li> <li>• Conservation of exhausted species such as bat populations</li> <li>• Development of the strategy and management plan on crocodiles</li> <li>• Establishment of global action plan in the management of Madagascar turtles: <i>Astrochylis yniphora</i> and <i>Geokelone yniphora</i></li> <li>• Establishment of a Recovery Plan and Management Strategy for <i>Mantella aurantica</i></li> <li>• Establishment of National Action Plan on <i>Ardeola idea</i></li> <li>• Establishment of National Action Plan on <i>Falco concolore</i> de <i>Falco eleonorea</i></li> <li>• Establishment of Action Plan for the conservation of <i>Aythia inotata</i>, scaups of Madagascar</li> <li>• Development of a conservation strategy for Granddidier's Baobab tree: <i>Adansonia granddidieri</i></li> <li>• Setting up Dina in order to protect coastal species such as endangered dolphins and turtles in the Atsimo Andrefana and Androy regions</li> <li>• Multiplication and monitoring of natural regenerations of precious wood species of the kind of <i>Dalbergia</i> in the northeast</li> <li>• Ex situ conservation of endangered, rare and useful species in the seed banks (Collaboration between</li> </ul>	
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	<p>the SNGF and the Royal Botanic Gardens, within the scope of the Millennium Seeds Bank Partnership)</p> <ul style="list-style-type: none"> <li>• Listing of the species <i>Diospyros</i> et <i>Dalbergia</i> in Appendix II of CITES</li> <li>• Development of collaboration ( between various stakeholders) to eradicate consumption of endangered species (bushmeat)</li> </ul>	
<b>Target 13</b> – Genetic Diversity Maintained: By 2020, the genetic diversity of cultivated plants, farm and domesticated animals, and of wild relatives, including other species presenting socio-economic or cultural value, will have been preserved; and strategies will have been developed and implemented to minimize genetic erosion and to safeguard their genetic diversity	<ul style="list-style-type: none"> <li>• APA/ABS: use of the Standard Material Transfer Agreement (SMTA) within the scope of the SML of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR) for the exchanges and transfers of PGRFA (Plant Genetic Resources for Food and Agriculture)</li> <li>• Endemic species regeneration (Zahana, Hasina) on the Royal Hill of Ambohimanga Rova</li> <li>• Regeneration of species of historical and cultural value (Amontana, Aviavy, Ravitsara) at the Rova of Ilafy</li> <li>• Ex situ species multiplication carried out by operators (controlled and monitored by the management authority in the CITES to avoid nature extinction)</li> <li>• Regeneration of endemic species of cultural and/or religious and/or historical value in cultural sites</li> <li>• Varietal selection in the areas of agriculture</li> <li>• Setting up and managing seed orchard for forest species</li> </ul>	Low
<b>Target 14</b> – Ecosystems and Essential Services Protected: By 2020, ecosystems that provide essential services, particularly water, and that contribute to health, livelihoods and well-being, will have been restored and safeguarded, taking into account the needs of women, indigenous and local communities, as well as the poor and vulnerable	<ul style="list-style-type: none"> <li>• Implementation of the Water Code</li> <li>• Protection of upstream ecosystem in the action plans to sustainably maintain water resources</li> <li>• Ongoing creation of 10 new RAMSAR sites (RAMSAR Convention)</li> <li>• Incentives for forest conservation to regulate water cycle</li> <li>• Development of the Locally-Managed Marine Areas (LMMA) network in Madagascar, supported by activities to improve community livelihoods (Source: CI)</li> <li>• ICBG project for education, health and access to clean water</li> <li>• Mangroves reforestation and restoration</li> <li>• Restoration and valorization of aquatic plants which are sources of crafts raw materials for women's</li> </ul>	Insufficient

populations.	<p>associations</p> <ul style="list-style-type: none"> <li>• Inventory and assessment of NPA essential services</li> <li>• National Water Sector Strategy and Planning</li> <li>• Implementation of the document on the Integrated Water Resources Management and the socio-economic development of Madagascar</li> <li>• Inventories and analyses of water points</li> <li>• Integration of biodiversity conservation into the water resources management at all levels.</li> <li>• Pooling resources to restore and protect water resources</li> <li>• Updating of the OLEP (Organization fighting against marine oil pollution) Contingency Plan to prevent oil spills. Methodology development and vulnerability analysis (dry forests, wet forests, mangroves and reefs)</li> <li>• Funding of the Protected Area of Tsitongambarika, the main water resource of the Anosy region (QMM)</li> </ul>	
<p><b>Target 15 – Restored and safeguarded ecosystem:</b> By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks will have been enhanced through conservation and restoration, including restoration of at least 15% of degraded ecosystems, contributing thus to climate change mitigation and adaptation to it, as well as to the fight against desertification.</p>	<ul style="list-style-type: none"> <li>• Encouraging large mining companies to create conservation areas (AP)(case of QMM and Ambatovy project)</li> <li>• Mangroves reforestation and restoration</li> <li>• Implementing adaptation measures</li> <li>• REDD+ mangrove project feasibility study</li> <li>• Restoration of degraded ecosystems</li> <li>• Incentives provided to forest plantations</li> <li>• Application of mitigation and adaptation measures to CC (REDD+, CDM; resilience)</li> <li>• Restoration of wetlands, habitat of critical aquatic species</li> <li>• Bamboo plantation in lakes, river banks restoration, mangrove restoration</li> <li>• Site reforestation and post-mining restoration</li> </ul>	Very Low

	<ul style="list-style-type: none"> <li>• Sales promotion of carbon credits in Protected Areas (CAZ, Makira)</li> <li>• Institutional development of the REDD Mechanism</li> <li>• Ecological rehabilitation for carbon sequestration within the scope of the Clean Development Mechanism (CDM) of the Kyoto protocol (proposed sale of 1,000 ha recorded at the ACR (American Carbon Registry)</li> <li>• Developing the National Action Plan to fight Climate Change PNLCC (2010)</li> <li>• Developing and implementing national efforts to combat climate change.</li> </ul>	
<b>Target 16.</b> Nagoya Protocol: By 2015, the Nagoya Protocol on genetic resources access as well as fair and equitable sharing of benefits arising from their use will have been in force and operational, in accordance with the national legislation.	<ul style="list-style-type: none"> <li>• Conception d'un plan de communication relatif à la ressource génétique pour sensibiliser les acteurs concernés</li> <li>• Elaboration de la lettre de politique (décembre 2012) sur l'accès aux ressources génétiques et le partage des avantages découlant de leur utilisation</li> <li>• Création et développement de la section relative au Protocole de Nagoya au niveau du CHM/CDB Madagascar.</li> <li>• Elaboration du projet de loi sur l'accès aux ressources génétiques et le partage des avantages (en cours)</li> <li>• Renforcement des capacités sur l'APA: des réunions pour différents groupes cibles (Chercheurs, secteurs privés, communautés locales) afin de pouvoir discuter sur la mise en œuvre des aspects APA</li> <li>• Ratification du Protocole de Nagoya (transmis en décembre 2013)</li> <li>• Analyse de législations pertinentes pour la mise en œuvre de l'Accès et le Partage des Avantages et formulation de différentes recommandations</li> </ul>	A long way to go
<b>Target 17.</b> SPANB adopted: By 2015, all Parties will have developed and adopted it as a general policy instrument, and begun to implement effective, participatory, and updated	<ul style="list-style-type: none"> <li>• Mise Updating of national strategy and action plan for biodiversity (under way)</li> <li>• Decision-makers and operators capacity-building in the regions for the implementation of the Cartagena Protocol and the Convention on Biodiversity</li> <li>• Capitalization with the TAFO MIHAAVO network of planning and regional strategies elaboration on natural resources</li> </ul>	???

strategy and national action plan for biodiversity	<ul style="list-style-type: none"> <li>• Development of action plans for biodiversity (BAP) and for priority species: elaboration of national strategy for the <i>Phelsuma antanasy</i> conservation</li> <li>• Beginning of works for the development of the national strategy for plants conservation</li> </ul>	
<b>Target 18.</b> Traditional knowledge is respected: By 2020, traditional knowledge, innovations, and practices of the indigenous and local communities relevant to the conservation and sustainable use of biodiversity, and their sustainable customary use, will have been respected, provided that the provisions of national legislation and international obligations in force, and will have been fully integrated and taken into account in implementing the Convention, with the full and effective participation of indigenous and local communities, at all relevant levels.	<ul style="list-style-type: none"> <li>• Documentation on traditional management and on the DINA (local social conventions)</li> <li>• Reconciling local knowledge (traditional practice) and modern knowledge «Legalizing the legitimate»</li> <li>• Creation of community networks:           <ul style="list-style-type: none"> <li>◦ MIHARI or Locally Managed Marine Areas (LMMA): 134 organized into 36 Management Associations.</li> <li>◦ TAFO MIHAAVO, a National Network which represents 482 communities in 17 regions of Madagascar and which are concerned with or involved in natural resources management and/or governance</li> </ul> </li> <li>• Appropriate consideration of traditional knowledge within the legal framework on the access to genetic resources and to fair and equitable sharing of benefits derived from their utilization (SAGE Fampandrosoana Maharitra – Alliance Voahary Gasy, 2013)</li> <li>• Study on the valorization of traditional knowledge (cf APA)</li> <li>• Publication on people and cultural heritage of Fianarantsoa district</li> <li>• Traditional medicine valorization and protection</li> <li>• Integration of traditional pharmacopoeias among the basic essential medicines in health facilities</li> <li>• Ethnobotany use of plants</li> <li>• Inventory of traditional pharmacopoeias and documentation on the product usage monograph for a few medicinal plants           <ul style="list-style-type: none"> <li>◦ Regulation of the practice of traditional medicine used by traditional practitioners</li> <li>◦ Establishment of a technical structure to ensure the quality control of medications from medicinal plants (since January, 2013)</li> </ul> </li> </ul>	Good (but efforts should be pursued)

<p>Target 19 – Knowledge is improved, shared and transferred, and applied: By 2020, knowledge is improved, shared and transferred, and applied.: By 2020, knowledge, the scientific basis and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its depletion, will have been improved, widely shared and transferred, and applied.</p>	<ul style="list-style-type: none"> <li>• Training participants in the techniques of aerial observation (identification of species, counting ...)</li> <li>• Capitalization of data on the state of diversity, trends, threats within the scope of the SWIOFP mainstreaming biodiversity in fisheries management project in the IOC region</li> <li>• Development of research-action and applied researches</li> <li>• Creation and regular updating of biodiversity databases (REBIOMA, CHM, GBIF, and ARSIE)</li> <li>• Organisation of various trainings: <ul style="list-style-type: none"> <li>◦ Biodiversity users/stakeholders</li> <li>◦ Conservation of marine mammals for students</li> <li>◦ Security forces (OPJ) on species listed in the CITES list</li> <li>◦ Application of regulations on whale-watching, guides and boat pilots in cooperation with the Ministry of Tourism</li> <li>◦ Introductions to ecotourism for a women's association (FIVEPANOHA)</li> </ul> </li> <li>• Nature tour and implementation of an ecological research center</li> <li>• Academic training: Engineering / Masters and “à la carte” training on natural resources management for future professionals and decision-makers (ESSA-forest, Antananarivo University)</li> </ul>	<p>Average</p>
<p><b>Target 20.</b> Target 20 - Financial resources have increased: By 2020 at the latest, the mobilization of necessary financial resources for the effective implementation of the 2011-2020 Biodiversity Strategic Plan from all sources and in accordance with the enhanced and</p>	<ul style="list-style-type: none"> <li>• Financement Financing the FAPBM (since 2010): capital management begins to generate interest incomes. In 2011: financing of USD 850,000 for the Protected Areas and Madagascar Biodiversity (total surface of 1.5 million ha distributed into 11 sites, which include 6 national parks and 5 new protected areas. In 2012: financing of more than USD 1,000,000 for 15 protected areas (total surface of about 1.7 million ha.) In 2013, funding of USD 1,379,422 for 21 Protected Areas.</li> <li>• Financing of protected areas natural resources management by mining private sectors</li> <li>• Development of foundations</li> <li>• Development of ecotourism</li> <li>• Payment of environmental services (water, and so forth...)</li> </ul>	<p>Low</p>

<p>agreed mechanism of the Strategy for Resource Mobilization will have substantially increased compared to the current levels. This target will be subject to change based on the resource needs assessments that parties must develop and report.</p>	<ul style="list-style-type: none"> <li>• Sale of carbon credits</li> <li>• Development of different mechanisms with the local communities: revolving fund, matching fund and sustainable community funds</li> <li>• Integration of the natural resources value in the national accounting through the WAVES initiative (Wealth Accounting and the Valuation of Ecosystem Services): a project considering biodiversity and ecosystemic services value in the national accounting.</li> </ul>	
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## **III.2. ASSESSMENT OF MADAGASCAR'S PROGRESS LEVEL COMPARED TO THE AICHI TARGETS**

***Target 1: By 2020 at the latest, people will have been aware of the value of biodiversity and the steps they can take to conserve and use it sustainably.***

Since Madagascar is one of the 34 biodiversity hotspots in the world where the extraordinary levels of biodiversity and endemism are associated with extremely high levels of threat, efforts have been made by the Malagasy Government in the field of raising the Malagasy citizens' awareness on conservation and sustainable use of biodiversity.

To this end, the Ministries, Civil Society, and Non-Governmental Organizations (NGOs) have conducted briefings, communication, training, and awareness activities relating to biodiversity conservation. Successes to keep in mind include inter alia:

- Strengthening awareness campaigns, information and communication activities at all levels: Operators, Regional Directors, Heads of Districts, Mayors, Security Forces, Officials, Population, Pupils, Students, and Teachers through environmental education tools and educational and scientific articles, and films;
- Lobbying to the ministerial departments concerned by the rosewood and ebony sector reform by the Steering Committee responsible for the precious wood sector management and cleansing;
- The responsibilization of citizens through the establishment of a helpline (512) to collect public complaints and denunciations about unlawful acts and/ or environmental issues;
- Celebration of World Days on: biodiversity, migratory birds, Ramsar, and Environment;
- Organization of a great debate on environmental governance;
- Awareness campaign on the use of Renewable Energy and sustainable water management.

In spite of the efforts made, sensitization on biodiversity does not reach the whole population as the technical, human, and financial resources are insufficient. Moreover, rural population prove to be selective about the conveyed message in the sense that their attentions are more focused on information improving productivity rather than on those enabling natural resources sustainable management.

***Target 2: By 2020 at the latest, biodiversity values will have been integrated into the national and local development and poverty reduction strategies and planning processes, and included in the national accounts, as appropriate, and in the reporting systems.***

Integrating the environmental dimension and biodiversity protection in the Policy, Strategy, and Program Plan has become a major asset for Madagascar at the local and national level.

Initiatives are underway including: Waves Project, payment of ecosystem services, environmental and social safeguard plans for each Protected Area.

Although the number of environmental permits issued for all the branches of activities seems to be fairly significant, the implementation of MECIE was not convincing because of low compliance with environmental specifications, given the socio-political context in the country.

***Target 3: By 2020 at the latest, incentives including subsidies harmful to biodiversity will have been eliminated, reduced gradually or reformed in order to minimize or avoid negative impacts; while positive incentives for the conservation and sustainable use of biodiversity will have been developed and applied consistently and in harmony with the provisions of the Convention and with relevant international obligations, taking into account the national socio-economic conditions.***

The impact of including controls and monitoring mechanisms in the policy of incentives and subsidies can be considered insignificant.

The adoption of compensatory principle related to the restriction of access to the park for households and deserving communities in friendly-activities for biodiversity conservation and environment help reinforce incentives applied before. Consequently, establishing sustainable community funds mechanism demonstrates the effectiveness and sustainability of this approach.

Interventions on establishing a promotion system and sustainable, equitable, and interdependent development should be duplicated and expanded in various locations managing resources.

Support to implement reforestation program for energy purposes to protect watersheds will be increased and very effective.

The recognition and inclusion of Civil Society Organizations in decision-making bodies will allow major advancements in natural resource governance.

The involvement of development sectors, the intersectoral mobilization, the creation and revitalization of various committees involving different sectoral ministries will be essential to achieve harmonious interventions.

Despite the efforts produced in the country when implementing Target 3, it is then clear that the effectiveness of the actions is still insufficient for the following reasons: unfavorable judicial system, in particular in the prosecution and repression of infringements, and difficult financial constraints due to cyclical crises.

***Target 4: Sustainable Consumption and Production: by 2020, at the latest, Governments, business, and stakeholders at all levels will have taken steps or have implemented plans to ensure sustainable production and consumption, and will have kept the use of natural resources within safe ecological limits.***

Measures have been taken by stakeholders to make it possible to operate long-term natural resources vision and policy.

Activity reports produced by the operators managing the new protected areas allow them conducting regular assessments and ensuring the implementation of results to guide future interventions.

The emergence of projects that benefit from support and accompaniments in their natural resources management is an asset and a guarantee of production sustainability.

However, the effectiveness of the actions remains low due to lack of operational technical capacity and the absence of real policy for sustainable large-scale production policy at the national level.

***Target 5: By 2020 at the latest, the rate of impoverishment of all natural habitats, including forests, will have been at least cut by half, and where feasible brought close to near zero; and degradation and fragmentation will have been significantly reduced.***

Progresses in terms of creating New Protected Areas (NPA) and the growing involvement of local people in managing natural resources significantly slow down the loss of habitats and forests. The average deforestation rate in Protected Areas is seriously cut by half between the 2005 and 2010, the impact of conservation and management measures can thus be considered to be significant. Consecutively to increased awareness campaigns activities, the elaboration of relevant development strategies geared towards reducing natural resources degradation has been observed. This is particularly true through the profound changes in the extensive cropping system brought by the prodigious expansion of rainfed rice cultivation, the goal of which is to eradicate slash-and-burn cultivation.

In addition, the recognition and inclusion of OSC in decision-making bodies are essential in lobbying for the fight against natural habitats loss.

However, effectiveness varies depending on the zone and the local contexts. It may even be lower if the assessment focuses on the spatial dimension; conservation activities and isolated areas restoration require important funding. All the more as the evolution is slow especially for ecological conservation and restoration of habitats. The lack of resources is felt when assessing degradations, when elaborating strategies, and implementing related solutions.

Besides, an effective application of legal texts is essential to strengthen the control (illicit logging and charcoal production, illegal logging and wood exports trafficking, illegal mining in PAs, ...)

***Target 6: By 2020, all stocks of fish and invertebrates and aquatic plants will have been managed and harvested sustainably, legally and by applying ecosystem-based approaches, to avoid overfishing; recovery plans and measures will be in place for all depleted species, fisheries will not have had significant adverse impacts on threatened species and vulnerable ecosystems; and the impacts of fisheries on stocks, and species, and ecosystems will have been within safe ecological limits.***

The rational fisheries management strategy, amongst other things, by introducing fishing schedule (opening /closing,) has helped stop the decline of endemic species for a few years in marine and coastal areas, lakes and rivers and has even reversed the trend over a period. In addition, community management is developing steadily.

However, the population is no longer able to effectively manage fishery because of poverty and the ever increasing needs for fishing resources. Thus, the effectiveness of actions is restricted by financial, human and technical means. All the more as for all fishery resources exploitation, the strict enforcement of law constitutes the main mechanism to improve management effectiveness and sustainable harvesting.

***Target 7: By 2020, areas dedicated to agriculture, aquaculture, and forestry will have been managed sustainably so as to ensure biodiversity conservation***

Promotion of new technologies for sustainable agriculture, through population capacity building workshops, proves to be very relevant in improving production conditions.

National institutions do not have enough funds to carry out concrete actions. Profitable agro-ecological techniques are still poorly-disseminated and developed, given the slow pace of grassroots adherence.

Thus, biodiversity conservation and valorization must be addressed with an intersectoral approach: harmonization of rural activities (agriculture, aquaculture, and forestry.)

**Target 8: Reduced pollution: by 2020, pollution, in particular from excess nutrients, will have been brought to levels that are not detrimental to ecosystem function and biodiversity.**

The management of different pollution sources related to the agriculture sector is not yet very relevant.

One of the major challenges lies in the capacity to implement the GIDS Project (Integrated Solid Waste Management) at the level of Decentralized Territorial communities. Effective specific actions are carried out but there are gaps in the periodical control and monitoring due to the lack of technical, human, and financial means.

**Target 9: By 2020, invasive alien species and their introduction pathways have been identified and prioritized, priority species will have been controlled or eradicated, and measures will have been in place to manage pathways to prevent the introduction and settlement of these species**

Efforts have been made in the fight against invasive plants; the completion rate has exceeded 63% (253 ha completed out of the planned 398.) The difference arises from the unavailability of cash flow at the right time.

Regulatory frameworks and control systems exist, even if the texts are insufficient, but their application does not produce the expected effectiveness.

On an experimental basis, research institutions use certain invasive plants to produce compost/ fertilizer and manufacture biogas, or develop substitute products (paper, multi-nutritional products, and so forth...) Disseminating research results is still a major step to take as population poverty primarily limits their interest just to economic values.

**Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable marine and coastal ecosystems affected by climate change or ocean acidification will have been reduced to a minimum, so as to maintain their integrity and functioning.**

Many actions have been undertaken in view of conservation of coral reefs and other vulnerable marine and coastal ecosystems through the restoration of 43 ha i.e. 50% of the total mangrove area. The sustainability of this initiative falls under the priority activities of the Ministry of Environment and Forests.

The mangrove forests restoration reaches 50% of the estimated areas despite the plant growth phase which is slow given the heavily-felt pressure.

Concerning the initiatives to reduce pressures, the absence of many legislative texts is clearly felt in the programs carried out by organizations working in marine resources conservation; the only way is to put on hold the operation in any given region (the operations move into other regions.)

**Target 11 - By 2020, at least 17 % of terrestrial and inland water areas, and 10 % of coastal and marine areas, including areas of particular importance for biodiversity and ecosystem services, will have been conserved by means of networks of ecologically-representative and well-connected protected areas that are effectively and equitably managed and by other effective conservation measures by zone, and integrated into the broader landscapes and seascapes.**

The objective of tripling the Malagasy protected areas is achieved with the establishment of 145 protected areas, but it is an average as regard effectiveness since the lack of resources (financial and human) is still difficult to manage; framing and collaboration between different sectors still require efforts in these protected areas where local grassroots communities are involved through participatory management or joint-management.

The effectiveness of the Interministerial Committee, Mine and Forests, the main mission of which is to ensure the consistency of production activities, has been demonstrated in the establishment and management of protected areas in three mining areas (Mandena, Sainte Luce, Petriky.)

There are many committees (including other public sectors) that are being revitalized, under creation for the good participatory and inclusive management of protected areas, which are being in the final establishment.

Sometimes, local population does not have enough technical, organizational, and financial skills to manage effectively the protected area.

***Target 12 - By 2020, the extinction of known threatened species will have been avoided and their conservation status, particularly of those mostly in declines, will have been improved and sustained.***

Action plans and conservation strategies developed for threatened species do not yet cover all the critical species but only species that are likely to be known to secure funding. Strategies and actions as listed in the table include ecological monitoring, registration of precious wood species in Appendix II of CITES, taxonomic group conservation strategy (birds, turtles, crocodiles, chameleons, lemurs, and on plants like the Baobab tree..)

Action effectiveness is average for obvious lack of financial and technical resource.

***Target 13 – Genetic Diversity Maintained: By 2020, the genetic diversity of cultivated plants, farm and domesticated animals, and of wild relatives, including other species presenting socio-economic or cultural value, will have been preserved; and strategies will have been developed and implemented to minimize genetic erosion and to safeguard their genetic diversity.***

Regeneration priority of endemic species and/ or with cultural and/ or religious and/ or historical value in cultural sites is partially achieved with respect to the objective of 166 sites ranked among the national genetic heritage.

Improving agricultural productivity through varietal selection in agriculture leads to increase farmers' income by use of improved seeds.

The use of the Standard Material Transfer Agreement (SMTA) within the scope of the SML of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGR) for exchanges and transfer of Plant Genetic Resources for Food and Agriculture (PGRFA) is of help.

Several genetic studies on coastal wildlife species are underway.

A slow progress towards achieving the conservation objectives of genetic diversity is noticed.

***Target 14 – Ecosystems and Essential Services Protected: By 2020, ecosystems that provide essential services, particularly water, and that contribute to health, livelihoods and well-being, will have been restored and safeguarded, taking into account the needs of women, indigenous and local communities, as well as the poor and vulnerable populations.***

The national framework as regards water resource management provides for the «Integrated Management of Water Resources and Socio-economic Development of Madagascar» by contributing to pool resources for water resources restoration and protection. The National Strategy and the National Planning of the Water Sector are adopted.

For a better management of risks to and disaster incidence on biodiversity, it proves necessary to establish biodiversity monitoring indicators in relation to water resources and to operationalize water resources management structures at the national and local level.

Financial support has been granted by the QMM to the Tsitongambarika Protected Area which provides the main water resource for the Anosy Region and the implementation support for the NTPF study (Non Timber Forest Product) with FFI (Fauna and Flora International,) and Rio Tinto.

The implementation of the objective is moderately effective, in particular as regards the MECIE implementation, dthe lack of effective control of environmental specification implementation.

However, the downstream population begins to acknowledge the benefits of protecting the sources for their wellbeing through the various uses of water, protection of water resources (sites,) and its upstream services are not really a national priority.

***Target 15 – Restored and safeguarded ecosystem: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks will have been enhanced through conservation and restoration, including restoration of at least 15% of degraded ecosystems, contributing thus to climate change mitigation and adaptation to it, as well as to the fight against desertification.***

The large mining operators participate in the implementation of their environmental specifications, including site rehabilitation after operation, while much more remains to be done for the small ones and to deal with illicit operators.

Sales promotion of carbon credits is well on track in the three large protected areas (CAZ, Makira, and COFAV) where net progress in the process and institutional development of the REDD mechanism can be noted. On other sites, carbon sales initiatives are already under consideration, in particular one carried out in partnership with the ACR (American Carbon Registry) which is listed among the experiences of Madagascar in ecological restoration and carbon sequestration in the context of the Clean Development Mechanism (CDM) of the Kyoto Protocol.

The effectiveness of the actions is still very low because the potentiality in terms of carbon sequestration is relatively high especially in New Protected Areas, but only some carbon credit marketing initiatives were successful.

***Target 16 – Nagoya Protocol: By 2015, the Nagoya Protocol on genetic resources access as well as fair and equitable sharing of benefits arising from their use will have been in force and operational, in accordance with the national legislation.***

Analysis of legislation relevant to the implementation of the Benefit Access and Sharing and various recommendations has been successfully conducted with the passage of the bill on the ratification of the Nagoya Protocol on APA, which is awaiting enactment.

Reflection on APA for the RPGAA in collaboration with the National APA Focal Point is conducted and a support project on the implementation of benefit access and sharing issues is underway.

An important step forward has been made towards the national implementation of the Nagoya Protocol. However, after the actual ratification of the bill on Benefit Access and Sharing, there is still much to be done including different national political frameworks, the elaboration and effective implementation of enforcement texts.

***Target 17: By 2015, all Parties will have developed and adopted it as a general policy instrument, and begun to implement effective, participatory, and updated strategy and national action plan for biodiversity***

The National Strategy for Biodiversity Management (SNGDB) is dated from 2002. To have a strategy that meets current needs in terms of biodiversity conservation and valorization, it would be very important to update the SNGDB. This strategy must be translated into practical projects and concrete actions programs and must include all stakeholders, as well as public and private institutions.

***Target 18: By 2020, traditional knowledge, innovations, and practices of the indigenous and local communities relevant to the conservation and sustainable use of biodiversity, and their sustainable customary use, will have been respected, provided that the provisions of national legislation and international obligations in force, and will have been fully integrated and taken into account in implementing the Convention, with the full and effective participation of indigenous and local communities, at all relevant levels.***

Traditional practices of indigenous communities are of real interest in the conservation and sustainable use of biodiversity. However, the related social, cultural, and religious dimensions are generally not valued in the development of various policies, strategies, programs, and action plans relating to biodiversity conservation.

Although an important step has been taken and has resulted in the inventory of traditional pharmacopoeia and the elaboration of documentation on product usage monograph concerning some medicinal plants, these tools need to be developed for all regions of Madagascar.

Given that such initiatives prove to be expensive, the availability of substantial financial resources constitutes a necessary precondition.

***Target 19 – By 2020, knowledge is improved, shared and transferred, and applied.: By 2020, knowledge, the scientific basis and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its depletion, will have been improved, widely shared and transferred, and applied.***

The Network of Educators and Professionals in Conservation of Diversity (RPEC) is created and effective. To ensure the continued functioning of said network, a sustainable financing mechanism should be promoted.

An “à la carte” training program in natural resources management for future professionals and decision-makers is integrated within the ESSA Forests. This initiative is recognized as a benchmark at the national and international level for both the academic courses, to receive Engineering/ Masters/ and Doctorate degree, and the vocational training courses, delivered “à la carte”. Research projects addressing the great challenges of natural resources sustainable management in Madagascar have been published in 30 to 60 national and international articles.

The effectiveness of actions is relatively good as shared knowledge is recognized nationally and internationally. However, given the scope of application of biodiversity conservation and valorization, a large number of scientific studies still need to be carried out.

**Target 20 – Financial resources have increased: By 2020 at the latest, the mobilization of necessary financial resources for the effective implementation of the 2011-2020 Biodiversity Strategic Plan from all sources and in accordance with the enhanced and agreed mechanism of the Strategy for Resource Mobilization, will have substantially increased compared to the current levels. This target will be subject to change based on the resource needs assessments that parties must develop and report.**

Although real efforts have actually been made to ensure the funding of various biodiversity conservation actions, mainly through the development of foundations, the promotion of ecotourism, the initiatives towards the payment of environmental services, it must be noted, however, that the funds available are far from being sufficient. The implementation of most conservation efforts is still dependent on availability of external financing. While external donors often unilaterally define the general framework of their supports (selection of beneficiaries, method of use, and so forth....)

Presently, the financial sustainability of most protected areas is not yet ensured. To meet the country needs in terms of conservation actions funding, a strategy for resource mobilization and a clear funding framework must be developed.

### **III.3. ASSESSMENT OF MADAGASCAR'S PROGRESS TOWARDS THE MILLENNIUM DEVELOPMENT GOALS (MDG)**

Madagascar is committed to achieving by 2015, with technical and financial support from its partners, the Millennium Development Goals (MDG,) which aim at creating a program development framework for the country in various fields. A National Survey on Monitoring Millennium Development Indicators (ENSONMD) was conducted in Madagascar from September 2011 to August 2013. MDG focuses mainly on human welfare. Man acts on biodiversity, but is also affected by any change in the biodiversity status. In other words, human well-being depends largely on biodiversity and ecosystem services associated with it. Such appreciations are presented in the Appendices.

### **III.4. LESSONS LEARNED**

The implementation of the Convention on Biodiversity requires the intervention of an array of actors in the Public Sector, Private Sector, Communities, Civil Society Organizations, International NGOs, and Associations that interact so as to develop and implement related policies, strategies, programs, and action plans. The establishment of inter-institutional structures has also been an essential step in harmonizing various interventions.

The implementation of the Protected Areas System specifically developed for Madagascar SAPM, building on the IUCN different management categories for Protected Areas has, on one hand, helped to further protect, manage, and utilize the Malagasy biodiversity wealth, and on the other hand, to meet the expectations of different stakeholders, particularly the who population who are directly affected. This approach was more important insofar as the expansion of protected areas is one of the safest ways to protect biodiversity and ecosystems, and to maintain their ecological functions. Thus, the creation of the protected areas has been financially privileged.

In addition, the majority of investments for conservation purposes is focused around integrated approaches, taking into account the community factors, social services, sociological considerations, livelihood, welfare, and the local development.

In Madagascar, it seemed that a socio-political crisis regularly happens approximately every 10 years, hence the need to study and set up a system of crisis and post-crisis management for biodiversity conservation. Indeed, the pressures are the strongest and are hard to manage during these periods. The riparian populations or local communities living on the borders of the protected areas are conscious of these as a result of the awareness campaigns; but the existing system has not prepared the authorities to face these pressures.

## CONCLUSIONS

**Using information collected from all stakeholders working on biodiversity and an overview of legislative, policy, and planning tools, this fifth national report has come to the following key findings:**

Being a signatory of the CDB, Madagascar has developed its national biodiversity strategy and action plan, the implementation of which is the subject of this fifth national report.

The ecosystems with its high biodiversity and species endemism (animal and plant) provide the country with a set of economic and social opportunities.

A major progress has been made towards of Convention implementation since the 4<sup>th</sup> National Report (2010,) concerning the reduction of pressures on biodiversity and the natural ecosystems concerning various constraints, in particular:

- insufficiency of knowledge on biodiversity;
- lack of effectiveness in equitable sharing of benefits from the exploitation of genetic resources;
- lack of vision and continuity in public policies regarding biodiversity, which results in the coexistence of various projects and initiatives, without genuine links nor synergies between them;
- adverse national socio-political context, leading to different pressures on natural resources resulting in the reduction or even the cancellation of some external financies;
- insufficiency of available means at the disposal of environmental units which should act as catalysts to leverage the integration of the environmental dimension on the level of their respective sector.

The approach adopted for biodiversity management in Madagascar implies collaboration between all stakeholders, through consultation and coordination with the support of international donors. This facilitates the development of management tools allowing preserving biodiversity while supporting the socioeconomic development. Thus, inter-institutional strategic partnerships which bring together all stakeholders have been set up.

In spite of the difficulties of conservation, and the various threats to which Madagascar is confronted, it is worth noting that although some cases of extinction are noted, many new animal and plant species continue to be discovered. Scientific researches in wildlife and flora are of utmost importance and the reported results are being used to acknowledge the services provided by biodiversity for human well-being.

The legislative instruments create the comprehensive framework of environmental governance in the country by outlining the duties and responsibilities of the different national and governmental institutions, but they also define the principles and procedures that govern biodiversity management.

In Madagascar, the policy tools guide the planning and management of biodiversity. They focus on priority areas and allow the coordination and harmonization of efforts of several bodies involved in biodiversity conservation and management.

Protecting, valorizing environmental assets and natural resources, as well as maintaining the functions of biodiversity and its supporting natural ecosystems, have been the main areas of concern of the Malagasy Government, on which the country's socioeconomic development is based, particularly sustainable employment creation and poverty reduction.

Finally, the update of the national strategy as regards sustainable management of biodiversity and its setting in synergy with the national vision from all perspectives will follow this 5<sup>th</sup> Report.

## **RECOMMANDATIONS**

**On the basis of the above-mentioned findings, the following recommendations shall be submitted to decision-makers, to national policy-makers, as well as to practitioners working in the field of biodiversity conservation in the country to help develop the national strategy and the national action plan (SPNB):**

- To enhance information and awareness campaigns activities for actors working in the field of biodiversity by rapidly acting on its core value; by using for example the CHM (Clearing House Mechanism) through a mechanism to be established in order to ensure the free flow of information and to facilitate the preparation of national reports or other papers;
- To take into account the dimension of the fight against poverty in the activities of biodiversity conservation and sustainable use;
- To adopt biodiversity mainstreaming strategies in the development plan and decision-making process and better coordinate the interventions from various actors in specific biodiversity areas and ecological support areas, in order to encourage a certain inter-institutional synergy;
- To maintain close linkages between research and conservation, hence the need for biodiversity systematic planning through the respective plans;
- To put emphasis on biodiversity planning in Madagascar by valuing results from the accounting of the natural resources and ecosystem services for sustainable development;
- To develop a sustainable funding mechanism by enhancing resource mobilization capacities in order to sustain conservation actions at all levels: genetic resources, species, and ecosystems.

Biodiversity is an expression of life on earth: it can grow, thrive, wither, or even die. Whatever the pressures and constraints, its management should be pursued. The point of no return that would imperatively lead to weaken or totally make species disappear should be avoided, as recovery is not always obvious. Thus, one of the suggested efficient management measures in uncontrollable situations such as the one lived by the country is to direct all the efforts towards monitoring and control for their protection, and this is done while waiting for the crisis to be resolved:

- The gender approach needs to be developed in implementing biodiversity conservation;
- A system for assessing the management of each protected areas is to be envisaged to assess its efficiency as well as the effectiveness of its sustainability;
- It is recommended to continue exploiting the mechanism adopted during the NR5 development in order to update and implement the SPNAB, namely the adoption of thematic groups and sub-groups.

**To sum up, the following two principles deserve consideration for future actions in view of the Convention implementation:**

- Firstly, the «poverty reduction through biodiversity conservation action and sustainable use» perspective is of utmost importance. Actually, the increasing poverty of the population in Madagascar is one of the most important factors of biodiversity loss.
- Secondly, efforts are required to ensure coordinated interventions of the various parties to develop real synergy. For that purpose, institutional measures, in particular the creation of a National Biodiversity Committee in Madagascar should be anticipated. The coordination should also ensure the capitalization and regular information-sharing beyond the compilation of national reports.

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- [http://31.222.186.27/moodle/pluginfile.php/791/mod\\_resource/content/3/Brochure\\_ISLANDS\\_fr\\_finale\\_2013.pdf](http://31.222.186.27/moodle/pluginfile.php/791/mod_resource/content/3/Brochure_ISLANDS_fr_finale_2013.pdf)
- <http://www.seaturtle.org/mtn/archives/mtn106/mtn106p7.shtml>
- <http://www.objectifmada.org/index.php/presentation/biodiversite-en-danger>
- <http://www.fondation-nicolas-hulot.org/extras/dossiers-pedagogiques/biodiversite/perte-biodiversite.php>
- [http://wwf.panda.org/fr/wwf\\_action\\_zones/madagascar\\_nature/](http://wwf.panda.org/fr/wwf_action_zones/madagascar_nature/)

## **VARIOUS SOURCES**

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- IOSEA Madagascar National Report.
- Plan d'Action Nationale Genre et Développement, janvier 2004.
- Politique Nationale de la Population.
- Politique Nationale pour la Promotion de la Femme, octobre 2000
- Protection Sociale et Gestion des risques, juillet 2006.
- Rapport intérimaire national sur la mise en œuvre du plan d'action mondial pour les ressources zoogénétiques. REEM, 2012.
- Stratégie de gestion des risques et Protection Sociale, mai 2005.

## **APPENDIX**

**Appendix I:** Development process of the 5thNational Report Madagascar.

**INFORMATION ON THE PARTY IN CHARGE OF THE REPORT AND THE PROCESS USED FOR THE  
PREPARATION OF THE NATIONAL REPORT**

**A. THE PARTY IN CHARGE OF PRESENTING THE REPORT**

<b>CORRESPONDING AND CONTACT OFFICER FOR THE NATIONAL REPORT</b>	
Full name of the institution	Ministry of Environment and Forests
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**SUBMISSION OF THE REPORT**

**Signature of the administrator in charge of the presentation of the National Report**

**Rasoavahiny Laurette Hermine**

**Dispatch date**

**March 2014**

This short report is significant because it indicate in which approach realized the Report is the product of consultations of various stakeholders. It also indicates if the country has used the National Report in order to mobilize a support and the Public participation increased for the application of the Convention.

**PARTICIPATIVE AND INSTITUTIONAL APPROACH:** public and private sectors, NGOs, platforms, Conservationists, researchers, Association

- Coordination: Coordinator, Technical Assistants, financial Assistants, Administrative Assistants
- Working groups:
- 3 Sets of thematic Groups:
  - o Taxonomy and Ecosystem, Transverse, Sectorial
  - o 17 sub - groups:

Taxonomy and Ecosystem	Transverse	Sectorial
Sub-group Flora	Sub – group International Conventions	Sub-group of the Public Sectors
Sub-group Fauna	Sub – group of the Environmental Projects and of Rural Developments	Sub-group of the Private Sectors
Sub-group forest Ecosystem and Mountain	Under – durable management group of natural resources	Sub-group of Governance
Sub-group arid and semi-arid regions		Sub-group of the Mechanisms of financing and of Mobilizations of financial resources
Sub-group Ecosystem Sailors and Coastal		
Sub-group wetlands and island waters		
Sub-group protected Areas		
Sub-group Agricultural biodiversity		
Sub-group Mushrooms and Micro-organisms		
Sub-group Domestic animals		

#### STAKEHOLDERS:

- **Ministry of Environment and Forests;**
- **Organizations under supervision of the MEF: All Agencies of Execution of the MEF**
- **Public Sector: All Governmental departments, the Public National Institutions including the University of Madagascar**
- **NGOs and National Associations**
- **Technical partners:** NGOs, Associations and various Institutions working in the conservation of biodiversity
- **Financial partners:** “ Foundations” ,
- **Environmental and of development projects**
- **International Conventions** related to Biodiversity, Environmental matters and the sustainable Development:
- **Platforms:** Civil societies
- **PrivateSectors:** working in the sectors of economic development in direct relation or not with Environmental matters

#### METHODOLOGY:

##### ❖ Meeting:

- Meeting of the restricted committees
- Meeting of the Working-groups thematic
- Meeting of the sub-working-groups on each theme
- Dispatching of types of data to collect: report canevas, questions, other available information

##### ❖ Data collection: talks, meetings, bibliographic research....

- Tables canevas completed,
- Answers to the guide questions from CBD,
- Global or specific information,
- Activities Reports,
- Vision, Policy, Strategy, Programs, Action plans, Projects...,

- Legal and lawful framework (Ordinances, Laws, Decrees, Order , notes...)

❖ **Data analysing:**

❖ **Draft of report writing**

- Compilation of the data
- Analyzing
- Writing
  - ✓ Writers (People resources, National Coordination of the Project, DCBSAP)
- Presentation of the Progress Status
  - ✓ Restricted committees (reading and checking)
  - ✓ Finalization
- Official presentation of the Report to the Government

**B. PARTICIPANTS LIST OF 5<sup>TH</sup> NATONAL REPORT OF CBD ELABORATION 2014**

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Rakotonandrasana Mino Nandrianina	Ministère de l'Agriculture
Rakotondrahanta Solofoniaina	FOFIFA - DRZV
Rakotondratsima Marius	The Peregrine Fund
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Razafindrakoto Yvette	C3
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**Appendix II:** Situation of Madagascar compared to the international treaties

**International treaties that Madagascar ratified**

INVENTORIES OF CONVENTIONS OR INTERNATIONAL ORGANIZATIONS <a href="http://www.vohikala.net">http://www.vohikala.net</a> Source				
	Headings	History and Mission	Achieved Activities, Activities of implementation Advantages	Prospects and Vision
1	Convention of RIO sustainable	<b>Date of ratification</b> 1995 Agenda 21 is an action plan aiming to make the development sustainable, at the social, economic and environmental levels It is composed of 40 chapters	Elaboration of a national strategy elaboration guide for Sustainable development. <input type="checkbox"/> Installation of a national steering committee of agenda 21 and sustainable development <input type="checkbox"/> Nomination of a national focal point and an assistant of the Agenda 21 implementation and Sustainable development. <input type="checkbox"/> Production of the national profile of the agenda 21 implementation for the sustainable Development World Summit  <input type="checkbox"/> National reports Production to communicate to the Sustainable development Commission (CDD) of UNO, the body set up following the Summit of Rio, in 1992, with an aim of supervising the implementation Action 21 <input type="checkbox"/> Support to the formulation of certain plans of township developments (PCD) <input type="checkbox"/> Contribution to the progress accomplished examination and the obstacles encountered by each country and stressing of Madagascar's experiments on the theme chosen by the commission at each session <input type="checkbox"/> Contribution to the taking into account of the sustainable development in the different policies and national plans such as: clear vision of the Ministry charged of Environment, the PNNDD, and the policy of Regional development...	<b>Prospects</b> <input type="checkbox"/> National indicators of sustainable development definition <input type="checkbox"/> Setting up of a coordination structure and a sustainable development consultative body at the national and regional levels  <input type="checkbox"/> To contribute to the setting in synergy of international conventions implementation on the environment at the level of the experimental regions

			<ul style="list-style-type: none"> <li><input type="checkbox"/> Contribution to the sustainable development Strategy formulation of aquaculture, National Strategy of the Biological Diversity Management,</li> <li><input type="checkbox"/> National Strategy of the Ramsar sites Management, National Strategy of Mountain Sustainable Management , sustainable development Policy of coastal and marine zones, national Strategy of reafforestation, regional Strategy of Cetacea conservation ...</li> <li><input type="checkbox"/> Stakeholders' capacity reinforcement to development process</li> <li><input type="checkbox"/> Adhesion to the National Councils network of the French-speaking countries sustainable Development since 2005</li> <li><input type="checkbox"/> Contribution to the integration of the sustainable development concept in the approach of SADC</li> </ul>	
2	Convention on Biological Diversity	<p><b>History :</b> created in Nairobi in May 1992 and opened to the signature during the United Nations' conference on the environment and development (CNUED) in Rio de Janeiro on June 05, 1992</p> <p>Coming into effect : 29 December 1993</p> <p>Date of ratification: August 09, 1995</p>	<p><b>Activities achieved</b></p> <p>The Convention implementation on Biological Diversity is currently done on the basis of a multiannual program, within the framework of objectives 2010 that the Member States agreed.</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> work program elaborations within the framework of the Subsidiary body in charged of providing, Scientific, Technical and Technological Opinions (SBSTTA),within the expert group network, according to thematics (Protected areas, Access and benefit sharing, Biodiversity of the forests, insular Biodiversity...)</li> <li><input type="checkbox"/> national strategy<sup>□</sup>elaboration of biodiversity sustainable management (SNGDB) in 2001, accompanied by 6 regional action plans, also having to be updated in systemic way</li> <li><input type="checkbox"/> Adoption of several developed approaches within the framework of the CDB, such as : approach by the ecosystem which allows the participation of all actors,mainly the local communities that must be involved directly in the biodiversity, or the sustainable use of the biodiversity resources.</li> <li><input type="checkbox"/> Commitment to tripling the surface of the terrestrial protected areas until 2008, and the marine protected areas in 2012. /</li> <li><input type="checkbox"/> POWPA cf. Intersectorial program of work on questions</li> <li><input type="checkbox"/> Adoption of the 6 categories of protected areas proposed by the UICN;</li> <li><input type="checkbox"/> exchange provision center of (CHM) according to article 18.3 of the CDB.</li> </ul> <p><a href="http://www.bch-cbd.Naturalsciences.be/Madagascar/">http://www.bch-cbd.Naturalsciences.be/Madagascar/</a></p>	<p><b>Current prospects</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> CDB objectives are shown in MAP challenges</li> <li><input type="checkbox"/> Synergy development for an international coherent implementation mainly related to the biodiversity.</li> <li><input type="checkbox"/> Strategy development at the international, regional and national levels and the relations implementation as well as the joint interventions to the Convention on the Climate Changes</li> </ul>

			<ul style="list-style-type: none"> <li><input type="checkbox"/> Update of the CDB information exchange center on the actions, events.</li> <li><input type="checkbox"/> Setting up of a work committee on the right to access to the biological resource.</li> <li><input type="checkbox"/> Madagascar belongs to the most active countries within the international and regional network (groups of experts) working for the setting up of an international regime for the genetic resource management.</li> <li><input type="checkbox"/> strategy elaboration for plants conservation</li> <li><input type="checkbox"/> periodical report elaboration on the status of the strategic plan implementation 2010 (three national reports)</li> </ul>	
3	Convention on Climate Change (CCNUCC) Summit of RIO	<b>Date of ratification</b> December 1998	<b>Activities achieved</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> initial Communication in 2003</li> <li><input type="checkbox"/> Elaboration of the 2<sup>nd</sup> national communication (in progress)</li> <li><input type="checkbox"/> National action plan of Adaptation to the Climate change (PANA) was submitted to the Secretary office of Convention in November 2006 after the Government approval</li> <li><input type="checkbox"/> Setting up of structures and necessary tools for the implementation of CCNUCC and Protocol of Kyoto (km No)</li> <li><input type="checkbox"/> Authority National Designed (AND)</li> <li><input type="checkbox"/> Procedures of projects approvals</li> <li><input type="checkbox"/> sustainable development Criteria</li> <li><input type="checkbox"/> national Strategy of MDP implementation</li> <li><input type="checkbox"/> Training on MDP (Protocol of Kyoto)</li> </ul>	<b>Prospects</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Finalization of the 2nd national communication</li> <li><input type="checkbox"/> Training for the AND</li> <li><input type="checkbox"/> Promotion of the Clean Development Mechanism (Sensitization, training for the promoters)</li> <li><input type="checkbox"/> climate sensitization and measurements of adaptation necessary adaptation measures to face climate changes</li> </ul>
4	Convention on the fight against desertification	<b>History</b> Adoption: June 17, 1994 <b>Ratification</b> Law 96-022 of the 04 seven 1996 Decree 97-772 of June 10 1997 Coming into effect: Dec. 26, 1996	<b>Activities achieved</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> National Action plan elaboration and adoption of the fight against desertification by the decree 2003 199 of March 11 2003</li> <li><input type="checkbox"/> Execution of the second project stage "Support to the resource mobilization for the National Action plan implementation of the fight against desertification in Madagascar"</li> <li><input type="checkbox"/> At the national level: Elaboration of a document allowing the best knowledge about the profile of the public assistance to the development of Madagascar and of the financing resources inventories investing in the PAN/CLD priority fields (definitions of the priority actions)</li> </ul>	<b>Prospects</b> <ul style="list-style-type: none"> <li><input type="checkbox"/> Alignment of the Convention implementation of with the new <u>Plan Tallies</u> Strategic Decennial 2008 – 2018 and with the MAP</li> </ul>

<p>Carthagene Protocol on the biotechnological risks prevention related to CDB or Protocol on the Biosecurity (Cdb)</p>	<p><b>History</b> The protocol is from CDB <b>Ratification</b> November 22 2003</p>	<p><b>Activities achieved</b></p> <ul style="list-style-type: none"> <li>□□National Biosecurity Policy in 2012</li> <li>□□decree n° 2012-833 concerning setting up, operation and attributions of various biosecurity bodies in Madagascar</li> <li>□□ national law draft elaboration on the biosecurity and the related national structure.</li> <li>□□ capacity reinforcement of information exchange center</li> </ul>	<p><b>Prospects</b></p> <ul style="list-style-type: none"> <li>□□Finalization of National law elaboration of biosecurity and text adoption by the competent authorities</li> </ul>
<p>Convention on the international trade of the wild fauna and flora species under threat of extinction or CITES</p>	<p>Convention on the international trade of the wild fauna and flora species under threat of extinction or CITES</p>	<p><b>Activities achieved</b></p> <ul style="list-style-type: none"> <li>□□Setting up of the Scientific Authorities represented by Animal Biology Department of the University of Antananarivo for the fauna and plant Biology and ecology Department for the flora</li> <li>□□the General Direction of Environment, water and Forest ensures the management body role and thus manages the licence system of CITES</li> <li>□□ action plan elaboration for the reform of CITES concerning four fields which are : <ul style="list-style-type: none"> <li>- the national policy about the use and conservation of wild species as well as the legislation and regulation concerning the collection and trade of wild species</li> <li>- the scientific contribution to the process of decision-making concerning the collection and trade of wild species</li> <li>- operational procedures concerning the administration of the trade of wild species, from catching to export</li> <li>- Application of controls and follow-up</li> <li>- Elaboration of the legislation on the administration of trade</li> <li>- Production of CD on Madagascar and CITES</li> <li>- Elaboration of guide on chameleons</li> <li>- Determination of the processes of the Scientific Authority work</li> <li>- Determination of the priority species for studies</li> <li>- Installation of the permanent Secretary office CITES</li> <li>- Elaboration of identification cards for the most commercialized species</li> <li>- on-the-field study of the several species</li> <li>- System of quota limitation</li> <li>- Web site and Data base on CITES in Madagascar</li> </ul> </li> </ul>	<p><b>Prospects</b></p> <p>National Policy Evaluation on Trade</p>

			<p>(<a href="http://www.citesmadagascar.mg">www.citesmadagascar.mg</a>)</p> <ul style="list-style-type: none"> <li>- Setting up of action plan follow-up mechanism of procedure Handbook on the field of trade of wild species</li> <li>- follow-up System of the operators' stocks</li> <li>- regional training to the services concerned (Customs office, order forces, other technical services and local authorities).</li> </ul> <p>Setting up of a national committee for the follow-up of the action plan implementation CITES</p>	
Convention of Ramsar on wetlands of international importance	of	Ratification by the Law n°98- 003 of 19/02/1998	<p>As a signatory of convention on the wetlands of international importance or there convention of Ramsar, Madagascar expressed its commitments to registering some wetlands in the Ramsar list (article 2.1 of convention) and working in the conservation and the rational use of some wetlands qualified as biodiversity center and their resources as well on its own territory as in co-operation on a world level and with other parts.</p> <ul style="list-style-type: none"> <li>• Since 1998, Madagascar registered in the Ramsar list 9 wetlands of a total surface of 1, 175, 000 hectares of which 3 registered in 2010 and 7 of these sites are integrated in the System of the Protected areas of Madagascar or SAPM.</li> <li>• The process of registration of 2 new sites is in progress hand following the example the New Protected area of Antrema in the region of Boeny with a surface area of 20, 300 ha including 1,000 ha of marine Park and the complex of the lakes Sirave Ambondro in Menabe region of a surface area of 14, 481 ha</li> <li>• Studies on the 10 sites located in the region of south-east of Madagascar between the national parks of Andringitra and Andohahela were carried out by Asity Madagasikara, partner of Birdlife International, thanks to the modest small subsidies from Ramsar</li> </ul> <p>The elements of report of these studies were already submitted to Ramsar Convention in 2013 for an eventual registration of overall before 2015.</p> <ul style="list-style-type: none"> <li>• The sites concerned are:</li> </ul> <p>Complex of the lakes Manambolomaty (Melaky region); Lake Kinkony (Boeny region); Lake Tsimanampetsotsa (region Atsimo Andrefana);</p>	

		<p>Lake Alaotra (region Alaotra Mangoro);  Marsh of Torotorofotsy (region Alaotra Mangoro);  Park Tsarasaotra (Analamanga region);  Nosivolo river and its affluents (Atsinanana region );  Wetlands of Mandrozo (Melaky region);  Wetlands of Bedo (Menabe region)</p>		
	<p>Convention on the migrating conservation of the species belonging to wild fauna (CMS) known as Convention of Bonn</p>	<p><b>Adoption:</b> June 23, 1979 in Bonn <b>Coming into effect:</b> 1<sup>er</sup> November 1983 <b>Ratification</b> Law n° 2006-002 of July 24 2006 Decree n° 2006-541 of the 24 July 2006 Coming into effect: 1<sup>er</sup> January 2007</p>	<p><b>Activities achieved</b>  <b>1 - Members of International agreements quoted below :</b>  <input type="checkbox"/> AEWA Agreement on the conservation of the migrating waterbirds of Africa-Eurasia  (1.01.2007);  <input type="checkbox"/> Dugong Memorandum of Agreement on the conservation and the management of Dugongs and their habitats overall their surface of distribution (31.10.2007);  <input type="checkbox"/> Turtles of IOSEA Memorandum of Agreement on the conservation and management marine turtles and their habitats of the Indian Ocean and the South Eastern Asia  (01.09.2001);  <input type="checkbox"/> migrating Birds of prey : Memorandum of Agreement on the migrating birds of prey conservation of Africa and Eurasia (01.11.08);  2- Development and adoption of the National Action plan of conservation of Heron Crabier White Madagascar <i>Ardeola idae</i> 2011;  3 -Elaboration and adoption of the National Action plan of <i>Falco concolor</i> and <i>Falco Eleonorae</i> 2011;  4- Elaboration and tortoises conservation Plan adoption ;  5 -Project implementation on the improvement of the status of knowledge and Heron Crabier White Madagascar <i>Ardeola idae</i>, 2011-2012;  6 - Project execution of the follow-up by satellite of the <i>Falco concolor</i> migration enters Madagascar and Oman, 2013-2014.</p>	<p><b>Prospects</b>  <input type="checkbox"/> Development of the 3<sup>rd</sup> report/ratio on the setting in work of the CMS and AEWA;  Implementation of the plan of conservation of tortoises</p>
	<p>Convention of Nairobi: convention for</p>	<p><b>History</b> -1974: Starting of program " regional Seas</p>	<p><b>Activities achieved</b>  •Review and update of Convention and its two protocols (in progress by regional experts and of the personnel of the United Nations); to present</p>	

	<p>protection, Management and the improvement of marine environnement and coastal zones Eastern Africa region</p> <ul style="list-style-type: none"> <li>" with the PNUE -1985, adoption of convention of Nairobi by 9 States of the Eastern Africa</li> <li>- May 1993: meeting of other ministers of the Environment Arusha qui have stressed the value of Coastal and marine zones</li> <li>-1996: Conference on the management Policy of of the islanders States</li> <li>Coastal zones of Eastern Africa</li> <li>- March 1997: 1stConference Parts (COP)</li> <li>- In December 2001, all the countries of the EAF ratified the</li> </ul>	<p>at the COP 5. The technical and legal national working group have re-examined the proposal</p> <ul style="list-style-type: none"> <li>•Elaboration of the 3<sup>rd</sup> protocol on the activities of terrestrial source (Environmenta Impact study to present for the Ministers at the COP 5.</li> <li>The Technical and legal national working group have re-examined the proposal</li> <li>• National Report Elaboration is in process of finalization</li> <li>•Implementation of the demonstrations project for Anakao-Nosy Be (Toliara) having as title " development of pressure reduction activities exerted on ecosystem of the Littoral Park Marine of Toliara " in progress</li> <li>•Physico-chemical analysis of the sediments in the Anakao region (IHSM) to start</li> <li>•Determination of the pollution zones by heavy metals by sampling</li> </ul>	
	<p>Convention of Nairobi</p> <ul style="list-style-type: none"> <li>- South Africa has reached it</li> </ul> <p>May 2003</p>	<p>(CNRE) (done)</p> <ul style="list-style-type: none"> <li>•Elaboration of national reports on the ratification status of international conventions related to the marine and coastal environment (done)</li> <li>•National report on the national legislation governing the marine and coastal environment (done)</li> <li>•National report on waste in coastal and marine environment (done)</li>   <li>• exchange center on the convention of Nairobi (CHM) set up; collect data collection in progress.</li> <p><b>Project of WIO LAB</b></p> <ul style="list-style-type: none"> <li>•To reduce the pressure exerted on the ecosystem by improving quality of water and of sediments;</li> <li>•To reinforce the regional regulation in order to prevent the pollution sources proliferation</li> </ul> <p>Issued from the terrestrial activities;</p> <ul style="list-style-type: none"> <li>•To develop regional capacities for a sustainable development and less pollutant.</li> </ul> </ul>	

		<p>This project was launched in Madagascar in July 2004 during the COP 4.</p> <p><b>Project of Demonstration</b></p> <ul style="list-style-type: none"> <li>To develop pressure reduction activities exerted on the ecosystem of the future Toliara Littoral marine park that will attract tourists in order to generate income sources for management and also those operations especially to improve the bordering population' life quality.</li> </ul> <p><i>Attenuations of the terrestrial activities harmful impact on the marine and coastal environment of the Western Indian Ocean</i></p>	
International treaty on phylogenetic resources for the food and agriculture	<p><b>History</b></p> <p><b>Coming into effect</b></p> <p>30 October 2002 in Rome</p> <p>The treaty came into effect June 29 2004</p> <p><b>Ratification</b> March 13 2006</p> <p>After seven years of negotiations, the Conference FAO at the time from its 31<sup>st</sup> session in November 2001 by Resolution 3/2001.</p> <p>The International Treaty on Phylogenetic Resources for the Food and Agriculture (TIRPGAA)</p>	<p><b>Activities realized:</b></p> <ul style="list-style-type: none"> <li>Inclusion of 7999 accessions in Appendix 1 in September 2010;</li> <li>Control of reflexion on the APA/ABS for the non covered RPGAA by Appendix 1 in collaboration with the NFP APA;</li> <li>Reflexion on the farmers' rights to preserve, to use, to exchange and to sell seeds for farmland and for other reproductive equipments and to take part in the decision making concerning the use of the RPGAA as the benefit sharing fair and equitable from that as well as the promotion of the farmers' rights at the national and international levels.</li> </ul>	<p><b>Prospects</b></p> <ul style="list-style-type: none"> <li>Development of the Information System for wild plants connected (PSA) with Cultivated ones.</li> <li>Implementation of National Convention concerning the access and information exchange Related to the RPG and PSA</li> <li>Reinforcement of the national capacities necessary to the execution of obligations from the Treaty.</li> <li>self the texts for the setting in work of the Treaty</li> <li>Elaboration of the Plan / Program of National Action 1 to be submitted to the plan of Action World and / or to put in synergy with other conventions ratified by Madagascar.</li> <li>Conservation and sustainable use of RPGAA</li> <li>Food Safety</li> </ul> <p>Taking into account of the rights of the farmers (in private individual around 80 %)</p>
Convention of Stockholm on organic persistent pollutants	<p><b>Ratification</b></p> <p>Decree n° 2005-512 of the 03 August 2005</p>	<p><b>Activities of implementation</b></p> <ul style="list-style-type: none"> <li>Studies on the inventories of POP with of infrastructures capacity evaluation and institutional framework to manage the POP ones : pesticides, DDT, PCB, Dioxanes</li> </ul>	<p><b>Prospects</b></p> <p>Search for financings with international organizations for action plan implementation and of convention</p>

(POPs)		<p>and furans (POPs) •</p> <p>Study on the effects and incidences of POP on human health and the environment</p> <ul style="list-style-type: none"> <li>• Study on the socio-economic evaluation impacts of POPs use and reduction</li> <li>• Elaboration of the POP National Profile</li> <li>• Study on the definition of the country priorities</li> <li>• Study on the determination of the national objectives of the country</li> <li>• Elaboration of a national strategy of information exchange, public education, communication and sensitizing.</li> <li>• CD Rom and brochures containing the objectives, the contents and the outcome of the Stockholm convention</li> <li>• A documentary film of information and sensitization on POPs and their effects</li> <li>• Two small informational and educational posters on POPs</li> <li>• Malagasy version of the Stockholm convention guided tour on POPs</li> <li>• Study on the economic opportunities analysis and the POP elimination and replacement (tool of decision-making aid for the decision makers)</li> <li>• sensitization activities</li> <li>• Organization of the workshops sensitization on PCBs, Dioxanes and furans, POP pesticides and DDT</li> <li>• on field work to sensitize the local authorities</li> <li>• Diffusion of the tools for sensitization press center for the journalists: emission of sensitizing to the radio and article in the newspapers</li> <li>• National action plan document elaboration of convention implementation</li> </ul> <p>This document includes six specific action plans:</p> <p>Reinforcement of capacity, sensitization and information, PCB, DDT, POP Pesticide and dioxane and furan</p>	
Convention of Rotterdam on the procedure of	<b>History</b> <b>Coming into effect</b> February 24 2004	<b>Activities achieved</b> <ul style="list-style-type: none"> <li>• Elaboration of the national plan implementation draft</li> <li>• Elaboration of a project document draft on "the evaluation of risk</li> </ul>	<b>Prospects</b> <ul style="list-style-type: none"> <li>• Elaboration of a national plan of convention implementation.</li> </ul>

<p>preliminary assent in the full knowledge of the fact that is applicable to certain dangerous chemical and pesticides products which is the object of an International trade (Procedure Peak)</p>	<p><b>Ratification</b></p> <p>Law N° 20004-008 of the 28 authorizing July 2004 there ratification of Rotterdam Decree N° 2004-771 of the 03 Concerning the Rotterdam convention ratification on August 2004</p>	<p>generated by chemicals covered by the aforementioned Convention " draft</p> <ul style="list-style-type: none"> <li>•Field Activities to meet the chemicals importers' requestes of the registered in appendix III of the Convention and at the preliminary assents formulated by chemical exporters and importers.</li> </ul> <p>Implementation Priority activities in the:</p> <p>Elaboration of an implementation National Plan</p>	<p>.Elaboration of a project document on the evaluation of risk generated by chemicals covered by the aforementioned Convention</p>
<p>Convention of Basle on control of dangerous waste transborder movements and their elimination (dangerous waste)</p>	<p><b>History</b></p> <p>Ratification: Law 99 022 of January 20 1999 Decree 99-141 of February 22 1999</p>	<p><b>Activity of implementation</b></p> <p>Of an administrative nature on the control of the transborder movements by technical and scientific study of the dangerous waste movement documents in transit on the territory national.</p> <ul style="list-style-type: none"> <li>•Control of transborder movements of dangerous waste of an administrative and systemic nature</li> <li>•Installation of a National office of the Convention of Basle.</li> <li>•Installation of a National Committee of implementation of the Convention of Basle.</li> <li>•Financing request with the embassies of the developed countries (Norway...)</li> </ul> <p>Elaboration of a national project on the control unit of the transborder movements of dangerous waste</p>	<p><b>Prospects</b></p> <ul style="list-style-type: none"> <li>•National inventory of dangerous waste in the 22 regions</li> <li>•committee setting up</li> <li>•Regional Management of dangerous waste</li> <li>•Installation of a Regional plan Management and Control of the dangerous waste transborder movements</li> <li>•Installation of a National Plan of Management and of the Control of the movements transborder of dangerous waste /...</li> </ul>
<p>(ASGIPC) Stratégic Approach to International Chemicals Management</p>	<p><b>History</b></p> <p>Worked out and adopted in February 2006 in Dubai by members of the United Nations</p>	<p><b>Fast starting activity</b></p> <p>The three elements of the program of starting concern:</p> <p>National profile of Chemicals Management (PC) and requirements determination in matter of reinforcement of capacity</p> <ul style="list-style-type: none"> <li>•The installation and reinforcement of the institutions, plans, activities, or national programs aiming at the good managements of the PC in</li> </ul>	<p><b>Prospects</b></p> <ul style="list-style-type: none"> <li>•Reactualization of the national profile, to identify the assets and the problems as regards management of the PC at the level national in all field</li> </ul> <p>To proceed to the two other stages of the project of which:</p>

	(SAICM)		<p>correlations with the related international agreements, The realization of activity related to the institutions coordination and / or the participation of the public or On the private as regards of the management chemicals</p>	<ul style="list-style-type: none"> <li>- the national evaluation of the capacities based on the profile which will be carried out as from February 2008 and,</li> <li>- Definition of the priority subjects requiring an immediate action as regards management of chemicals which will be determined in a concerted way at the level of the Government and different stakeholders</li> </ul>
	<p>Convention of Vienna for the protection of the Ozone layer</p> <p>Protocol of Montreal, related to Substances Impoverishing the Ozone Layer</p>	<p><b>History</b></p> <p>Ratification:</p> <p>Decree 95 032 of January 11 95 related to the convention of Vienna</p> <p>Decree 96-321 of May 02</p> <p>1996, related to the protocol of Montreal</p> <p>Madagascar has ratified the amendment of London (1990),</p> <p>the amendment of Copenhagen (1992),</p> <p>the amendment of Montreal (1997) and the amendment of Beijing (1999) on October 23 2001</p>	<p><b>Activity of implementation</b></p> <ul style="list-style-type: none"> <li>•Annual campaign of communication, information and mediatization and celebration of the world day for the environmental protection.</li> <li>•Periodic investigations on the SAO use and consumption</li> <li>•Establishments of the periodic reports of the BNO activities</li> <li>•Training of the refrigeration technicians trainers within the framework of the refrigeration practical application in order to save the Ozone layer</li> <li>•Training of the customs officers and the personnel in charge of the control of the imports of substances regulated by the protocol of Montreal (49 trained),</li> <li>•Training of the refrigeration technicians to the good practices as regards repair, maintenance and in handling of the equipment of recovery and recycling (200 trained)</li> <li>•Acquisition of training, recycling and recovery materials, to identify the SAO, equipment of training for methyl bromide and its alternatives</li> <li>•Installation of the SAO, recovery and recycling networks (Antananarivo, Tuléar, Antsiranana)</li> <li>•Country host of the 10 th joint meeting of the english and French-speaking African countries in 2006 (ODSONET/AF)</li> <li>Country host of the first regional workshop of the Member State of the COMESA on the regional regulation on the SAO</li> </ul>	<p><b>Prospects</b></p> <p>Implementation of the Management Plan of Cooling agents Brought up date (Pgra)</p> <p>- <i>component 1</i></p> <p>Training of the technicians to good practices as regards repair and maintenance, and in recovery and recycling</p> <p>- <i>component 2</i></p> <p>Training of the customs officers and the personnel in charge of the control of the imports of substances regulated by the Protocol of Montreal</p> <p>- <i>Component 3</i></p> <p>Implementation of the network of recovery and of recycling of the SAO</p>
	<p>International Conventions of 1990 on the</p>	<p><b>History</b></p> <p>Ratification:</p> <p>Law 2001-011 of the 11 seven 2001</p>	<p>These three International Conventions related to the protection of morning and coastal environment against pollution by discharges of hydrocarbons were implemented by the Law</p>	

preparation, the fight, and the co-operation in matter of pollution by hydrocarbons (ORPC)	Decree 2001-896 of the 11 October 2001	n°2004-019 of August 19 2004 which leads to the creation of the Body of Fight against the Event of marine Pollution by hydrocarbons (OLEP) by the decree n°2004-994 of October 26 2004 whose mission is the preparation and coordination of the operations of fight against the event of pollution by hydrocarbons in marine and coastal environment	
International Convention 1992 on the civil responsibility in event of damage caused by pollution of hydrocarbons, by ships (CLC)	Ratification: Law 2001-012 of the 11 seven 2001 Decree 2001-897 of the 11 October 2001		
International funds Convention 1992 concerning creation of international of compensation (FC 92)	History Ratification: Law 2001-013 of the 11 seven 2001 Decree 2001-898 of the 11 October 2001		
International Conventions on the fight against discharges of hydrocarbons onto the sea (CILDH)	<b>History</b> Coming into effect on May 24 2002	In addition, in accordance with the provisions of the draft-agreement signed by the Organization Maritime International and the Program of the United Nations for the Environment for the dynamization of the Convention of Nairobi as regards preparation and the fight to face accidental marine pollution in the region of eastern Africa followed by a meeting between two parties in Mozambique in 2001, on the one hand, and the recommendation of the meeting between the International Maritime Organization and Commission of the Indian Ocean which was held in Mauritius in 2002	<b>Prospects</b> •To fill out the centers of storage with new fight materials to increase the number of centers of storage of material

			<p>,on the other hand, an emergency emergency plan sub-regional in the event of major event of pollution in the Western Indian Ocean zone was set up since 2003 of which the implementation was entrusted to the Ministry in charge of the Environment.</p> <p>Madagascar now has 14 storage centers of fight materials against discharges of hydrocarbons on to the sea of which seven are already operational since 2001 namely Toamasina, Antsiranana, Mahajanga, Toliara, Manakara, Tolagnaro, and Holy Marie, two since 2005-Morondava and Nosy Be, and five which have been just set up this year: Antalaha,</p> <p>Vohémar, Antsohihy, Mananjary, and Maintirano. And also has fifteen plans of fight of which</p> <p>a national plan, new regional plans for the Areas and five local plans for the Districts.</p>	
International Convention on the World Patrimony	<p><b>History</b></p> <ul style="list-style-type: none"> <li>- Registration of the " Wet Forests of Atsinanana Of Madagascar in the list of the World patrimony in June 2007, made up of 6 national parks (Andringitra, Masoala, Marojejy, Andohahela, Zahamena, Ranomafana)</li> <li>- the Committee of the World Patrimony, during the 34<sup>th</sup> Session, Brasilia, Brazil, July 25 – August 3 2010 decides to register the " wet Forests of Atsinanana " on the List of the World Patrimony</li> </ul> <p><b>in danger</b> (Decision: 34 COM 7B.2 ) because of illicit exploitations of precious rosewood (rosewood) in two National parks Marojejy and Masoala related to socio-polical crisis of 2009 undergone by Madagascar</p>	<p><b>Activities achieved :</b></p> <ul style="list-style-type: none"> <li>□□Since the registration in 2007, the Malagasy State is required to submit periodical reports on the state of conservation of these sites annually,</li> <li>□□Efforts were deployed for the re-establishment of this fortune for purposes of its withdrawal from the list of the world patrimony " in danger ":</li> <li>- international Assistance of an amount of 100 000 dollars from UNESCO to contribute to the re-establishment of this fortune : this assistance allowed the realization of scientific studies on the state of the Exceptional Universal Values (VUE) of both Marojejy and Masoala National parks as well as the installation of the device of controls of the illicit exploitations in the two sites</li> <li>- international Assistance of an amount of 1 million dollars from the Government of Norway: a collaboration agreement between the Malagasy and the Norway Governments was signed in this assistance whose objective is not only to reinforce the acquisitions of the first assistance but also to contribute to the activities of socio-economic development of the population bordering the 6 national parks of the Wet Forests of Atsinanana,</li> <li>- the ordinance n°2011-01 of August 08 2011 Issued by the Malagasy</li> </ul>	<p><b>Prospects</b></p> <ul style="list-style-type: none"> <li>□□Withdrawal of the fortune " Wet Forests of Atsinanana " from the list of the World patrimony in Danger,</li> <li>Reinforcement of the fight against the illicit, exploitations and traffics of precious wood including rose wood inside the protected areas</li> </ul>	

		<p>State concerning</p> <p>repression of the infringements related to the ebony wood and rosewood,</p> <ul style="list-style-type: none"> <li>- registration of rosewood in appendix 2 of CITES,</li> <li>- Installation of the Steering committee of the Management and the Cleansing of the</li> </ul> <p>Precious wood Sector by interministerial decree n°22143/2012 of August 16 2012,</p> <ul style="list-style-type: none"> <li>- Training of the Malagasy party (Forest Administration and Madagascar Parks National) by IUCN expert on the use of the tool " Enhancing Our Heritage " (or EoH) of the IUCN to evaluate the effectiveness of the Wet Forests of Atsinanana management,</li> </ul>	
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The Ramsar sites of Madagascar

SITES	DATE OF REGISTRATION	REGION	SURFACE
Complex of the Lakes Manambolomaty	25/09/98 MELAKY	MELAKY	7,491 ha
Lake Kinkony	05/06/12	BOENY	13,800 ha
Lake Tsimanampetsotsa	25/09/98	ATSIMO ANDREFANA	45,604 ha
The Lake Alaotra: wetlands and slopes basins	09/09/03	ALAOTRA MANGORO	722,500 ha
Marsh of Torotorofotsy with their slopes basins	02/02/05	ALAOTRA MANGORO	9,993 ha
Park of Tsarasaotra	09/05/05	ANALAMANGA	5 ha
Nosivolo river and affluents	17/09/10	ATSINANANANA	358,511 ha
Wetland of Mandrozo	05/06/12	MELAKY	15,145 ha
wetlands of Bedo	12/05/07	MENABE	1,962 ha

### **Appendix III: Programs of thematic work and intersector issues**

The Parties are invited to submit a report on the implementation of the programs of thematic work and intersector issues of the Convention, more particularly those which are part of the pluriannual work program of Convention, for purposes of thorough examination of the eleventh and twelfth meetings of the Conference of the Parties. The Parties do not have to repeat in this appendix the information already provided in the report. The Parties can illustrate by means of a table or a grid the way in which the national measures taken to implement the SPANB and the objectives of 2020, and to integrate biological diversity , contributed or contribute to the objectives, the targets and the activities suggested in the thematic work programs and plans and decisions related to the intersector issues.

#### **Global Strategy for Plant Conservation**

#### **Madagascar Catalogues Contributions to the Global Strategy for Plant Conservation**

GSPC Targets	Mad Cat contributions
Target 1: Year online Flora of all known plants	<ul style="list-style-type: none"> <li>•In the last decade, <b>61,300 new collections</b> have been made through MBG' S program (Ca 50% of the total number of herbarium specimen at TAN), most in replicate so that duplicates can Be deposited in both of Madagascar' S national herbaria and in key international herbaria. All associated date have been entered into TROPICOS.</li> <li>•Within the last 10 years, over one hundred taxonomic revisions have been published by MBG staff, including the description of more than 400 <b>new species</b> Since MBG' S program began, the estimated number of plant species in Madagascar has risen from 8,000 to 13-14,000.</li> <li>•Currently the <i>Madagascar Catalogues</i> project contains <b>11,276 accepted species</b> (and has total of 26,306 taxa names), all carefully reviewed and validated, and linked to specimen dated, distribution Maps, and other significant resources. The <i>MadCat</i> also includes <b>4,015 references, 19,646 vernacular names, 15,232 photographs and 4,028 high standard resolution scans</b> of specimens, all fully available on-line.</li> </ul>
Target 2: Year assessment of the conservation status of all known seedling species, have far have possible, to guide conservation action.	<ul style="list-style-type: none"> <li>•Nearly 3,000 endemic species assessed, more than 2,600 submitted by the MPSG to IUCN for addition to the Red List.</li> <li>•Assessment completed of 350 species of medicinal and food seedlings.</li> <li>•Of publication has Red Data Book of Madagascar' S endemic seedlings species and has Guide to the 250 most threatened species (linked to Target 3).</li> <li>•Assessments completed of 20 species of <i>Diospyros</i> severely affected by the illegal logging; being compiled for assessments of Ca 30 dated 40 additional threatened species.</li> <li>•Training provided for Ca 50 let us persons (MPSG members, the conservation agent At some Protected Areas, students doing to their masters one risk of extinction study) in Red List methods.</li> </ul>
Target 3: Information, research and associated outputs, and methods necessary to implement the Strategy developed and shared	<ul style="list-style-type: none"> <li>•More than 200 seedling-themed articles appeared in room newspaper, WWF' S " Vintsy " Magazine, " Songadina " (Conservation International' S local new magazine), etc</li> <li>•10 key seedling topics, developed have PowerPoint presentations,</li> </ul>

	<p>produced have has Tool kit used for training 1,450 pupils in 9 schools and 700 people from 2 room communities.</p> <ul style="list-style-type: none"> <li>•MBG' S community-based efforts widely recognized have setting has new standard in Madagascar.</li> </ul>
<b>Target 4</b> (At least 15% of each ecological area standard gold vegetation secured through effective management and/or restoration ;  Target 5: At least 75 per hundred significant of the most areas for seedling diversity of each ecological effective area protected with management in place for conserving seedlings and to their genetic diversity.	<ul style="list-style-type: none"> <li>•78 PAPCs identified (complementing Madagascar' S existing network of parks and reserves)</li> <li>•Ten PAPCs targeted by MBG awarded " Temporary Protection " by the Malagasy government, the first step toward creating has new protected area</li> <li>• Eleven PAPCs (covering has wide arranges of vegetation and types has total area of 60,000 ha) now implementing community-based conservation projects involving has various program of activities, have defined by to their plane management.</li> </ul>
Target 7: At least 75 per hundred of known threatened seedling species conserved in situ.	Enable accurate calculation of the number and bore of Malagasy seedling species known to be conserved <i>in situ</i>
Target 8: At least 75 per hundred of threatened seedling species in ex-situ collections, preferably in the country of origin, and At least 20 per hundred available for recovery and restoration programs.	<ul style="list-style-type: none"> <li>• Of the 37 initially target species, 21 are now growing At Ivoloina Park and available for recovery and restoration</li> <li>•Stock of five species has already been used to reinforce wild populations</li> </ul>
Target 9: 70 per hundred of the genetic diversity of crops including to their wild relative and other socio-economically valuable seedling species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge.	Develop thematic Content, through the aggregation of Mad Cat Species Pages, pertaining to endemic crop wild relative species and other socio-economically valuable native species.
Target 10: Effective management plans in place to prevent new biological invasions and to manages significant areas for seedling diversity that are invaded.	Develop thematic Content, through the aggregation of Mad Cat Species Pages, pertaining to invasive alien seedling species.
Target 11: No species of wild Flora endangered by International trade.	Add to Mad Cat Species Pages year indication that has species is CITES listed to facilitate easy searching and aggregation.
<b>Target 12:</b> all wild harvested seedling-based products sourced sustainably  Target 13: Local Indigenous and knowledge innovations and practices associated with seedling resources, maintained gold increased, have appropriate, to support customary uses, sustainable livelihoods, room food security and health care.	All eleven of MBG' S new conservation areas now cuts committees that are implementing locally-conceived plans for the sustainable uses of natural resources, including seedlings. In most boxes we cuts recorded reduction in anarchic exploitation of these resources, goal has achievements to fragile date are and depend on the continuing intervention of MBG staff.
Target 14: The importance of seedling diversity and the need for its conservation incorporated into communication, education and public awareness programs.	<ul style="list-style-type: none"> <li>•To dates, five endangered seedlings twinned with five villages: <i>Poupartiopsispondiocarpus</i> for Soanierana-Ivongo, <i>Schizolaenalaurena</i> for Ambila-Lemaitso, <i>Chaetocarpusrabaraba</i> for Mahavelona, <i>Mantalanialongipedunculata</i> for Ambodifotora, and <i>Schizolaenatampoketsana</i> for Ankazobe.</li> <li>•To dates we cuts enabled the publication of more than 200 plant themed articles in national Malagasy newspapers, eight in the WWF Magazine " Vintsy ", two in Conservation International' S magazine " Songadina ", three books and 15 exits of the trimestral newsletter " Ravintsara " concerning the Malagasy Flora (see <a href="http://www.mobot.org/MOBOT/Research/madagascar/">http://www.mobot.org/MOBOT/Research/madagascar/</a>).</li> <li>•In 2010, our local staff animated 44 emissions by radio operator stations concerning seedling conservation.</li> <li>•To dates, we cuts supported environmental education activities at</li> </ul>

	<p>over one hundred schools including the provision of hundreds of hours of special let us lessons, the installation of furnace environmental libraries, organization of 22 nature rambles and organization of 54 workshops to train teachers in environmental education ;</p> <ul style="list-style-type: none"> <li>•To date we have conceived, produced and distributed 20 different t-shirts, 35 different posters and one Malagasy traditional dress concerning conservation and the Malagasy Flora ;</li> <li>•In 2010 we were the hand supporters for two biodiversity festivals and contributed botanical special input to 13 celebrations one day ;</li> <li>•Ten seedling-themed educational kits (including PowerPoint presentations, games, and posters) developed and used to train 1450 pupils in nine schools ;</li> </ul>
Target 15: The number of trained people working with appropriate facilities sufficient according to national needs, to achieve the targets of this Strategy.	<ul style="list-style-type: none"> <li>•Provision of extension to herbarium TAN At, roof repairs to herbaria at TAN and TEF, assist TAN and TEF to obtain funds for 74 new cabinets, mounting sheets and protective sleeves, provision of pay of two specimen TAN mountersat</li> <li>•Trained since the start of its program: <b>6</b> Malagasy students one PHD program, <b>21</b> Malagasy students to obtain professional degree in applied conservation management; students to obtain Masters qualification: <b>8</b> one estimating risk of extinction, <b>6</b> one seedling taxonomy, <b>19</b> one seedling ecology, <b>4</b> one ethnobotany and <b>11</b> obtained qualification after the training program. Most of these graduates cuts found employment that makes full uses of to their training.</li> <li>•<b>20</b> room collectors cuts trained since 1990. Have has field botanists, they cut unrivaled knowledge in this domain.</li> </ul>
Target 16: Institutions, networks and partnerships for seedling conservation established and strengthened national At, regional and international levels to achieve the targets of this Strategy.	<ul style="list-style-type: none"> <li>•In Madagascar we are regularly <b>contributing our botanical knowledge</b> to the following organizations: GSPM (Group of Spécialistes des Plantes of Madagascar), ARSIE(Association of Network of the Environmental Information systems), REPC (Network of the Teachers and Professional of the Conservation), HNI (Human Network Initiative), Ranon' Ala, Cwr (Crop Wild Relative), TBE (Environmental Dashboard), SAPM Process (System Surfaces Protected from Madagascar), TAMS (Tetik' Asa Mampody Savoka), CHM (Clearing House Mechanism), REBIOMA (Network of Biodiversity of Madagascar).</li> <li>•partnership established (Wash U, Blessing Basket...)</li> </ul>

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**Program of work on the Protected Areas**

**NATIONAL PROFILE ON THE IMPLEMENTATION OF PROGRAM  
OF WORK ON THE PROTECTED AREAS**

**Program of work on the Protected Areas**

**NATIONAL PROFILE ON THE IMPLEMENTATION OF PROGRAM  
OF WORK ON THE PROTECTED AREAS**

<b>COUNTRY:</b>	<b>MADAGASCAR</b>	
Name of the person completing the investigation:		
E-mail address of the person completing the investigation:		
Date on which the investigation was completed:	<b>February 17 2014</b>	
Describe briefly who was involved in the collection of information for this investigation	<b>All Promoters Of NAPs</b>	
1) Was a multipartite Consultative Committee trained to implement the program of work on the protected areas?	<b>YES</b>	
2) Is there a strategic plan to implement the program of work on the protected areas?	<b>YES</b>	
3) If so, please provide a URL (or enclose a pdf file) of strategic action plan:	<b>List of activities for POWPA (see statement)</b>	
4) If so, what is the principal organization in charge of the implementation of the strategic plan?	<b>DCBSAP and protected areas promoters</b>	

<b>1.1 PROTECTED AREA NETWORK</b>			
1) What progress have you made in the evaluation of the representativeness and the ecological gaps of your network of protected areas?		<b>4: national evaluation (Zonation and Marxan at the national level with Rebioma)</b>	
2) If you carried out an evaluation of the ecological gaps, please indicate the URL (or enclose a pdf file) of the report:		<b>Atlas Rebioma Article published in PARKS Plan GRAP in the course of updating Ecological profile APAPC (Priority areas for plant conservation)</b>	
3) Do you have precise objectives and indicators for the system of protected areas?		<b>YES</b>	
4) If so, please provide a URL (or enclose a pdf file) objectives and indicators		<b>Document of Orientation Vision Durban Strategic plan MNP</b>	
5) What measures were taken to increase the ecological representativeness of the network of protected areas? Please tick the suitable boxes and provide one short description:			
<input checked="" type="checkbox"/>	<b>MEASURE</b>	<b>FROM 2004 to 2009</b>	<b>SINCE 2010</b>

X	Creation of new protected areas	Several terrestrial APs and AMPs were created from 2005 to 2009 WWF: Ankodida 2006 North Ifotaka 2006 Amoron' I Onilahy 2007 Ranobe Pk32 2008 Area put in temporary protection : 93 NAP	The creation of the new APs continue from 2010 until now MBG: Ampasindava Galoko (188,000 ha) MNP: 04 NAP created (Nosy Tanikely, Sahamalaza, Nosy Hara, Mikea) - final WCS: Makira Continuation of the process of final creation of 92 NAP
X	Expansion and/or reconfiguration of the limits of the existing protected area	Expansion of existing Aps managed by MNP	MNP: 11 AP (in progress) TPF: Manambolomatry in Tsimembo- Manambolomatry
X	Change of the legal statute and/or the type of governance of the protected areas.		Change of the type of governance especially for APs managed by MNP: 02 AP (Lokobe, Bemaraha: Become RNI National parks)
	Other measures aiming at increasing the representativeness of the network		Private protected areas (Salary Bay, Ranopiso, Lemuria lands) and Community reserves (Ankafobe initiate by MBG)

## 1.2 CONNECTIVITY AND INTEGRATION OF PROTECTED AREAS

1) What progress did you make in the evaluation of connectivity and the integration of the protected areas?		4
2) If you carried out an evaluation of the ecological gaps, please indicate the URL (or enclose a pdf file) of the report:		Pgi Fha (Wet Forest Atsinanana) – patrimony site Nap Sapm Chart
3) What measures were taken to improve connectivity and integration of the protected areas? Please tick the suitable boxes and provide short description:		
✓	MEASURE	FROM 2004 to 2009
	Change of the legal statute and/or the governance in key zones of connectivity	MNP: development of Coadministration policy collaborative type (COSAP at FHA level) WWF: COBA/TGRN with COMATSA
X	Creation of new protected areas in the connectivity key zones	Ci: Several Protected areas were created in the connectivity key zones (Corridors) Several protected areas were created in the connectivity zones (Corridors) WWF-MNP: NAP COMATSA (process of acquisition of the temporary statute in final course envisaged at the end of 2014)

	Improvement of the natural resource management to improve connectivity		<b>MNP: Installation of TGRN green belt NAP: integration of TGRN in categories 5 or 6</b>
X	Designation of corridors and/or plugs of connectivities	yes	Yes (ex: COMATSA)
X	Creation of incentives of market to promote connectivity		<b>Ci: Especially within the framework of the market of carbon. We can take the example of the Tetikasa project. Mampody Savoka (CAZ) and Sla (Sustainable Livelihood activities at CAZ)</b>
	Sensitization of the principal stakeholders in the connectivity key zones	yes	<b>Yes (ex; TPF: creation of platform of local associations in terms of management of natural resources ) MNP: Plan of Integrated Wet Forest Management of Atsinanana</b>
	Improvement of the laws and the policies inside or around the connectivity key zones		<b>Dina elaborated and approved by site (TPF, WWF, MNP)</b>
X	Restoration of the degraded areas in the connectivity key zones		<b>Ci: Identification of the priority zones of restoration for the whole of Madagascar MNP: cf report MNP WWF: restoration at the COFAM and COMATSA level</b>
	Change of the plug and/or zoning, regional planning in the connectivity key zones		<b>Yes (Mnp, Wwf: Update PAG)</b>
	Elimination of the barriers of connectivity and ecological operation		<b>No information</b>
X	Integration of the protected areas in the strategies for poverty reduction	Yes (Map, DSRP)	<b>SNAT Srat (Alaotra Mangoro, Analanjirofo, Melaky, Diana, Sava, Amoron' I Handek, Atsinanana, Vakinankaratra, Atsimo Atsinanana, Atsimo Andrefana)</b>
	Other measures to improve connectivity and integration		

### 1.3 REGIONAL NETWORKS OF PROTECTED AREAS AND TRANSBORDER AREAS

1) What progress have you realized in the identification of conservation priorities and the common possibilities of creation of transborder protected areas?	<b>4 (Strategy WIOMER and priorisations, networks</b>
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		AMP; Northern Mozambique Channel) – WWF, CI, WCS Mangroves Network
2)	If you carried out an evaluation of the possibilities of transborder protected areas, please indicate the URL (or enclose pdf file) of the report:	(URL OR ENCLOSURES)
3) What measures were taken to consolidate the regional network of protected areas and to support the creation of transborder protected areas?		
√	MEASURE	FROM 2004 to 2009
	Creation of protected transborder areas	
	Contribution to the creation of corridors of conservation on a national scale	
	Formulation of policies favourable to the creation of protected transborder areas	
	Setting-up of a mechanism of multi-country coordination	Within the framework of RAMPCOI project Network of marine protected areas from the COI.
	Other measures aiming at supporting the regional networks and the transborder area	WWF, CI, WCS: installation of NMC landscape

1.4 PLANNING OF THE MANAGEMENT OF THE PROTECTED AREAS			
√	MEASURE	FROM 2004 to 2009	SINCE 2010
	1) What percent of your protected areas has an adequate management plan?	3	
	2) Please provide the URL (or enclose a pdf file) of a recent example of participative and scientific management plan		Cf. TPF : PAG
	3) What measures were taken to improve the planning of the management of the protected areas? Please tick the suitable boxes and provide short description:		
√	MEASURE	FROM 2004 to 2009	SINCE 2010
X	Development of hot lines and tools for the elaboration of management plans	Production of guide and Framework for the elaboration of management plan	Use of the MIRADI software PAG Guide updated for category 5 and 6
X	Has provided a training and/or a technical support in management planning	TPF: Miradi by WWF Miaro	Collaboration between DCBSAP and REPC: reinforcement of capacity of Protected Area managers
X	Elaboration of management plans of protected areas	TPF : 3 NAP	MNP: 35 PAG WWF: 4 (Ankodida, Ifotaka, Onilahy, Ranobe Pk32) TPF: 2 updated PAG Each AP must have a Management Plan In general, almost all the protected areas update their PAG

	Change of the legislation or the policy to reinforce the management planning		<b>Management Code of the Protected Areas:</b> in the course of promulgation and signature by the new president (decree of enforcement) <b>Interdepartmental committee with land</b> <b>Decree of creation of Sapm Commission</b>
X	Improvement of the scientific base of the existing management plans	TPF : RAP and Miradi	Ci: complementary Inventory for some APs (ex: RAP marine east coast of Diégo) WWF: inventory and analyses of vulnerability (Nosy Hara, Ambodivahibe, Mountain of French, Oronjia) MNP: MIRADI, 5STNC TPF: MIRADI MRPA: reference inventory MRPA: Data Base
X	Control of inventories of the resources of the protected areas	TPF : RAP	Yes (see above)
	Other measures aiming at improving the planning		ecological follow-up

1.5 THREATS ON THE PROTECTED AREAS			
MEASURE		FROM 2004 to 2009	SINCE 2010
√	Change of the statute and/or the type of governance of a protected area		MNP: Integration Park local Committee COBA/TGRN
X	Increase in the personnel and/or their competences in order to attenuate the threats		MNP: new policy RH Training of the managers AP and communities within REPC framework (WCS) Training of the managers of AMP on the vulnerability Of DC (WCS, WWF, Ci N BV, WIOCC) Recruitment of new agents for the NAP Standard of competence (REPC) on the

			management of the AP Training and certification program (REPC)
X	Inclusion of measures aiming at countering the threats in a plan of management		PAG and PGESS (The quality of life of population is improved by the sustainable use of natural resources (fight against poverty)) Measures aiming at reinforcing the ecological and socio-economic impact strength (with respect to their vulnerability in general) of AP (WWF)
X	Improvement of the practices of management in order to prevent or reduce the threats		Clp Integration (MNP) Capacity reinforcement of basic communities in sustainable matter of agriculture, durable use of resources, (Ci) Installation of forest guard "polisin' ala " (MBG, WWF...) Reinforcement of the participative follow-up system (TPF, Durrell, MBG, Asity)
	Increase in the financing of the attenuation of the threats		The World Bank (Mnp: H/J paid CLP) Fapbm, UNDP Gef, Tany Meva, various foundations (ex: MBG, Asity)
X	Elaboration of an impact strength plan and adaptation to the climate change		Adaptation of the biodiversity to DC (Ci) Measures aiming at reinforcing the ecological and socio-economic impact strength of AP (WWF).

X	Change of the incentives of market to reduce or prevent the threats		<b>Carbon market (Ci, WWF, WCS...)</b> <b>Ecotourism, Priority market at the level of sites (Mnp, Fanamby)</b> <b>Rainforest alliance (MBG)</b> <b>Sale of tortoises from Mauritius to lower the pressure of demand (DVRN)</b>
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X	Improvement of the control and the detection of the threats		<b>Participative follow-up (IDEM)</b> <b>Satellite follow-up of the traffics of rosewood</b> <b>Improvement followed by fires</b> <b>Evolution of the forest cover (1990-2010) (see MNP/ONE)</b> <b>Skimming through of the NAP and Photograph shooting/analysis followed by on-the-spot sensitization and confrontation (WWF, MNP) AVG: network of information and toll-free number (512)</b>
	Evaluation of the effectiveness of measures related to the threats		5 STNC, MIRADI (MNP and others)
	Increased sensitization and better behaviour of the public in the field of the threats		Yes (on-the-spot sensitization and confrontation afterwards skimming through, CLP, coadministration)
	Change of the laws and the policies related to the threats		<b>Rosewood (HAT)</b> <b>Internal Penal policy of the Justice (see WWF)</b> <b>Rosewood in CITES appendix II</b>
X	Restoration of the degraded areas		<b>Restoration within the framework TAMS (CI)</b> <b>Ecological restoration (MBG)</b> <b>Afforestation (Wwf)</b> <b>MNP Report (statistics)</b> <b>Reforestation Program (TPF)</b>

	Development and/or implementation of strategies for attenuation of threats		<b>AGR, Collaboration with WFP (food for work, MBG, WWF) Statistics MNP / AGR PGES (TPF)</b>
	Other measures aiming at attenuating or preventing the threats		Application of the local dina and " dinam-paritra " (WWF)
<b>2.1 EQUITY PROFITS AND GOVERNANCE</b>			
1)	What progress have you made in the costing and the profits from the establishment of protected areas?		
2)	If you carried out a costing and benefit from the protected areas, please indicate the URL (or enclose a pdf file) of the report:		
3)	What measures were taken to improve the equitable sharing of the benefits? Please tick the suitable boxes and provide a short description		
✓	MEASURE	FROM 2004 to 2009	SINCE 2010
X	Development of mechanisms of compensation		PGESS
	Formulation and/or application of policies of access and benefit sharing	MNP: 50% DEAP WWF: PA-BAT TPF: Nap Bemanevika: 100% of entrance fee from tourism are deposited in the account of Coba	<b>Letter of national policy on the APA (WISE)</b> <b>Project of text in progress (WISE)</b>
X	Development of mechanisms of equitable benefit sharing	MNP : 50% DEAP	Ecotourism (statistics): 50% of the entrance fee in the Protected areas) REDD+: presence of a decree (cf Makira)
X	Use of the profits from protected areas in the fight against poverty	MNP : 50% DEAP	WAVES: Assessment of the value of the ecosystems services
	Other measures aiming at reinforcing the equitable benefit sharing		Idem
4)	What progress was made in the evaluation of the participation of the native and local communities in principal decisions concerning the protected areas?		

5) What percent of the protected areas is assigned one category of the UICN?			100%
6) If you have finished an evaluation of the governance of protected areas, please indicate the URL (or enclose a pdf file):			Stocktaking Usaid Cf decree of creation
7) What measures were taken to improve and diversify the types of governance? Please tick the suitable boxes and provide a short description			
✓	MEASURE	FROM 2004 to 2009	SINCE 2010
X	Creation of new protected areas with innovative forms from governance	CI, WWF: Community Governance and Divided Governance MNP: Structure of management implying the communities: case SML, NSH, MRL, MKA Community patrimony areas (SGP)	Community Governance and Divided Governance MNP: Structure of management implying the communities: case SML, NSH, MRL, MKA Community patrimony areas (SGP)
X	Change of the laws and/or the policies to allow new types of governance	Ci: Decree 248/2005	Amendment of the COAP (in the course of promulgation)
X	Legal recognition of a large group of types of governance		Decree of application COAP (in progress).
	Other measures aiming at diversifying the types of governance	WWF: Ankodida and Ifotaka: TGRN as key unit of governance within the AP	

2.2 NATIVE AND LOCAL COMMUNITIES			
1) What progress was made in the evaluation of the participation of the native and local communities in principal decisions concerning the protected areas?			4
2) If an evaluation of the Community participation were carried out, please indicate the URL (or enclose a pdf file) of the report:			MNP: Cf Functional framework and PDPA MKA PAG, Annual reports
3) What measures did you take to increase the participation of the native and local communities? Please tick the suitable boxes and provide a short description:			
✓	MEASURE	FROM 2004 to 2009	SINCE 2010
X	Improvement of the laws and/or the policies in order to promote the participation	TPF: 3 Elaborated dina and specifications	LMMA (Ci, WCS, BV...) Functional framework MKA (MNP)
	Elaboration of policies as regards preliminary assent knowing the fact for the reinstallation		Functional framework Safeguards prohibiting human displacement World Bank policy
X	Improvement of the mechanisms of participation of the native and local communities		PGEES Right Based approach for CI Dina Coba
X	Increase in the participation of the native and local communities in principal decisions	WWF: coadministration	framework (MNP Dina Coba

	Other measures aiming at promoting the participation	

### 3.1 INSTITUTIONAL AND SOCIO-ECONOMIC POLITICAL FRAMEWORK

1) What progress was made in the evaluation of the political framework for the creation and the management of the protected areas?		<b>3 (COAP, oil Code)</b>	
2) If an evaluation of the political framework of the protected areas were carried out, please indicate the URL (or enclose a pdf file) of the report:		<b>(URL OR ENCLOSURE) Policy of concession MNP</b>	
3) What measures were taken to improve the political framework of the protected areas? Please tick the suitable boxes and provide a short description			
√	<b>MEASURE</b>	<b>FROM 2004 to 2009</b>	<b>SINCE 2010</b>
X	Harmonization of the policies or sectorial laws to reinforce the effectiveness of management	Ci: Mines, oil, land (?)	<b>COAP, Oil Code, forestland committee, AP-hydrocarbon committee</b>
X	Integration of the values and the ecological services in national economy		<b>WAVES</b>
	Increase in the responsibility and/or participation in the decision-making		COE, COS, COM inter Min Accession of Madagascar to IPBES (SCGAP)
	Development of mechanisms of incentive to the creation of private protected areas		No information
X	Development of positive inciting measures on the market to support the protected areas		Development of the Contracts of Conservation with local communities. These tools help to extend the conservation in the buffer zone of APs. (Ci) Development sectors Financing of the activities of development through NODE. (Ci) REDD+ (MNP: MRL, ABV, WCS) Offset (Ambatovy, Mbg, Asity, QMM etc)
	Elimination of the incentives with perverse effects which block an effective management		
X	Reinforcement of the legislation for the establishment and the management of the protected areas		<b>Idem</b>
	Co-operation with the neighbouring countries on the transborder areas		
	Installation of mechanisms and equitable procedures of disagreements payment		Plan of Social and Environmental Safeguard / Mnp, Plan of Environmental Management and Social Safeguard / Nap

	Other measures taken to improve the political framework		
4)	What progress was made in the evaluation of the contribution of the protected areas to the national economy?		2
5)	If an evaluation of the economic contribution of the protected areas were carried out, please indicate the URL (or enclose a pdf file) of the report:		MNP Statistics on Ecotourism Annual reports
6)	What measures were taken to evaluate the contribution of the protected areas? Please tick the suitable boxes and provide a short description		
√	<b>MESURE</b>	<b>DE 2004 à 2009</b>	<b>DEPUIS 2010</b>
	Implementation of a communication campaign to evaluate the protected areas		
	Creation of mechanisms of financing related to the values of the protected areas		FAPBM MNP: priority market, MNP strategic plan Significant increase in the financing percentage towards the support to socio-economic development of the Community (TPF)

### 3.2, 3.3 et 3.5 CAPACITIES, TECHNOLOGY AND EDUCATION AS REGARDS PROTECTED AREAS335

1)	What progress was made in the assessment of capacity requirements as regards protected areas?	4
2)	If a requirement assessment in capacities as regards protected areas were carried out, please indicate the URL (or enclose a pdf file):	MNP: Cf Statistics and RH training plan Repc Standard MNP: Cf Statistics and RH training plan <b>REPC Standard</b>

3) What measures were taken to improve the capacities, the use of suitable technologies and/or to develop the programs of education?  
Please tick the suitable boxes and provide a short description:

√	<b>MEASURE</b>	<b>FROM 2004 to 2009</b>	<b>SINCE 2010</b>
X	Creation of a programme of professional development for the personnel of protected areas		REPC MNP training plan
X	Staff training of the protected areas	WWF: training on management planning of program and project (MIARO) TPF : X	Statistics MNP training report REPC

	Increase in the total number of the protected areas		Statistics of the Human Resources MNP and NAP
	Creation of the value estimate system and traditional knowledge exchange.		
X	Elaboration of programmes of studies on the protected areas in collaboration with the training establishments.		REPC: Training and certification program with ESSA-Forsts and et DBA MNP: IHSM/MNP
X	Production of the public information material		Production of posters, factsheets, booklets, films
X	Conduct of the public information programmes		Media MNP: statistics green class and plea Green Picnic (MBG) Biodiversity day JMB, JME, JMZH
	Creation of exchange mechanisms of the drawn lesson		MNP: green school report and plea
	Other measures aiming at reinforcing the capacities.		

### 3.4 VIABLE FINANCING

1) What progress was made in the requirement assessment for viable financing of the Protected areas?	2
2) If an evaluation of the protected area financial viability or system were realized, please indicate the URL (or enclose a pdf file) of the report:	FAPBM financing convention with promoters Business Plan (cf Ci, MBG)

3) What measures were taken to increase the financial viability of your protected areas? Please tick the suitable boxes and provide a short description			
✓	MEASURE	FROM 2004 to 2009	SINCE 2010
X	Creation of new financing mechanisms for the protected areas	Fund Trust, Ecotourism, Carbon	Trust Fund, Ecotourism, Carbon
X	Elaboration of business plans for the protected areas		Training and elaboration of business plan (MNP in progress) Businesses Plan (TPF; MBG, Asity etc;)
X	Creation of a mechanism of income sharing		MNP: 50% DEAP Cf above
	Improvement of the procedures of resource allocation		MNP: Procedure Handbook
X	Supply of training and support as regards financing		MNP: Training Small investment P, policy of concession Training in Fund Raising (Ci)
	Improvement of budgeting process		See above Plan Work Annual to budget standard, Rap single standard
	Improvement of accountancy and monitoring		MNP: installation of audit unit Management
	Improvement of financial planning		Standard PTAB, Rap standard unique
	Elimination of the legal barriers to the viable financing		
	Clarification of interinstitution tax responsibilities		
	Other measures aiming at increasing financial viability		

#### 4.1 et 4.2 MANAGEMENT EFFECTIVENESS AND BETTER PRACTICE

1) What progress was made in the evaluation of the effectiveness of the management of the protected areas?	<b>3 (4 MNP and 2 for NAP)</b>
2) If an evaluation of the effectiveness of the management of the protected areas were carried out, please indicate the URL (or enclose a pdf file) of the report:	<b>MNP: Cf evolution IEG Cf Annual reports / indicators</b>

3) What percent of your protected areas was evaluated for the effectiveness of management?		<b>50% (100% MNP, 40% NAP)</b>	
4) What measures were taken to improve the processes of management in the protected areas? Please tick the boxes			
√	MEASURE	FROM 2004 to 2009	SINCE 2010
	Improvement of the systems and management processes.		Participative system (idem)
X	Improvement of the law enforcement		IDEML

X	Improvement of the relationships with stakeholders	CLP, BM, COSAP WWF : OPCI, UMG, CGP TPF : COE
	Improvement of the management of visitors	MNP: training of guides, improvement of the reception system Single Gichel WWF, FANAMBY: collaboration with private operator.
X	Improvement of the natural and cultural resource management	Clp/cosap, Coba, patrimony FHA Coba: participative follow-up and monitoring (Durre ll etc)
	Other measures aiming at increasing the effectiveness	Mobilization of patrols by Polisin' ala (forest guard), KASTI

#### 4.3 et 4.4 FOLLOW-UP AND RESEARCH.

1) What progress was made in the identification of essential requirements of research and monitoring in the whole system of protected areas?	3
2) If an essential need assessment for research were carried out, please indicate the URL (or enclose a pdf file) of the report:	MNP: Cf Research topic per site PAG, Annual reports

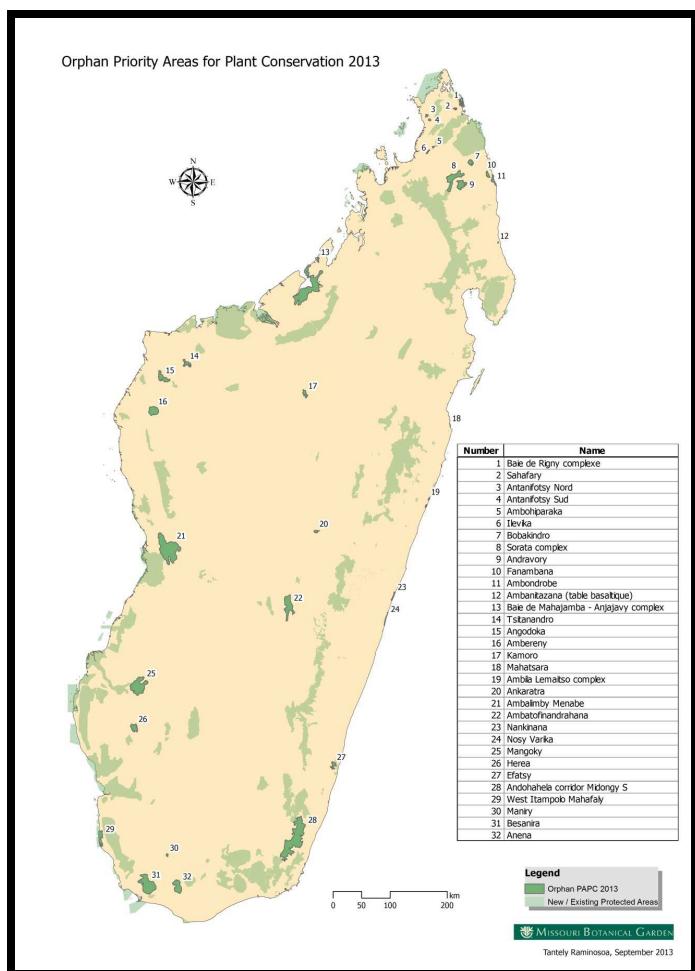
3) What measures were taken to improve the research and the monitoring of the protected areas? Please tick the boxes adapted and provide a short description:

√	MEASURE	FROM 2004 to 2009	SINCE 2010
X	Evaluation of the state and the evolution of the key biodiversity	TPF: Ecological follow-up water birds	MNP: calculation of the level of threat Viability of the targets (Miradi) (WWF) Ecological follow-up of the target species of conservation and other species (TPF, MBG, GERP, MNP etc)

X	Elaboration or improvement of a program of biological monitoring	TPF: Program of de ecological follow-up	IDEM participative ecological follow-up WWF, MNP: flight over and on-the-spot confrontation MNP, WCS: Ecological Smart, protocol
	Improvement of research on the socio-economic issues related to the protected areas		PAG, PGESS gives baseline
	Promotion of the diffusion of research on the protected areas	TPF: Publications in scientific newspapers	Publications in scientific newspapers
X	Revision of the plan of management based on the results of monitoring and/or of research		Update PAG from results of research
	Change of the management practices based on the results of monitoring and/or research.		MNP: tiling of the AP for to facilitate monitoring
	Other activities of follow-up and research		

## Appendix Iv Other Appendices

### Orphan sites of conservations of endemic plant families not yet present in protected areas



(MBG, 2013)

### Species belonging to the Malagasy endemic families not yet included in the MPAS

Familles	Espèces
Sphaerosepalaceae	<i>Dialycerasdiscolor</i> J.-F. Leroy
Sphaerosepalaceae	<i>Rhopalocarpusmollis</i> G.E. Schatz & Lowry
Sarcolaenaceae	<i>Leptolaenaraymondii</i> G.E. Schatz & Lowry
Sarcolaenaceae	<i>Perrierodendroncapuronii</i> J.-F. Leroy, Lowry, Haev., Labat& G.E. Schatz
Sarcolaenaceae	<i>Perrierodendronodoense</i> J.-F. Leroy, Lowry, Haev., Labat& G.E. Schatz
Sarcolaenaceae	<i>Rhodolaenamacrocarpa</i> G.E. Schatz, Lowry & A.-E. Wolf
Sarcolaenaceae	<i>Sarcolaenahumbertiana</i> Cavaco
Sarcolaenaceae	<i>Schizolaenacapuronii</i> Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf
Sarcolaenaceae	<i>Schizolaenamillieri</i> Lowry, G.E. Schatz, J.-F. Leroy & A.-E. Wolf
Sarcolaenaceae	<i>Schizolaenaraymondii</i> Lowry & Rabehivitra
Sarcolaenaceae	<i>Schizolaenaviscosa</i> F. Gérard
Sarcolaenaceae	<i>Xyloolaenaspeciosa</i> Lowry & G.E. Schatz

### NEW SPECIES OF FAUNA DESCRIBED UNTIL 2010

Group	Family	Species
FOURMIS	FORMICIDAE	<i>Crematogaster mahery</i>

Group	Family	Species
		<i>Crematogaster malala</i>
		<i>Crematogaster sabatra</i>
		<i>Crematogaster sisal</i>
		<i>Paraparatrechina myops</i>
		<i>Paraparatrechina ocellatula</i>
		<i>Tetramorium mahafaly</i>
		<i>Adetomyrma aureocuprea</i>
		<i>Adetomyrma bressleri</i>
		<i>Adetomyrma caputleae</i>
		<i>Adetomyrma cassis</i>
		<i>Adetomyrma caudapinnigera</i>
		<i>Adetomyrma cilium</i>
		<i>Adetomyrma clarivida</i>
		<i>Adetomyrma goblin</i>
		<i>Crematogaster mpanjono</i>
		<i>Crematogaster razana</i>
		<i>Crematogaster telolafy</i>
		<i>Crematogaster volamena</i>
		<i>Simopone consimilis</i>
		<i>Simopone dignita</i>
		<i>Simopone dux</i>
		<i>Simopone elegans</i>
		<i>Simopone fera</i>
		<i>Simopone inculta</i>
		<i>Simopone merita</i>
		<i>Simopone nonnihil</i>
		<i>Simopone rex</i>
		<i>Simopone sicaria</i>
		<i>Simopone silens</i>
		<i>Simopone trita</i>
		<i>Simopone victrix</i>
		<i>Tanipone aglandula</i>
		<i>Taniponeaversa</i>
		<i>Tanipone cognata</i>
		<i>Tanipone hirsuta</i>
		<i>Tanipone maculata</i>
		<i>Tanipone pilosa</i>
		<i>Tanipone scelestia</i>
		<i>Tanipone subpilosa</i>
		<i>Tanipone varia</i>
		<i>Tanipone zona</i>
		<i>Tetramorium adamsi</i>

Group	Family	Species
		<i>Tetramorium ahenri</i>
		<i>Tetramorium ala</i>
		<i>Tetramorium ambanizana</i>
		<i>Tetramorium ambatovy</i>
		<i>Tetramorium andohahela</i>
		<i>Tetramorium ankarana</i>
		<i>Tetramorium artemis</i>
		<i>Tetramorium avaratra</i>
		<i>Tetramorium bonibony</i>
		<i>Tetramorium elf</i>
		<i>Tetramorium hector</i>
		<i>Tetramorium isoelectrum</i>
		<i>Tetramorium jedi</i>
		<i>Tetramorium kali</i>
		<i>Tetramorium mackae</i>
		<i>Tetramorium malagasy</i>
		<i>Tetramorium mallenseana</i>
		<i>Tetramorium marojejy</i>
		<i>Tetramorium nazgul</i>
		<i>Tetramorium nify</i>
		<i>Tetramorium noeli</i>
		<i>Tetramorium norvigi</i>
		<i>Tetramorium nosybe</i>
		<i>Tetramorium olana</i>
		<i>Tetramorium orc</i>
		<i>Tetramorium popell</i>
		<i>Tetramorium robitika</i>
		<i>Tetramorium ryanphelanae</i>
		<i>Tetramorium sabatra</i>
		<i>Tetramorium sada</i>
		<i>Tetramorium sargina</i>
		<i>Tetramorium shamshir</i>
		<i>Tetramorium silvicola</i>
		<i>Tetramorium singletonae</i>
		<i>Tetramorium smaug</i>
		<i>Tetramorium trafo</i>
		<i>Tetramorium tsingy</i>
		<i>Tetramorium tyrion</i>
		<i>Tetramorium valky</i>
		<i>Tetramorium voasary</i>
		<i>Tetramorium vohitra</i>
		<i>Tetramorium vony</i>

Group	Family	Species
		<i>Tetramorium wardi</i> <i>Tetramorium yammer</i> <i>Crematogaster alafara</i> <i>Crematogaster bara</i> <i>Crematogaster hafahafa</i> <i>Crematogaster hazolava</i> <i>Crematogaster mafybe</i> <i>Crematogaster malahelo</i> <i>Crematogaster masokely</i> <i>Crematogaster ramamy</i> <i>Crematogaster tavaratra</i> <i>Crematogaster tsisitsilo</i> <i>Meranoplus cryptomys</i> <i>Meranoplus sylvarius</i> <i>Pachycondyla agnivo</i> <i>Pachycondyla antsiraka</i> <i>Pachycondyla daraina</i> <i>Pachycondyla gorogota</i> <i>Pachycondyla haratsingy</i> <i>Pachycondyla ivolo</i> <i>Pachycondyla kipyatkovi</i> <i>Pachycondyla maeva</i> <i>Pachycondyla masoala</i> <i>Pachycondyla mialy</i> <i>Pachycondyla nosy</i> <i>Pachycondyla planicornis</i> <i>Pachycondyla rovana</i> <i>Pachycondyla tahary</i> <i>Pachycondyla tavaratra</i> <i>Pachycondyla vazimba</i> <i>Pachycondyla vohitravo</i> <i>Pachycondyla zoro</i>
AMPHIBIA	MANTELLIDAE	<i>Boophis arcanus</i> <i>Boophis calcaratus</i> <i>Boophis entingae</i> <i>Boophis haingana</i> <i>Boophis luciae</i> <i>Boophis miadana</i> <i>Boophis piperatus</i> <i>Boophis praedictus</i> <i>Boophis quasiboehmei</i> <i>Boophis roseipalmatus</i>

Group	Family	Species
		<i>Boophis sandrae</i> <i>Boophis spinophilis</i> <i>Boophis tsilomaro</i> <i>Blommersia angolafa</i> <i>Blommersia dijongi</i> <i>Blommersia galani</i> <i>Blommersia variabilis</i> <i>Gephyromantis atsingy</i> <i>Gephyromantis hintelmannae</i> <i>Gephyromantis mafy</i> <i>Gephyromantis ranjomavo</i> <i>Gephyromantis tahotra</i> <i>Guibemantis annulatus</i> <i>Guibemantis tasifotsy</i> <i>Guibemantis wattersoni</i> <i>Mantidactylus paidroa</i> <i>Anodonthyla emilei</i> <i>Anodonthyla hutchisoni</i> <i>Anodonthyla jeanbai</i> <i>Anodonthyla theoi</i> <i>Anodonthyla vallani</i> <i>Platypelis olgae</i> <i>Platypelis ravus</i> <i>Rhombophryne mangabensis</i> <i>Rhombophryne matavy</i> <i>Stumpffia analamaina</i> <i>Stumpffia be</i> <i>Stumpffia hara</i> <i>Stumpffia megsoni</i> <i>Stumpffia miery</i> <i>Stumpffia staffordi</i>
REPTILES	GEKKONIDAE	<i>Blaesodactylus ambonihazo</i> <i>Phelsuma roesleri</i> <i>Uroplatus finiavana</i>
		<i>Brookesia brunoi</i> <i>Brookesia confidens</i> <i>Brookesia desperata</i>
		<i>Brookesia micra</i> <i>Brookesia tristis</i> <i>Calumma tarzan</i> <i>Calumma vohibola</i> <i>Furcifer major</i>

Group	Family	Species
	SCINCIDAE	<i>Amphiglossus meva</i>
		<i>Madascincus arenicola</i>
		<i>Paracontias fasika</i>
		<i>Paracontias vermisaurus</i>
		<i>Sirenoscinkus mobydick</i>
	LAMPROPHIIDAE	<i>Liophidium pattoni</i>
		<i>Madagascarophis fuchsi</i>
BIRD	RALLIDAE	<i>Mentocrex beankaensis</i>
BATS	MOLOSSIDAE	<i>Chaerephon atsinanana</i>
	MINIOPTERIDAE	<i>Miniopterus egeri</i>
	EMBALLONURIDAE	<i>Coleura kibomalandy</i>
	VESPERTILIONIDAE	<i>Neoromicia robertsi</i>
CARNIVORA	EUPLERIDAE	<i>Eupleres major</i>
		<i>Salanoia durrelli</i>
PRIMATES	CHEIROGALEIDAE	<i>Microcebus gerpei</i>
		<i>Microcebus tanosi</i>
		<i>Microcebus marohita</i>
		<i>Cheirogaleus lovaensis</i>

### New species of flora described since 2010

Famille	Espèce
Acanthaceae	<i>Anisotes hygroscopicus</i>
	<i>Anisotes perplexus</i>
	<i>Anisotes subcordiaceus</i>
	<i>Anisotes venosus</i>
Achariaceae	<i>Prockiopsis grandis</i>
	<i>Prockiopsis razakamalalae</i>
Anacardiaceae	<i>Spondias tefyi</i>
Anisophylleaceae	<i>Anisophyllea madagascariensis</i>
	<i>Anisophyllea masoalensis</i>
	<i>Anisophyllea parafallax</i>
	<i>Anisophyllea schatzii</i>
Annonaceae	<i>Uvaria lombardii</i>
Apocynaceae	<i>Calyptanthera viridiflava</i>
Araceae	<i>Amorphophallus perrieri</i>
	<i>Carlephyton darainense</i>
Arecaceae	<i>Dypsis andilamenensis</i>
	<i>Dypsis anjae</i>
	<i>Dypsis betsimisirakaе</i>
	<i>Dypsis culminis</i>
	<i>Dypsis dracaenoides</i>

	<i>Dypsis gautieri</i>
	<i>Dypsis gronophyllum</i>
	<i>Dypsis jeremieei</i>
	<i>Dypsis lilacina</i>
	<i>Dypsis metallica</i>
	<i>Dypsis pustulata</i>
	<i>Dypsis reflexa</i>
	<i>Dypsis sancta</i>
	<i>Dypsis subacaulis</i>
	<i>Dypsis vonitrandambo</i>
	<i>Ravenea beentjei</i>
	<i>Ravenea declivium</i>
Asteraceae	<i>Oliganthes anjanaribensis</i>
Begoniaceae	<i>Begonia masoalaensis</i>
Bignoniaceae	<i>Colea labatii</i>
	<i>Colea unifoliolata</i>
	<i>Ophiocolea ambrensis</i>
	<i>Ophiocolea darainensis</i>
	<i>Ophiocolea pauciflora</i>
	<i>Ophiocolea ratovosonii</i>
	<i>Rhodocolea humbertii</i>
	<i>Rhodocolea magnifica</i>
	<i>Rhodocolea parvifoliolata</i>
	<i>Rhodocolea ranirisonii</i>
	<i>Stereospermum gentryi</i>
	<i>Stereospermum randrianaivoi</i>
Blechnaceae	<i>Blechnum bonapartei</i>
	<i>Blechnum decrescens</i>
	<i>Blechnum integrifrons</i>
	<i>Blechnum longipinnum</i>
Combretaceae	<i>Combretum nusbaumeri</i>
Connaraceae	<i>Ellipanthus razanatsimiae</i>
Dryopteridaceae	<i>Rumohra linearisquamata</i>
Euphorbiaceae	<i>Argomuellera pumila</i>
	<i>Euphorbia ambatomenahensis</i>
	<i>Euphorbia beuginii</i>
	<i>Euphorbia nicaisei</i>
	<i>Hancea inhospita</i>
	<i>Pantadenia gervaisii</i>
	<i>Exacum alberti-grimaldii</i>
Iridaceae	<i>Aristea farafangana</i>
Lauraceae	<i>Cryptocarya rigidifolia</i>
	<i>Ocotea ambrensis</i>
	<i>Ocotea glaberrima</i>
	<i>Ocotea ivohibensis</i>

	<i>Ocotea spanantha</i>
	<i>Ocotea zahamenensis</i>
Lejeuneaceae	<i>Lejeunea masoalae</i>
Lindsaeaceae	<i>Osmolindsaea latisquama</i>
	<i>Osmolindsaea leptolepida</i>
Malvaceae	<i>Dombeya gautieri</i>
	<i>Grewia manomboensis</i>
	<i>Grewia rabehevitrae</i>
	<i>Grewia rufostellata</i>
	<i>Hibiscus fanambanensis</i>
	<i>Nesogordonia tricarpellata</i>
Meliaceae	<i>Humbertioturraea labatii</i>
	<i>Turraea andriamariisoana</i>
	<i>Turraea buerkii</i>
Myrtaceae	<i>Eugenia ardyceae</i>
	<i>Eugenia guajavoides</i>
	<i>Eugenia lacerosepala</i>
	<i>Eugenia louisae</i>
	<i>Eugenia manonae</i>
	<i>Eugenia nosibensis</i>
	<i>Eugenia petrikensis</i>
	<i>Eugenia roseopetiolata</i>
	<i>Eugenia stibophylla</i>
	<i>Eugenia stictophylla</i>
	<i>Eugenia vanwykiana</i>
	<i>Syzygium ludovicii</i>
	<i>Syzygium rakotovaoanum</i>
Orchidaceae	<i>Aeranthes unciformis</i>
	<i>Angraecum darainense</i>
	<i>Didymoplexis avaratraensis</i>
	<i>Didymoplexis recurvata</i>
	<i>Jumellea facilorchis</i>
	<i>Vanilla bosseri</i>
Orobanchaceae	<i>Bardotia ankaranensis</i>
Pandanaceae	<i>Pandanus ankaranensis</i>
	<i>Pandanus tsingycola</i>
Polypodiaceae	<i>Leucotrichum madagascariense</i>
	<i>Pyrrosia avaratra</i>
Rhamnaceae	<i>Gouania ambrensis</i>
	<i>Gouania callmanderi</i>
	<i>Gouania cupreifolia</i>
	<i>Gouania cupuliflora</i>
	<i>Gouania gautieri</i>
	<i>Gouania perrieri</i>
Rhamnaceae	<i>Gouania phillipsonii</i>

	<i>Gouania taolagnarensis</i>
	<i>Gouania zebrifolia</i>
Rubiaceae	<i>Amphistemon humbertii</i>
	<i>Amphistemon rakotonasolianus</i>
	<i>Bertiera brevithyrsa</i>
	<i>Coffea toshii</i>
	<i>Danais antilahimenea</i>
	<i>Danais disticha</i>
	<i>Danais laciniata</i>
	<i>Danais masoalana</i>
	<i>Danais rakotovaoi</i>
	<i>Danais randrianaivoi</i>
	<i>Gardenia brevicalyx</i>
	<i>Gardenia manongarivensis</i>
	<i>Gardenia sambiranensis</i>
	<i>Phialiphora bevazahensis</i>
	<i>Phialiphora capitulata</i>
	<i>Phyllopetas flava</i>
	<i>Thamnoldenlandia ambovombensis</i>
Sapotaceae	<i>Bemangidia lowryi</i>
	<i>Mimusops boeniensis</i>
	<i>Mimusops masoalensis</i>
Stemonuraceae	<i>Grisollea crassifolia</i>
Tectariaceae	<i>Pseudotectaria analamazaotrensis</i>
	<i>Pseudotectaria jouyana</i>
Thelypteridaceae	<i>Christella darainensis</i>
	<i>Pronephrium fideleae</i>
	<i>Pronephrium marojejyensis</i>
	<i>Pseudophegopteris andringitrensis</i>
Velloziaceae	<i>Xerophyta caulinflora</i>
Violaceae	<i>Rinorea ranirisonii</i>
Vitaceae	<i>Cyphostemma darainense</i>
Xanthorrhoeaceae	<i>Aloe analavelonensis</i>
	<i>Aloe antoetranana</i>
	<i>Aloe beankaensis</i>
	<i>Aloe bernardii</i>
	<i>Aloe ivakoanyensis</i>
	<i>Aloe mandrarensis</i>
	<i>Aloe martialei</i>
	<i>Aloe mottramiana</i>
	<i>Aloe spinitiaggregata</i>
	<i>Aloe virginieae</i>

New species of flora described until 2010

Family	Species

	<i>Anisotes hygroscopicus</i>
Acanthaceae	<i>Anisotes perplexus</i>
	<i>Anisotes subcoriaceus</i>
	<i>Anisotes venosus</i>
Achariaceae	<i>Prockiopsis grandis</i>
	<i>Prockiopsis razakamalalae</i>
Anacardiaceae	<i>Spondias tefyi</i>
Anisophylleaceae	<i>Anisophyllea madagascariensis</i>
	<i>Anisophyllea masoalensis</i>
	<i>Anisophyllea parafallax</i>
	<i>Anisophyllea schatzii</i>
Annonaceae	<i>Uvaria lombardii</i>
Apocynaceae	<i>Calyptanthera viridiflava</i>
Araceae	<i>Amorphophallus perrieri</i>
	<i>Carlephyton darainense</i>
Arecaceae	<i>Dypsis andilamenensis</i>
	<i>Dypsis anjae</i>
	<i>Dypsis betsimitiraka</i>
	<i>Dypsis culminis</i>
	<i>Dypsis dracaenoides</i>
	<i>Dypsis gautieri</i>
	<i>Dypsis gronophyllum</i>
	<i>Dypsis jeremie</i>
	<i>Dypsis lilacina</i>
	<i>Dypsis metallica</i>
	<i>Dypsis pustulata</i>
	<i>Dypsis reflexa</i>
	<i>Dypsis sancta</i>
	<i>Dypsis subacaulis</i>
	<i>Dypsis vonitrandambo</i>
	<i>Ravenea beentjei</i>
	<i>Ravenea declivium</i>
Asteraceae	<i>Oliganthes anjanaribensis</i>
Begoniaceae	<i>Begonia masoalaensis</i>
Bignoniaceae	<i>Colea labatii</i>
	<i>Colea unifoliolata</i>
	<i>Ophiocolea ambrensis</i>
	<i>Ophiocolea darainensis</i>
	<i>Ophiocolea pauciflora</i>
	<i>Ophiocolea ratovosonii</i>
	<i>Rhodocolea humbertii</i>
	<i>Rhodocolea magnifica</i>

	<i>Rhodocolea parvifoliolata</i>
	<i>Rhodocolea ranirisonii</i>
	<i>Stereospermum gentryi</i>
	<i>Stereospermum randrianaivoi</i>
Blechnaceae	<i>Blechnum bonapartei</i>
	<i>Blechnum decrescens</i>
	<i>Blechnum integrifrons</i>
	<i>Blechnum longipinnnum</i>
Combretaceae	<i>Combretum nusbaumeri</i>
Connaraceae	<i>Elliptanthus razanatsimiae</i>
Dryopteridaceae	<i>Rumohra linearisquamata</i>
Euphorbiaceae	<i>Argomuellera pumila</i>
	<i>Euphorbia ambatomenahensis</i>
	<i>Euphorbia beuginii</i>
	<i>Euphorbia nicaisei</i>
	<i>Hancea inhospita</i>
	<i>Pantadenia gervaisii</i>
Gentianaceae	<i>Exacum alberti-grimaldii</i>
Iridaceae	<i>Aristea farafangana</i>
Lauraceae	<i>Cryptocarya rigidifolia</i>
	<i>Ocotea ambrensis</i>
	<i>Ocotea glaberrima</i>
	<i>Ocotea ivohibensis</i>
	<i>Ocotea spanantha</i>
	<i>Ocotea zahamenensis</i>
Lejeuneaceae	<i>Lejeunea masoalae</i>
Lindsaeaceae	<i>Osmolindsaea latisquama</i>
	<i>Osmolindsaea leptolepida</i>
Malvaceae	<i>Dombeya gautieri</i>
	<i>Grewia manomboensis</i>
	<i>Grewia rabehevitrae</i>
	<i>Grewia rufostellata</i>
	<i>Hibiscus fanambananensis</i>
	<i>Nesogordonia tricarpellata</i>
	<i>Humbertia turraea labatii</i>
Meliaceae	<i>Turraea andriamiarisoana</i>
	<i>Turraea buerkii</i>
Myrtaceae	<i>Eugenia ardyceae</i>
	<i>Eugenia guajavoides</i>
	<i>Eugenia lacerosepala</i>
	<i>Eugenia louisae</i>
	<i>Eugenia manonae</i>

	<i>Eugenia nosibensis</i>
	<i>Eugenia petrikensis</i>
	<i>Eugenia roseopetiolata</i>
	<i>Eugenia stibophylla</i>
	<i>Eugenia stictophylla</i>
	<i>Eugenia vanwykiana</i>
	<i>Syzygium ludovicii</i>
	<i>Syzygium rakotovaoanum</i>
Orchidaceae	<i>Aeranthes unciformis</i>
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	<i>Didymoplexis avaratraensis</i>
	<i>Didymoplexis recurvata</i>
	<i>Jumellea facilorchis</i>
	<i>Vanilla bosseri</i>
Orobanchaceae	<i>Bardotia ankaranensis</i>
Pandanaceae	<i>Pandanus ankaranensis</i>
	<i>Pandanus tsingycola</i>
Polypodiaceae	<i>Leucotrichum madagascariense</i>
	<i>Pyrrosia avaratra</i>
Rhamnaceae	<i>Gouania ambrensis</i>
	<i>Gouania callmanderi</i>
	<i>Gouania cupreifolia</i>
	<i>Gouania cupuliflora</i>
	<i>Gouania gautieri</i>
	<i>Gouania perrieri</i>
	<i>Gouania phillipsonii</i>
	<i>Gouania taolagnarensis</i>
Rubiaceae	<i>Gouania zebrifolia</i>
	<i>Amphistemon humbertii</i>
	<i>Amphistemon rakotonasolianus</i>
	<i>Bertiera brevithyrsa</i>
	<i>Coffea toshii</i>
	<i>Danaïs antilahimenae</i>
	<i>Danaïs disticha</i>
	<i>Danaïs laciniata</i>
	<i>Danaïs masoalana</i>
	<i>Danaïs rakotovaoi</i>
	<i>Danaïs randrianaivoi</i>
	<i>Gardenia brevicalyx</i>
	<i>Gardenia manongarivensis</i>
	<i>Gardenia sambiranensis</i>
	<i>Phialiphora bevazahensis</i>

	<i>Phialiphora capitulata</i>
	<i>Phyllopentas flava</i>
	<i>Thamnoldenlandia ambovombensis</i>
Sapotaceae	<i>Bemangidia lowryi</i>
	<i>Mimusops boeniensis</i>
	<i>Mimusops masoalensis</i>
Stemonuraceae	<i>Grisollea crassifolia</i>
Tectariaceae	<i>Pseudotectaria analamazaotrensis</i>
	<i>Pseudotectaria jouyana</i>
Thelypteridaceae	<i>Christella darainensis</i>
	<i>Pronephrium fideleae</i>
	<i>Pronephrium marojejyensis</i>
	<i>Pseudophegopteris andringitrensis</i>
Velloziaceae	<i>Xerophyta caulinflora</i>
Violaceae	<i>Rinorea ranirisonii</i>
Vitaceae	<i>Cyphostemma darainense</i>
Xanthorrhoeaceae	<i>Aloe analavelonensis</i>
	<i>Aloe antoetrania</i>
	<i>Aloe beankaensis</i>
	<i>Aloe bernardii</i>
	<i>Aloe ivakoanyensis</i>
	<i>Aloe mandrarensis</i>
	<i>Aloe martialii</i>
	<i>Aloe mottramiana</i>
	<i>Aloe spinifera aggregata</i>
	<i>Aloe virginiae</i>

#### Endemism among some Malagasy wildlife groups

Wildlife Fauna Species	Richness group known	Endemism rate (%) e (%)
<b>Ants</b>	1277	75
<b>Crustaceans</b>	42	76
<b>Fishes</b>	176	53
<b>Amphibians</b>	284	100
<b>Reptiles</b>	398	95
<b>Birds</b>	282	51
<b>Lemurs</b>	103	100

<b>Carnivora</b>	13	77
<b>Small Mammals</b>	64	93
<b>Bats</b>	43	72

## Fungal diversity (macro fungi) dense rainforests of Madagascar

CLASS /SUB CLASS	TAXA (Gender, Families, species)	Nb. MORPH O- SPECIE S	LIFE MODE	FORETS TYPES
ASCOMYCETES	<i>Cordyceps</i>	05	Par.	F. Litt. + F.H. alt.
	<i>Xylaria polymorpha</i>		Sap.	F.H. alt.
	<i>Xylaria longipes</i>			
	<i>Xylaria hypoxylon</i>	01		
	<i>Xylaria sp</i>			
	<i>Peziza</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Chlorocibora aeruginascens</i>		Sap.	F.H. alt.
	<i>Laeotia cf. lubrica</i>		Sap.	F. Litt. + F.H. alt.
	<i>Ciboria spp</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Philippia sp.</i>	01	Sap.	F.H. alt.
HETEROBASIDIOMYCETES	<i>Hypoxyylon spp.</i>	02	Sap.	F.H. alt.
	<i>Peziza spp.</i>	02	Sap.	F. Litt.
	<i>Auricularia mesenterica</i>		Sap.	F. Litt. + F.H. alt.
	<i>Auricularia spp.</i>	03	Sap.	F. Litt. + F.H. alt.
	<i>Tremella fuscidiformis</i>		Sap.	F. Litt. + F.H. alt.
HOMOBASIDIOMYCETES/ APHYLOPHORMYCETIDAE	<i>Pseudohydnum gelatinosum</i>		Sap.	F.H. alt.
	<i>Calocera cornea</i>		Sap.	F. Litt. + F.H. alt.
	<i>Cantharellus cf. tubaeformis</i>		ECM	F.H. alt.
	<i>Cantharellus cibarius var. amethysteus ?</i>		ECM	F. Litt.
	<i>Cantharellus longisporus var. littoralis</i>		ECM	F. Litt.
	<i>Cantharellus cf. rhodophyllus</i>		ECM	F. Litt. .
	<i>Cantharellus cf. densifolius</i>		ECM	F. Litt.
	<i>Cantharellus congolense</i>		ECM	F. Litt.
	<i>Cantharellus spp.</i>	08	ECM	F. Litt. + F.H. alt.
	<i>Cantharellus eyssartieri</i>		ECM	F.H. alt.
	<i>Cantharellus decolorans</i>		ECM	F.H. alt.
	<i>Hydnus cf. repandum</i>		ECM	F.H. alt.
	<i>Auriscalpium cf vulgare</i>		Sap.	F. Litt.
	<i>Clavulinopsis cf. helveola</i>		Sap.	F. Litt. + F.H. alt.
	<i>Ramaria spp</i>	04	Sap.	F.H. alt.
	<i>Clavulina spp.</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Clavaria spp.</i>	02	Sap.	F.H. alt.
	<i>Stereum hirsutum</i>		Sap.	F. Litt. + F.H. alt.
	<i>Stereum subtomentosum</i>		Sap.	F. Litt. + F.H. alt.
	<i>Stereum spp.</i>	05	Sap.	F. Litt. + F.H. alt.
	<i>Podoserpula pusio</i>		Sap.	F.H. alt.
	<i>Trametes spp</i>	05	Sap.	F. Litt. + F.H. alt.
	<i>Schizophylle commune</i>		Sap.	F.litt. + F.H. alt.
	<i>Pycnoporus cf. cinabarinus</i>		Sap.	F. Litt. + F.H. alt.
	<i>Hexagonia hydnoides</i>		Sap.	F. litt.
	<i>Lenzites spp.</i>	02	Sap.	F.litt. + F.H. alt.
	<i>Plicaturopsis crispa</i>		Sap.	F.H. alt.
	<i>Tomentella spp.</i>	03	ECM	F. Litt.
	<i>Phanerochaete spp</i>	02	Sap.	F.H. alt.
	<i>Hymenochaete rubiginosa</i>		Sap.	F.H. alt.
	<i>Telephora spp.</i>	05	ECM	F. Litt. + F.H. alt.
	<i>Ganoderma lucidum</i>		Sap.	F. Litt. + F.H. alt.
	<i>Ganoderma cf.. appplanatum</i>		Sap.	F.H. alt.

	<i>Polyporus badius</i>		Sap.	F.H. alt.
	<i>Polyporus spp.</i>	06	Sap.	F. Litt. + F.H. alt.
	<i>Daedalea spp.</i>	02	Sap.	F.H. alt.
	<i>Laetiporia sulphureus</i>		Sap.	F.H. alt.
	<i>Postia cf. caesia</i>		Sap.	F.H. alt.
HOMOBASIDIOMYCETES APHYLOPHOROMYCETIDAE	<i>Cymatoderma spp.</i>	03	Sap.	F. Litt. + F.H. alt.
	<i>Amauroderma spp.</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Coltricia spp.</i>	03	ECM	F. Litt. + F.H. alt.
	<i>Gomphus spp.</i>	06	ECM	F. Litt. + F.H. alt.
	<i>Trogia spp.</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Clavulinopsis spp.</i>	03	Sap.	F. Litt. + F.H. alt.
	<i>Favolaschia spp.</i>	02	Sap.	F.H. alt.
HOMOBASIDIOMYCETES / AGARICOMYCETIDAE	<i>Oudemansiella spp.</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Agaricus spp.</i>	06	Sap.	F. Litt. + F.H. alt.
	<i>Lepiota spp.</i>	05	Sap.	F. Litt. + F.H. alt.
	<i>Macrolepiota spp.</i>	01	Sap.	F. Litt. + F.H. alt.
	<i>Leucocoprinus spp.</i>	04	Sap.	F. Litt. + F.H. alt.
	<i>Entoloma spp.</i>	15	Sap.	F. Litt. + F.H. alt.
	<i>Lepista spp.</i>	03	Sap.	F.H. alt.
	<i>Laccaria spp.</i>	04	Sap.	F. Litt. + F.H. alt.
	<i>Psathyrella spp.</i>	02	Sap.	F.H. alt.
	<i>Coprinellus spp.</i>	02	Sap.	F. Litt. + F.H. alt.
	<i>Cortinarius spp.</i>	06	ECM	F. Litt. + F.H. alt.
	<i>Russula cyanoxantha</i>		ECM	F. Litt.
	<i>Russula gossypina</i>		ECM	F.H. alt.
	<i>Russula cf. fistulosa</i>		ECM	F. Litt.
	<i>Russula cf. delicata</i>		ECM	F. Litt.
	<i>Russula bananae</i>		ECM	F. Litt. + F.H. alt.
	<i>Russula madagascariensis</i>		ECM	F.H. alt.
	<i>Russula discopus</i>		ECM	F. Litt. + F.H. alt.
	<i>Russula cf. elastica</i>		ECM	F. Litt. + F.H. alt.
	<i>Russula cf. carmesiana</i>		ECM	F. Litt. + F.H. alt.
	<i>Russula spp.</i>	06	ECM	F. Litt. + F.H. alt.
	<i>Lactarius cf. phlebophyllus</i>		ECM	F.H. alt.
	<i>Lactarius cf. gymnocarpoides</i>		ECM	F. Litt.
	<i>Lactarius cf. volemoides</i>		ECM	F. Litt. + F.H. alt.
	<i>Lactarius spp.</i>	10	ECM	F. Litt. + F.H. alt.
	<i>Lentinus spp.</i>	05	Sap.	F. Litt. + F.H. alt.
	<i>Pleurotus spp.</i>	06	Sap.	F. Litt. + F.H. alt.
	<i>Lentinula cf. edodes</i>		Sap.	F.H. alt.
GASTEROMYCETIDAE	<i>Marasmiaceae</i>	35	Sap.	F. Litt. + F.H. alt.
	<i>Boletaceae</i>	16	ECM	F. Litt. + F.H. alt.
	<i>Hygrocybe spp.</i>	06	Sap.	F. Litt. + F.H. alt.
	<i>Mycena spp.</i>	10	Sap.	F.H. alt.
	<i>Gymnopilus spp.</i>	04	Sap.	F. Litt. + F.H. alt.
	<i>Lycoperdon spp.</i>	03	Sap.	F. Litt. + F.H. alt.
	<i>Scleroderma spp.</i>	04	ECM	F. Litt. + F.H. alt.
	<i>Bovista spp.</i>	02	Sap.	F.H. alt.
	<i>Calvatia sp.</i>	01	Sap.	F. Litt.
	<i>Geastrum spp.</i>	04	Sap.	F. Litt. + F.H. alt.
	<i>Cyathus spp.</i>	03	Sap.	F. Litt. + F.H. alt.
	<i>Aseroe sp.</i>	01	Sap.	F. Litt. + F.H. alt.
	<i>Clathrus sp.</i>	01	Sap.	F. Litt. + F.H. alt.
	<i>Dichyophora spp.</i>	02	Sap.	F. Litt. + F.H. alt.

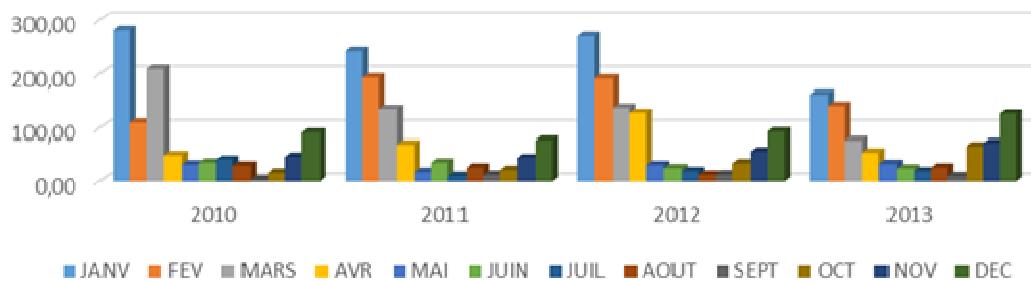
SOURCE : Inventaire mycologique CNRE (RANDRIANJOHANY, E.. 2005-2013)

Légende : Par. = parasite ; Sap. = saprophyte ; ECM = ectomycorhizien

F. Litt. = forêt littorale ; F.H. alt. = forêt humide d'altitude

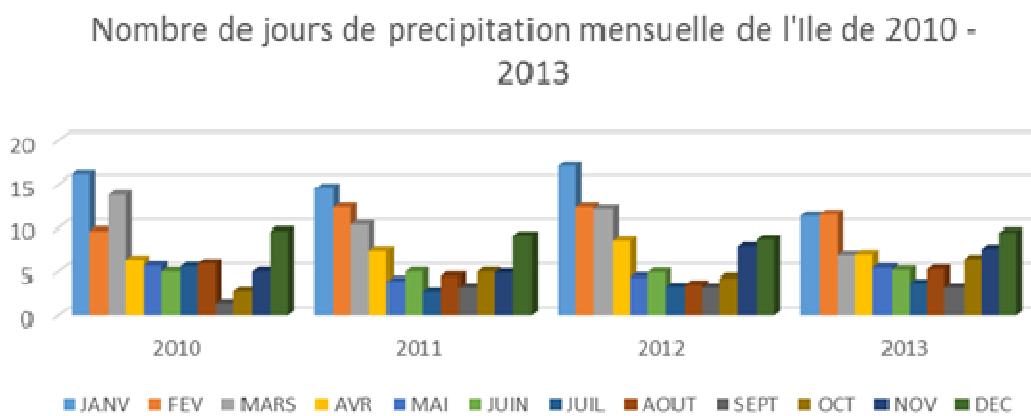
### Height of the precipitation of Madagascar 2010-2014

### Pluviometrie de Madagascar de 2010 - 2013: Hauteur de la précipitation (mm)



Meteorology General Direction source, 2014

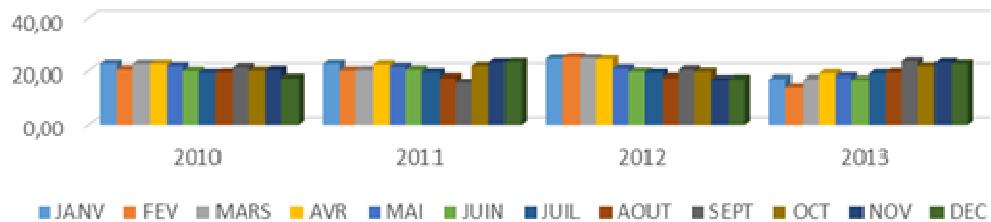
### A number of days of monthly precipitation of the Island from 2010 to 2013



Meteorology General Direction source, 2014

### Monthly maximum temperature

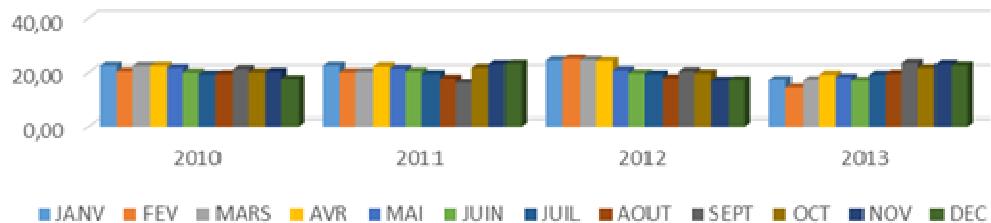
Temperature mensuelle maximum de Madagascar de 2010 - 2013



*Meteorology General Direction source, 2014*

### Monthly minimum temperature

Temperature mensuelle minimum de Madagascar de 2010 - 2013



*Meteorology General Direction source, 2014*

## **Report OMD Madagascar 2014**

### **Objective: Eliminate extreme poverty and hunger**

It's an ambitious target with ramifications in multiple areas, poverty is, by essence, multidimensional and appreciates compared to many parameter, including employment, labour market, consumption, food.

One of the features of Madagascar is the very high level of poverty, regardless of the adopted threshold. By 2015, none of the targets will be reached. Worse, the situation has tended to deteriorate, as the watch analysis on a long low period.

The analysis of food poverty here translates into the analysis of access to food, both in quantity (at least of 2133 Kcal/unit of consumption) and quality (at least 75% of the grains and starches) sufficient. The analyses show that on these two aspects, the situation has much degraded in Madagascar. Also, the prevalence of underweight among children under 5 years is still 32% while the expected goal is 19%.

In total, can be learned from this analysis that quantitative and qualitative deficiencies affect a very large share of the Malagasy population, both rural and urban. It is a structural situation because the data from the previous surveys (2005 and 2010 in this case) lead to the same worrying conclusion.

Indeed, nearly 89% of households have an income lower or, at best, equal to their basic needs. Households residing in Androy, Anosy and Vatovavy Fitovinany are most affected by these problems.

Inequality measurements show a very high concentration of consumption, thus, the richest 10% (in terms of per capita consumption) have a level of life 6.1 times higher than that of the poorest. A development of the informal sector has been observed, which contributes to more than 24% non-agricultural merchant GDP, and more than 93% of jobs (including 76% in agriculture).

### **Goal 2: Achieve universal primary education for all**

Under current trends, if the situation of school attendance is problematic, the level of completion of primary education and the literacy of 15 years and older are positive.

Progress has been achieved in literacy, with an increase of literacy of 15 years and more from 59.2% in 2004 to 71.6% in 2012. This literacy is for men, the urban and high standard of living people. This is so for the level of completion of primary education (from 47% in 2004 to almost 69% in 2012). Which reflects a performance in terms of trend but it is noted that nearly 30% children are unable always to finish primary school.

Poverty is one of the most important factors of the exclusion from school of children, particularly in rural areas. The non-gratuite of schooling does limit the number of schoolchildren (average expenditure for schooling: 66,000 Ariary/child / school year)

Beyond the non-achievement of the MDGs in education, degradation of the education indicators is of particular concern. Thus, the primary school attendance rate accuse decreased significantly between 2010 and 2012 (108% in 2012 against 118% in 2010 for the gross attendance rate and 69.4% in 2012 compared with 73.4 percent, in 2010, the net enrolment rate).

### **Goal 3: Promote gender equality and the empowerment of women**

Madagascar is committed to promote gender equality and the empowerment of women to eliminate disparities in primary and secondary education by 2005, if possible, and at all levels of education by 2015 at the latest. These commitments confirm the need and the will of the country to advance the process of development through the promotion of gender equality and women's rights.

The analysis of the results for the education and literacy of women showed that the girls/boys at the primary level parity has been reached; which gives a ratio of girls to boys of 1.05. While in secondary 1st cycle, there is a slight regression of the girls/boys with 0.93 parity. In the 2nd cycle secondary, the ratio of girls to boys is 0.86. More on monte level (0.73), most the girls/boys parity decrease.

Concerning the situation of employed women, the uneducated and level of primary education are numerous with respectively 1.10 and 1.18 throughout Madagascar.

The involvement and integration of women in an association are also among the steps to improve their living conditions. Nationally, nearly half of women, with a rate of 43 percent, said they were members of a religious association while they have only 5.5% for the political and civic association.

### **Objective 4: To reduce the mortality of children under 5 years**

To accelerate the achievement of the MDGs and in particular reduce by 2/3 3/4 and child mortality maternal mortality on the horizon of 2015, Madagascar has steadily strengthen activities for the survival of the mother and the child. Thus, the Malagasy Government has signed in March 2011, its accession to the strategy overall of Secretary General the United Nations for the health of the woman and the child. The Ministry of public health, with support from the development partners, has developed this multi-year operational plan to transform these commitments into concrete actions to improve the health of women and children. Activities implemented can be classified into three categories: firstly promotional interventions aimed to promote and create demands for health care and thus to encourage mothers to ask health care addressing the health of their children. Secondly, there was also interventions focused at the level of prevention including vaccination, and finally interventions focused on treatments as well at the level of health centres at the community level and health of children through support integrated disease of children.

In short, to achieve MDG 4, greater accessibility of health services to the entire population base arises as an inevitable alternative. In addition, it must break down social and financial barriers to social protection, encourage innovation to ensure that the poor have access to critical services and accountability systems of health at the local level.

#### **Goal 5: Improve maternal health**

One of the targets of the objective of the MDGs No. 5 is to reduce by three-quarters, between 1990 and 2015, the maternal mortality rate. Despite the interventions to prevent disabilities or death during pregnancy and childbirth, maternal mortality remains relatively high in Madagascar. Referring to the target for 2015 which stands at 127 maternal deaths per 100,000 live births, the current level of maternal mortality is still very high. Indeed, the rate of maternal mortality is 478 per 100,000 live births.

With regard to teenage pregnancies, the national target is to reduce by 50% early pregnancy for the year 2015. In addition, a very early pregnancy has higher risks of complications, even death. However, in Madagascar, the rate of fertility among adolescents (15-19 years) remains high to 163 births per 1,000 women against 148 in 2009. Regarding the use of contraceptive methods among women using no contraception, some of them want to delay or prevent pregnancy. Among married women or union in childbearing years (15-49 years), 17.7% did not consider their needs met in contraception. Although this proportion has decreased compared with that found at the EDSMD IV (18.9%), it departs widely from the target for 2015, which is 9.5%. Referring to the present results, the achievement of the objectives of the MDG 5 is still a challenge for Madagascar

Madagascar, by signing the Libreville declaration on health and the environment in Africa, a programme joint who and UNEP has the obligation to implement joint actions in health and environment to protect the population to the adverse effects of the degradation of the environment on human health.

#### **Goal 6: Combat HIV/AIDS, malaria and other diseases**

Regular use of condoms in casual sex significantly reduces the risk of transmission of HIV through sexual intercourse but also of IST. This is particularly important for young people, who often have the highest rates of HIV infection, because they themselves are previously exposed to infection and had (usually) a relatively large number of relationships with casual sexual partners. It will be measured in this study, the rate of condom use at last intercourse at high risk.

Furthermore, for EIA, social backup plans, creations of the NAPs, and any other activity related to biodiversity, a point not overlooked is the consideration of the human health component, in particular to consider the fight against HIV/AIDS access especially to sensitization.

#### **Goal 7: Ensure environmental sustainability**

MDG7 is given as the primary objective of ensuring a sustainable environment. The indicators taken into account are: (i) the proportion of the population with access to Potable water improved (27.7% and 38.9% according to the definitions of the Ministry of water) accusing an uptick respectively 8.1% and 6.3% from 2010. (ii) the proportion of the population using infrastructure of improved sanitation (7.1% and 50.1% according to the definitions of the Ministry of water) showing increased respectively by 4.3% and 27.4% from 2008, (iii) the proportion of the population using the main solid fuel (99.2%) with a rate remaining unchanged over 2010 and finally, (iv) the proportion of urban dwellers living in slums (88.2% and 72.8% if it used the definition of the Ministry of water lack of access improved drinking water and insufficient access to improved infrastructure) which reflects a very weak condition of life in urban areas. Furthermore, the targets for 2015 in relation to access

to improved drinking water and access to sanitation facilities are respectively 68% and 54% according to the WCO.

For the sector water, this goal is far from being achieved either 27, 7% or only 38.9% of the population have access to Potable water improved well that efforts on the part of the Government have been made during previous periods.

For the basic sanitation sector, the goal is possible with the rate at 50.1% in collaboration with the technical and financial partners on the implementation of the process of scaling of sanitation through the operationalization of the Marketing of sanitation (by the CLTS approach).

On the management of household waste, over 57% of the population throw their garbage in nature. This proportion is more pronounced in rural with 65.5% while workplace urban it is public or private collection which predominates with 43.7%.

Management of environmental resources, progress has been little palpable in Madagascar. Indeed, the wood with a rate of 69.9% and charcoal with 26.2% are most used as a first type of fuel for cooking. The stagnation of the tendency of use of this fuel, more than 96%, reflects a risk of loss of environmental resources of woody species-dependent.

Thus, most of reforestation activities are currently dedicated to the use of the local population to substitute for the natural forest resources.

## REDD project in MADAGASCAR

HCPF	Blue Venture	CAZ	COFAV
Reduce emissions of GHG from deforestation and forest degradation	Conservation of marine and coastal environments, combating poverty while protecting biodiversity	Conserve biodiversity, improve good human being, restore degraded lands and reduce carbon emissions,	Conserve biodiversity, improve good human being, restore degraded lands and reduce carbon emissions,
Track changes in forest cover on the area of study of the project Follow international recommendations Provide a meaningful assessment of the uncertainty of the results Application of a chain of processing 'classic' mapping of land cover by remote sensing Use of Open Source tools in substitute for traditional and commercial remote sensing software		Establishment of a management of the NAP and green belt, Followed by the reduction of the emissions of GHG (MRV): participatory monitoring, alerting of deforestation, followed the CWB approach	Establishment of a management of the NAP and green belt Followed by the reduction of the emissions of GHG (MRV): participatory monitoring, alerting of deforestation, followed the CWB approach
Deforestation	Deforestation	Deforestation	Deforestation
Support of the 110 communities (COBA) in the development of alternatives to slash-slash: increased yields rice (SRI, SRA), generating income and crop diversification (market gardening, poultry farming, beekeeping, cash crops, etc) Promotion of alternative activities to shifting cultivation: agroforestry techniques, improved agricultural techniques, enhancement of the forestry Non wood products, construction of irrigation infrastructure, etc	Ecotourism, sustainable management of the fisheries, aquaculture	Support for agricultural intensification and diversification of sources of income are implemented to constitute alternatives to the tavy and as incentives for sustainable practices through the corridor	Support for the transfer of management. Program current Node (subsidy of the micro-ProjectX around CAZ), HPE (health and environment, Population, current ecotourism program,
		Highlighted the aspect of governance at the local level and the use of revenues from carbon for development actions related to REDD	

(Source ONE, 2014)

**Table: List of major bilateral donors**

FUNDERS	TARGET ISSUES	BENEFICIARIES or implementing entity or promoter	AMOUNT and period (PEIII and other current and future projects)
USAID	Areas protected, biodiversity, forests	International and national NGOs	More than 20 million USD (until 2009)
AFD / FFEM	Protected areas, biodiversity, forests, mitigation (climate change)	FAPBM, international organizations (WWF, CIRAD, GRET), HELVETAS/ONE	24.7 million €, or about 33.35 million \$
KfW/PGM-E/GIZ	Sustainable management of natural resources	National and international NGOs	30.52 million €, approximately 41.20 million \$
KfW	Five protected network MNP	FAPBM	2.55 million €, approximately 3.44 million \$ (sinkingfund, approximately \$ 573 750 year, from 2004 to 2009).
Office of the Embassy of Norway, NORAD	Biodiversity, environmental governance	CI, WWF, AVG	2.5 million \$
JICA	Sustainable management of natural resources	JICA	7 million \$
Program Germano-Malgache for the environment (PGM - E / GIZ)	Sustainable management of renewable natural resources-	PGM-E	8 million €, approximately 10.8 million \$

*Source : Evaluation of investments in conservation Report (Conservation International, 2013)*