

# National Blue Carbon Policy Assessment Madagascar



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## **About the Blue Forests Project**

The Global Environment Facility's (GEF) Blue Forests Project is a global initiative focused on harnessing the values associated with coastal marine carbon and ecosystem services to achieve improved ecosystem management and climate resilient communities. The project is implemented by the United Nations Environment Programme (UNEP) with partners worldwide. Project sites include locations in Ecuador, Kenya, Madagascar, Mozambique, Indonesia, the United Arab Emirates, Thailand, and the United States of America. The project also addresses key 'blue forests' knowledge gaps, as well as providing experience and tools to support greater global replication and application of the blue forests methodologies and approaches.

Project website: [www.gefbblueforests.org](http://www.gefbblueforests.org)

## Preface

This report traces the policy, legal, and regulatory context for coastal “blue carbon” ecosystems – namely mangroves, salt marshes, and seagrasses – in MADAGASCAR and is one in a series of five country reports to be undertaken as part of the UNEP/GEF Blue Forests Project. Other countries included are Ecuador, Indonesia, Mozambique and the United Arab Emirates (UAE).

The goal of the National Policy Assessments (NPAs) is to bring together the key policy, legal and regulatory frameworks and incentives which have an implication for the management of blue carbon ecosystems including items from a perspective of national development, climate change, forestry, and biodiversity, as well as marine resource management.

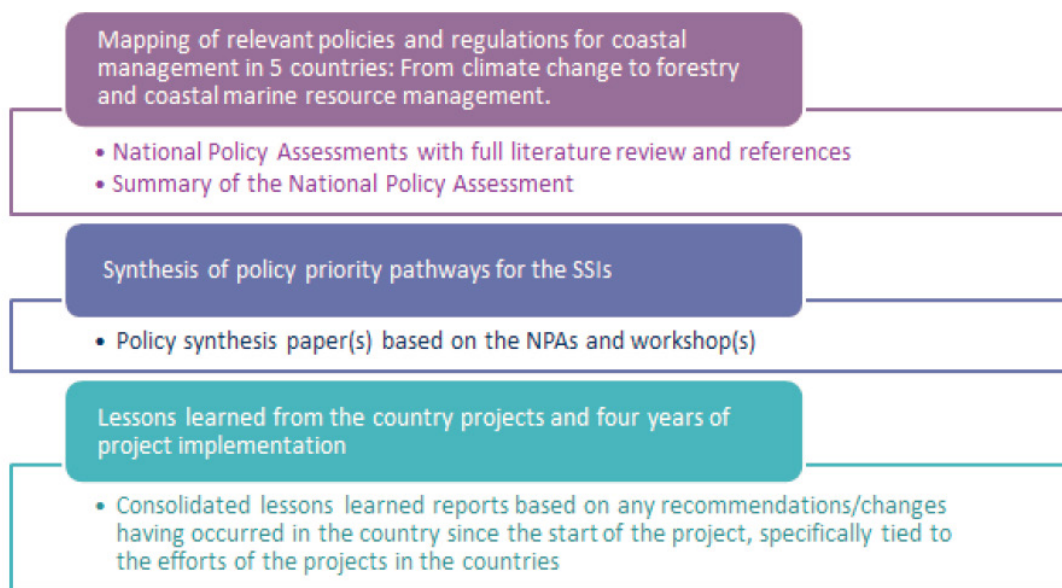
The report also undertakes a first order analysis of the gaps and opportunities for more comprehensive and coordinated coastal management using a variety of existing legal and financial incentive schemes. The report is accompanied by a summary document.

The NPAs are the first step in a series of consecutive documents (see Figure 1). After the completion of the five NPA reports, the aim is to extrapolate common trends and barriers, best practices and opportunities for the management of coastal carbon ecosystems across the five studies. These synchronized NPAs – for Ecuador, Indonesia, Madagascar, Mozambique, and the UAE – will serve as the basis for targeted advice on policy approaches for the Blue Forests Project’s Small-Scale

Interventions (SSIs) and, more broadly, for scaling up blue forest efforts at the international level. A document on lessons learned from the SSIs will be available towards the end of the Blue Forests Project in 2018.

The NPAs are one of the deliverables of the GEF-funded project Standardized Methodologies for Carbon Accounting and Ecosystem Services Valuation of Blue Forests (Blue Forests Project). Specifically, they contribute to Component 1, Development of guidance for carbon accounting and ecosystem services valuation for blue forests ecosystems (i.e. blue carbon ecosystems). The focus of Component 1 of the Blue Forests Project is the development of guidance for the implementation of methodologies and approaches for carbon accounting and ecosystem services valuation for blue forest ecosystems, specifically through project level support to the small-scale interventions. Component 1 will facilitate better management practices based on an improved understanding of carbon and other ecosystem services for blue forest ecosystems.

Overall the UNEP/GEF Blue Forests Project aims to improve and share knowledge about coastal and marine ecosystem with managers and stakeholders in selected regions on carbon sequestration, storage, possible greenhouse gas emissions as well as ecosystem services in blue forests ecosystems and on possible policy and economic instruments that may be applied to sustainable coastal habitat management.



**Figure 1.** Overview of UNEP/ GEF Blue Forests Project related policy assessment reports and products

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# Glossary

ANAE	National Association for Environmental Action
ANGAP	National Association for the Management of Protected Areas
BioCF	BioCarbonFund
BNCC	National Office for Climate Change Coordination
CDM	Clean Development Mechanism
CIME	Inter-Ministerial Environmental Committee
CLB	Communautés locales de base
CNGIM	National Committee for Integrated Mangrove Management
CNGIZ	National Committee for the Integrated Management of Coastal Zones
COAP	Management Code for Protected Areas
EIA	Environmental Impact Assessment
ER	Emission Reductions
ERPD	Emission Reduction Program Document
ERPIN	Emission Reductions Program Idea Note
ESV	Ecosystem Service Valuation
FCPF	Forest Carbon Partnership Facility
GCF	Forest Management Contracts
GELOSE	Community-Based Management of Natural Resources
GHG	Greenhouse Gas
GIZC	Integrated Management of Coastal and Marine Zones
INDC	Intended Nationally Determined Contribution
LULUCF	Land Use, Land Use Change and Forestry
MAP	Madagascar Action Plan
MECIE	Implementing Accounting for Investments affecting the Environment
MEEF	Ministry of the Environment, Ecology and Forests
MESUPRES	Ministry for Higher Education and Scientific Research
MNP	Madagascar National Parks
MPA	Marine Protected Area
MRHP	Ministry for Fisheries and Marine Resources
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Action
NAP	New Protected Areas
NAPA	National Adaptation Programme of Action
NSSMB	National Strategy for Sustainable Management of Biodiversity 6
ONE	National Office for the Environment
PES	Payment for Ecosystem Services
PNAE	National Environmental Action Plan

PND	National Development Plan 2015-19
PNIAEP	National Plan for Investment in Agriculture, Livestock and Fisheries Sector
PNLCC	National Climate Change Policy
PSAEP	Agriculture, Livestock and Fisheries Sector Policy
REDD	Reduction of Emissions from Deforestation and Forest Degradation
REDD+	REDD, including the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
REL	Reference Emissions Level
R-PP	Readiness Preparation Proposal
SAPM	Malagasy Protected Areas System
SEMer	Ocean Directorate (part of MRHP)
SNGDB	National Strategy for Sustainable Management of Biodiversity
SSI	Small Scale Intervention
UAE	United Arab Emirates
UNCLOS	United Nations Convention on the Law of the Sea
UNFCCC	United Nations Framework Convention on Climate Change
USGS	United States Geological Service
VCS	Verified Carbon Standard
WIO	Western Indian Ocean Region
WWF	World Wide Fund for Nature

# 1. Blue carbon ecosystems in Madagascar

Madagascar is considered an eminent 'biodiversity hotspot' (Myers et al. 2000) for its diversity of endemic species. Madagascar also hosts important swaths of mangroves and seagrass beds. It is one out of only four countries in the Western

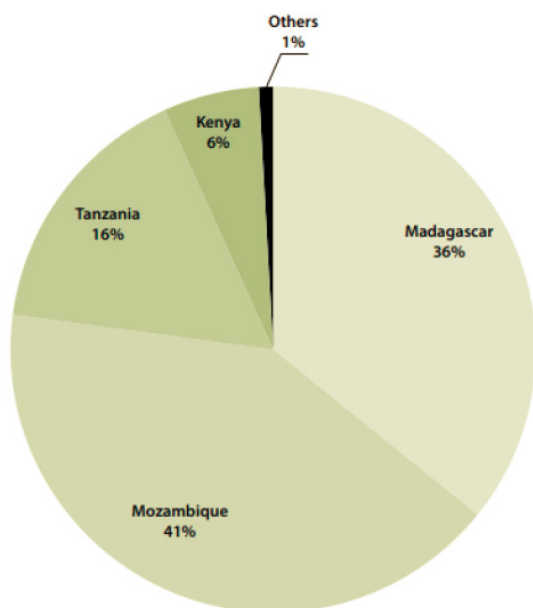
Indian Ocean region with large mangrove populations (see Figure 2). In mangrove area coverage, Madagascar is second only to Mozambique (see Figure 3).

Blue carbon is the carbon stored in or released from mangroves, saltmarshes and seagrasses (blue carbon ecosystems) due to human activities and is mainly used in the climate mitigation context.

Blue carbon used in a financial or policy context refers to a suite of financial and political mechanisms and incentives which can be used to better manage, protect and restore blue carbon ecosystems.

## 1.1 Mangroves

Madagascar holds approximately 278, 078 ha of mangroves as of 2005 (Jones et al. 2016), and 98% of this extent is found on the west coast (Lugendo 2015). The remaining 2% are in the northeast, between Mananara-Nord and Antsiranana (CBD 2014). These mangroves are vitally important to coastal communities, acting as a buffer to coastal erosion, a filter to pollutants, and a nursery area for several fish species. The breakdown of these areas are represented below:



**Figure 3.** The relative extent of mangroves in the four countries with the greatest mangrove cover in the Western Indian Ocean region. Source: Giri et al. 2011



**Figure 2.** Map of mangrove distribution in the Western Indian Ocean (WIO) region. Kenya, Madagascar, Mozambique and Tanzania account for virtually all mangroves in the WIO region Source: <http://data.unep-wcmc.org>

## Threats

As is the case for other countries, the exact rate of and drivers of deforestation and ecosystem degradation are far from clear. The main causes of deforestation in Madagascar to this date have been poverty-induced, with notable activity shifts over time due to varying economic and political factors in the country (Moser 2014).

Malagasy mangroves are increasingly under threat from slash-and-burn practices, followed by drainage to allow for smallholder agricultural production of (mostly) rice, maize and cassava (Barnes 2014). As inland forest resources are depleting fast, mangroves are also increasingly exploited for wood, charcoal, and tannin. Several of those areas, including Ambaro and Ambanja Bay, have been significantly exploited, particularly for charcoal (Barnes 2014). It is, however, a nation-wide issue. According to estimates, 95% of household energy needs are met by fuelwood (Hipler 2014). A third minor, and for now stagnant, driver of degradation is the aquaculture industry (mostly prawn), which converts natural mangrove areas into artificial ponds or impacts natural mangroves through channel-building, erosion, and other means (Mmochi 2015).

Other threats to mangroves relate to coastal development (residential and infrastructure) and the compounded impacts of deforestation, including erosion, sedimentation and siltation

(Jones et al. 2016). Upstream erosion results in weakened root structures and causes tree falls, as well as changes in salinity and freshwater inputs. The coastal areas of Madagascar are marked by continuous retreat. Sea-level rise further results in coastal erosion and salt-water intrusion. There is a risk that mangroves, particularly, are negatively affected (Clausen et al. 2010). However, as mangroves are able, within limits, to adapt to these changing conditions through the accumulation of sediments and organic matter (McIvor et al 2013), the long-term impact from sea-level rise need further detailed analysis.

Mangrove exploitation and their overall depletion particularly threaten poor, rural Malagasy who rely on natural resources and mangrove ecosystem services (such as fish production and timber) for survival (The Ecosystem Services Partnership 2014). For wildlife, the risks for many endemic species, including the Bernier's Teal, the Madagascar Fish Eagle, and the Humboldt's Heron, among many others, are dramatic (Gardner et al. 2016).

Giri and Muhlhausen's 2008 analysis of Malagasy mangrove distribution using USGS-produced national-level maps found a country-wide loss of approximately 21% (57,000 ha) between 1990 and 2000 (Giri and Muhlhausen 2008). Agricultural conversion accounts for most losses (35%), followed by logging (16%) and aquaculture (3%).



## 1.2 Seagrasses

Overall, there is comparatively little research on seagrasses as compared to mangroves and coral reefs in the WIO states (see Figure 4). The lack of knowledge makes it difficult for stakeholders to effectively integrate seagrass protection into local, regional or national initiatives. Thirteen species of seagrass have been identified on the coastline of the WIO but very little is known about the distribution and composition of these species in Madagascar. Though it is difficult to estimate the full extent of seagrasses nationally, a 2008 research assessment near the southern town of Toliara found that *Halodule uninervis* (Cymodoceaceae) was the most abundant species in the area (Hantanirina 2013).

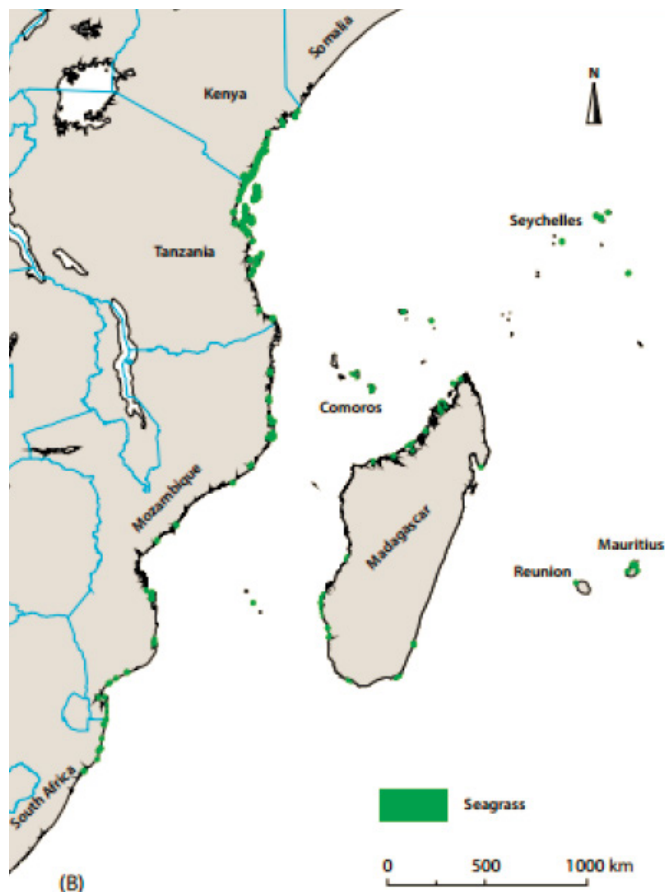
Seagrass meadows represent important nursery and feeding grounds for many commercially important fish species in Madagascar (Hantanirina and Benbow 2013). They also provide important ecological services, such as attenuating wave energy, and reducing coastal erosion and sedimentation. Seagrasses also host a number of other species, providing protective shelter as well as a direct food source for many and in particular for prawn and fish (Björk et al. 2008).

### Threats

In different parts of the world, seagrasses are threatened by a range of natural and human-caused disturbances. The survival of seagrasses is dependent on the water quality. When water quality is compromised, for example, by the runoff of nutrients and sediments (Björk et al. 2008), the productivity and growth of phytoplankton, macroalgae and epiphytic algae increases. This can impact the amount of light reaching a seagrass meadow, thereby compromising the growth and development of seagrass plants (Dennison 1987).

The amount of light reaching the seagrass plants is similarly impacted by overfishing. Overfishing reduces the amount of large herbivorous fish that eat the epiphytes that grow on seagrass leaves. In the absence of those fish, the epiphytes overgrow and reduce the amount of sunlight reaching the seagrass beds thereby hampering photosynthesis and reducing overall seagrass coverage (Hantanirina and Benbow 2013).

Seagrasses everywhere in the world also suffer from indirect effects of climate change. While increased atmospheric carbon may stimulate seagrass growth through increased levels of photosynthesis, overall temperature increase above the thermal limit of seagrasses leads to high levels of diebacks over time (Björk et al. 2008). Regardless, local studies tracing development conditions and levels of seagrass degradation in Madagascar, if any, are still largely missing.



**Figure 4.** Map of seagrass bed distribution in the WIO region. Source <http://data.unep-wcmc.org>

## 2. Blue carbon protection in Madagascar: Status Quo

Protection of blue carbon ecosystems ranges from national environmental plans to the creation of a protected areas system across the country (see Figure 5). Economic and political liberalisation in the 1980s opened the door for international financing streams, moving biodiversity conservation to centre stage (Ferguson 2010). Madagascar adopted its flagship environmental law, the National Environmental Charter, in 1990 and the development of the respective programmatic and institutional framework followed swiftly from there.

Political unrest and a coup d'état in 2009, however, has hampered significant progress in environmental conservation (USAID 2010). Several persistent political crises in the country have meant that the conservation and development agenda has remained in the backseat for Madagascar (Dhital et al. 2015). Inconsistencies in the development and implementation of a cohesive environmental plan can be explained by the complex political history of the country.

### 2.1 Constitution of the Republic of Madagascar

The Constitution of Madagascar of 2010 references the environment at several levels. The freedom to do business is granted within the limits of, among others, the environment (Article 39). The legislator is given the competence to adopt laws in the area of “environmental protection” (Article 95). The decentralized authorities (collectivités territoriales décentralisées), jointly with the central government, must ensure “the preservation of the environment” (Article 141). In addition, Madagascar’s traditional local government, known as “fokonolona”, is recognized as the basis for development as well as “social, cultural and environmental cohesion” (Article 152.1).

Forests, mangroves or coastal environments are not expressly referenced in the Constitution.

### 2.2 National Environmental Action Plan

The National Environmental Action Plan (Plan National d'Actions Environnementales, PNAE) was initiated in 1989 and adopted in 1990. PNAE was the first comprehensive attempt to mainstream environmental considerations into the management of other key areas, including health, education, and rural infrastructure (MoE 1990).

PNAE structured policy interventions into three phases over 15 years. The first phase followed a top-down approach and concerned the setting up of an operational structure targeting the conservation of biodiversity-rich forest environments (Ferguson 2010, Fritz-Vietta et al. 2011, Dhital et al. 2015, Froger & Méral 2012). Several national organisations were established, including the National Association for the Management of Protected Areas (Association Nationale pour la Gestion des Aires Protégées, ANGAP), which later became

Madagascar National Parks (MNP) in 2008, and the National Environmental Office (Office Nationale pour l'Environnement, ONE), which is charged with overseeing environmental impact assessments and monitoring of environmental change. The National Association for Environmental Action (Association Nationale d'Actions Environnementales, ANAE) was also established to increase environmental protection capacity (Springate-Baginski and Wollenberg 2010). For the institutional architecture, see the box 2 on Administrative Responsibilities (infra).

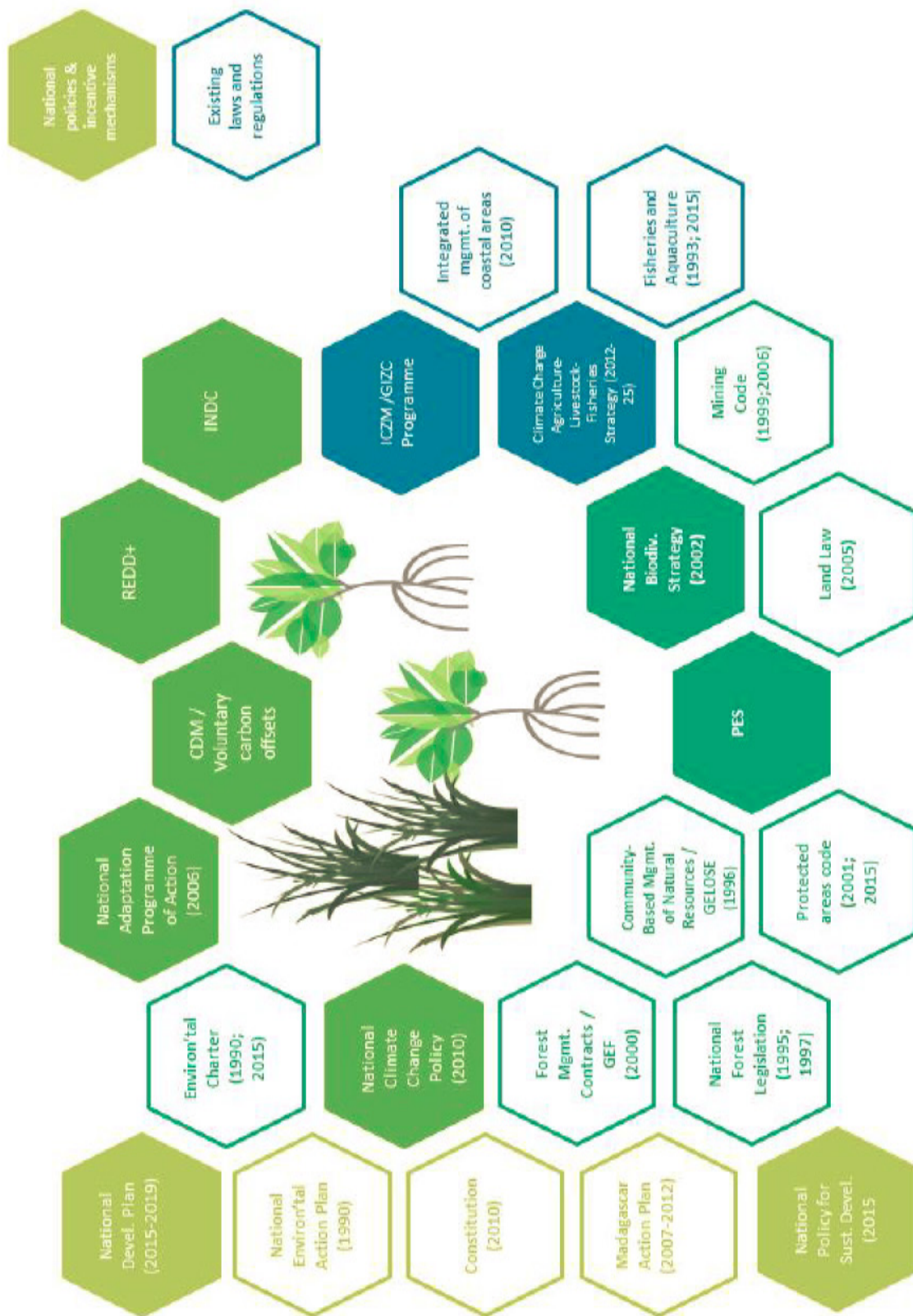
The second phase, starting in 1997, was dedicated – in a bottom-up perspective – to the development of community-based natural resources management. The goal was to steer interventions through horizontal agreements with a wide array of local communities (see section 3.4 on Forestry Law) (Froger & Méral 2012). While this change was initially welcomed by many stakeholders, the implementation of this new approach proved difficult, in particular because the conclusion of agreements with local communities became an overly important statistical target, pushing considerations of substance and effectiveness aside (Froger & Méral 2012). The third phase (2003-2008) focused on the set-up of new protected areas (see Box 1 on Protected Area System in Madagascar below).

### 2.3 Environmental Charter

The Environmental Charter (1990) was adopted alongside the PNAE (Loi No. 90-033 portant Charte de l'environnement et ses modificatifs). It has served since as the main legal basis to limit land degradation (soil erosion) and the decline in forest cover, and to mobilize funds for the environment and biodiversity in general (FCPF 2014).

Following further amendments in 1997 and 2004 (Laws No. 97-012 of 6 June 1997 and No. 2004-015 of 19 August 2004), Madagascar adopted a revised Environmental Charter (Loi n°2015-003 portant Charte de l'Environnement Malagasy actualisé) in 2015 which makes explicit reference to the need to deal with new risks, such as climate change. All legislation, policies, plans, programmes and projects need to account for climate change as well as integrated coastal zone and marine management. The Charter (2015) also commits to the “equitable benefit sharing” related to “environmental services”, in general, and “carbon markets”, in particular. Under Article 13 of the Charter (2015), any proposed public or private investments that may impair or harm the environment must be subjected to an Environmental Impact Assessment (EIA). Under delegated legislation, mangrove areas and their zones of impact are deemed “sensitive zones” (see Box 2 below) in which EIAs are compulsory for any construction or works.<sup>1</sup>

<sup>1</sup>Décret n° 99-954 du 15 décembre 1999 modifié par le décret n° 2004-167 du 03 février 2004 relatif à la mise en compatibilité des investissements avec l'environnement (MECIE) in conjunction with Arrêté No. 4355-97 du 13 mai 1997 portant définition et délimitation des zones sensibles.



**National development - Climate Change – Forestry / Biodiversity – Coastal and Marine Resources**

Figure 5: Existing national laws, policies and initiatives with an impact on blue carbon management.

## Box 1. Protected Area System in Madagascar

The designation of protected areas (see Figure 5) in Madagascar dates back to the French colonial rule. In recent, post-colonial times, the number of protected sites and their size has been substantially increased. During the tenure of President Marc Ravalomanana (2002-2009) in particular, the total area of protected areas tripled (Springate-Baginski & Wollenberg 2010). The expansion from 1.76 million ha to 5.58 million ha protected areas between 2003 and 2010 was triggered by, yet went well beyond, the IUCN recommendation issued at the World Parks Congress in Durban in 2003 ("Durban Vision") to increase the coverage of protected areas in each country by 10% .

Protected areas in Madagascar were given their first comprehensive legislative basis in 2001 through the Protected Areas Code (*Loi No. 2001/05 portant Code de gestion des aires protégées*) which defined three categories of protected areas: Integral Natural Reserve (*Réserve Naturelle Intégrale*, RNI), National Park (*Parc National*, PN) and Special Reserve (*Réserve Spéciale*, RS). Activities allowed in these areas depend on the category that applies. Fishing and forestry exploitation per se are not allowed in the Natural Reserve (Article 41 (2) Loi No. 2001-05) but all vital subsistence and cultural activities are permitted (*satisfaire les besoins vitaux des populations riveraines ou pour le respect de leur tradition*) (Article 41 (4) Loi No 2001-05).

Additional implementing legislation was adopted in 2005 (*Décret N° 2005-848 appliquant les articles 2 alinéa 2, 4, 17, 29 et 28 de la loi no 2001-005 portant Code de gestion des aires protégées*). The implementing act introduced further classifications, namely Natural Park (*Parc Naturel*, PNAT), Natural Monument (*Monument Naturel*, MONAT), Protected Harmonious Landscape (*Paysage Harmonieux Protégé*, PHR), and Natural Resources Reserve (*Réserve de Ressources Naturelles*, RRN).

The wider scope of different protection levels allows for multiple use zoning and various forms of collaborative management (Fritz-Vietta et al. 2011), namely:

**Natural Park (*Parc Naturel*)** Within this protected area, rights of usage and traditional fishing are allowed if in line with the management plans for the park and within the limitations of the zones where these activities are permitted. However, commercial exploitation, including natural resource extraction and artisanal or industrial fishing, is strictly prohibited.

**Natural Monument (*Monument Naturel*)** The Natural Monument designation allows for tourist, educational and scientific activities to occur in the area if they are in line with management objectives. However, there is strictly no commercial exploitation allowed.

**Protected Harmonious Landscape (*Paysage Harmonieux Protégé*)** The Protected Harmonious Landscape and Natural Resources Reserve designations may allow resource extraction under regulation.

**Natural Resources Reserve (*Réserve de Ressources Naturelles*)** Under this designation, all tourism activity and removal of natural resources is permitted, subject to enhanced protection of at least two-thirds of the protected area, and to requirements laid out by the management plan for the area.

Following the Promise of Sydney<sup>2</sup>, the Government of Madagascar recently issued a new Protected Areas Code (Loi N° 2015/05 portant refonte du Code de gestion des aires protégées - COAP). All protection categories are centrally defined in the new code with clear descriptions of the limitations to access and use (Art 11-23). The Integral Natural Reserve, National Park and Natural Park remain mostly under a strict no natural resource use policy with exemptions to scientific research.

<sup>2</sup>Madagascar committed to:

1. Finalise the expansion of tripling of the protected areas system which is almost complete, and to included protected areas at the heart of the country's Sustainable Development Strategy as tools for economic growth, political stability and the promotion of equity. In this context, by 20 May 2015 all of the new protected areas proposed through different studies, a total of 7 million ha, will be officially declared and a new Foundation for Protected Areas will enhance their management including their financial sustainability.
2. Triple the number of marine protected areas in the next 5-10 years.
3. A zero tolerance policy on illegal wildlife trafficking and to stop the illegal traffic of wildlife products from the country to contribute significantly to ending wildlife crime worldwide.

## Box 2. Mangroves as Sensitive Zones

All mangrove areas, including their impact zones (zones d'influence), i.e., stretching 10 km upstream from the internal limit of mangroves,<sup>3</sup> have been declared "sensitive zones". The classification gives rise to a certain level of protection, regardless of whether the mangroves are located in a protected area or not.

Any construction and works activity within sensitive zones requires an EIA. Resource management is firmly restricted. As a rule, commercial wood extraction has been banned since 2000.<sup>4</sup> In 2014, a new regulation was adopted which explicitly bans the extraction, transportation, stocking and sale of timber specifically in mangrove areas.<sup>5</sup> Communities may still apply for specific management rights and limited rights of use (see below 2.5). The Forestry Administration is the responsible government agency to enforce the ban and grant management rights and rights of use.

<sup>3</sup>Arrêté No. 4355-97 du 13 mai 1997 portant définition et délimitation des zones sensibles (Annex).

<sup>4</sup>Arrêté interministeriel portant arrêt de toute activité extractive et de ressources ligneuses dans les zones sensibles.

<sup>5</sup>Arrêté No. 32.100/2014 du 24 Octobre 2014: Arrêté interministeriel portant l'interdiction d'exploitation de bois des mangroves au niveau du territoire national.

## 2.4 Forestry legislation

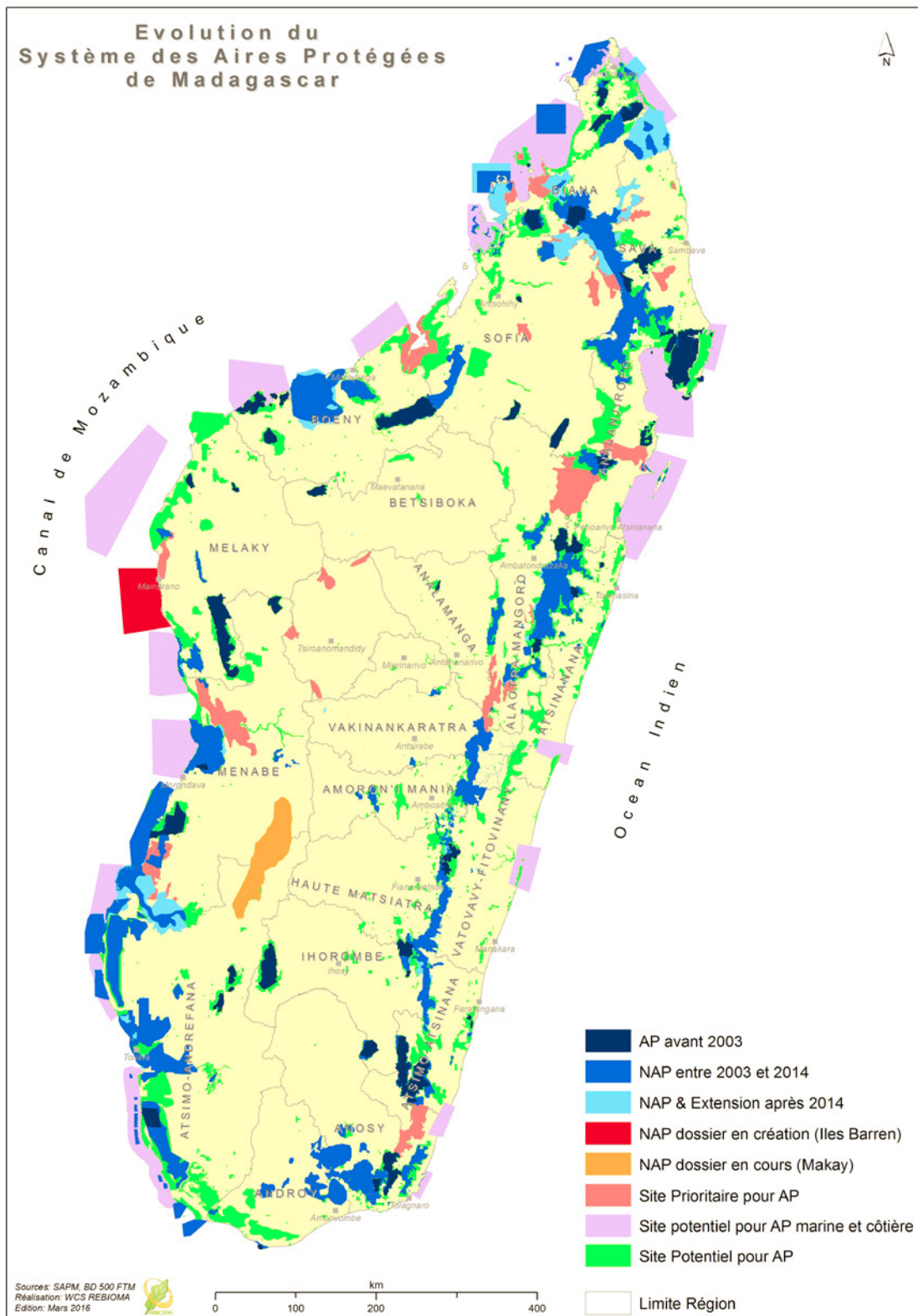
Forestry legislation has been in existence since colonial times. Since independence, the first major legislative milestone was the adoption of the Forestry Law in 1997 (*Loi No. 97-017 du 8 août 1997 portant révision de la législation forestière*). This law defines mangroves as "integrated" (*assimilées*) with forests (Article 2). It sets out different forest classes that are automatically governed by a specific "forestry regime" as set out in accordance with the law – state forests (*forêts de l'Etat*); forests of decentralized entities (*forêts des collectivités territoriales décentralisées*); and public forests (*forêts des établissements publics*). Private forests, on the other hand, are only covered by that regime if the Minister responsible for forests so decides. Customary rights are recognized in all forest types (including private forests), with a view to "allowing the effective participation of rural populations in the sustainable conservation of natural resources", subject to any applicable restrictions (Article 41). The law does not specifically address mangrove areas in any specific way.

By contrast, the decree concerning forest exploitation (*Décret No. 98-782 relatif au régime de l'exploitation forestière*) does refer directly to mangroves. It stipulates that "the mangrove forests and the estuary forests are subject to a management plan" and that "the rules for their exploitation will be specifically laid down by regulation, without prejudice to the exercise by the local populations of their rights of use" (Article 10.2). Beyond the limited sphere of customary rights, "any appropriation of forestry products" requires a government permit (Article 5).

In 1996, the law on local management of natural resources (*Loi No. 96-025 relative à la gestion locale des ressources naturelles renouvelables*), widely known as GELOSE (*gestion locale sécurisée*), was adopted. In 2001, a simplified form of GELOSE, the decree on contractual management of forests (*Décret No. 2001-122 Fixant les conditions de mise en oeuvre de la gestion contractualisée des forêts de l'Etat*), known as GCF (*gestion contractualisée des forêts*) was adopted.

Both GELOSE and GCF aim to empower local (village) communities ("*communautés locales de base*", CLB) through horizontal (contractual) governance. Under GELOSE, a tripartite agreement is concluded between the central government, the decentralised authority and the CLB; under GCF, a bilateral agreement between the Forest Administration and the CLB is concluded. The contracts clarify the communities' rights of use, while establishing a management framework (and management plan), which is designed and implemented locally. Both GELOSE and GCF are widely used by communities living in or adjacent to mangrove areas. Note that GELOSE allows for the integration of fisheries resources; GCF does not.

Protected areas are governed by specific legislation (see Box 1 above).



**Figure 6.** Evolution of the Protected Areas System in Madagascar. Source REBIOMA.

### Box 3. Administrative Responsibilités

A range of specialised implementation agencies manage the environmental action in Madagascar:

**Ministry of the Environment, Ecology and Forests** (*Ministère de l'Environnement, de l'Ecologie et des Forêts*, MEEF) is the body responsible for the EIA process. In the event that an Environmental Permit is refused by the National Environment Office (*Office National de l'Environnement*, ONE), the applicant can appeal to the MEEF for a second opinion.

**The National Environment Office** (*Office National de l'Environnement*, ONE) coordinates the implementation of the National Environmental Action Plan (PNAE). This body coordinates the EIA process and issues environmental permits, as well as the evaluation of environmental audits. This board was put under the control of the Ministry of Environment (*Ministère de l'Environnement*) and the Ministry of Finances and Budget (*Ministère des Finances et du Budget*) Forest in 2008 when environmental policy in Madagascar was strongly influenced by the World Bank foreign aid regime. (Froger & Méral 2012). The arrangement continues to be in place (GECO 2016).

**Madagascar National Parks** (MNP), formerly the National Association Protected Areas Management (*Association nationale de gestion des aires protégées*, ANGAP), is a para-state organisation that manages national protected areas.

The cross-cutting nature of environmental issues was recognized as early as 1997. It created the **Inter-Ministerial Environment Committee** by decree in 1997 (*Décret N° 97-823 du 12 juin 1997 portant création, organisation et fonctionnement du Comité interministériel de l'environnement - CIME*) as a coordination structure made up of ministers under the authority of the Prime Minister. This Committee works on mediation issues and looks to ensure that policies and strategies adopted within each ministry include an environmental or sustainability dimension. This body often intervenes in mining disputes (Soritra, ONF-International and REDD-TC 2014).

**The National Association for Environmental Action** (*Association nationale d'actions environnementales*, ANAE), created in 1991 to direct actions on soil erosion, water and soil conservation, and rural development, is an important public stakeholder, which manages conservation projects and builds capacity in the areas of biodiversity, climate change, food security and others (ANAE 2014).

**The National Office for Climate Change Coordination** (*"Bureau National de Coordination des Changements Climatiques"*) was created under the Ministry of Environment, Ecology, Sea and Forests, now Ministry of Environment, Ecology and Forests (Ramarojoana et al. 2011; LSE 2016) in March 2015 (through Decree No. 2015-09), in recognition of the need to have a government entity that can coordinate and lead activities related to climate change in Madagascar. The mission of the BNCCCC is twofold: 1) to promote climate change adaptation to improve economic resiliency, and 2) to promote a sustainable, low-carbon transformation of the economy. The BNCCCC's main attributions are therefore to coordinate and implement climate change actions, programmes and projects; monitor and verify additionalities regarding climate change responses; to facilitate and provide administrative and technical support to stakeholders working on climate change issues at the national level; to mainstream climate change actions into public and private sector policies and strategies; to elaborate and disseminate strategic documents related to the ratification of the UNFCCC; and to manage and disseminate information and techniques to adapt and mitigate for climate change. This Office is also responsible for coordinating the representation of Madagascar in international climate change negotiations.

**Ministry for Fisheries and Marine Resources** (*Ministère des Ressources Halieutiques et de la Pêche*, MRHP) is the body that concerns itself with commercial fisheries and other marine resources in the country, especially seeking to improve economic growth, reduce poverty levels and sustainably manage this natural resource (MRHP 2016). This body concerns itself with the management of blue carbon ecosystems.

**Ocean Directorate** (*Secrétariat d'Etat en charge de la Mer*, SEMer) With the last structure change the management of coastal and marine resources was removed from the Ministry of Environment (MEEF) and from now on managed by the Secrétariat d'Etat en charge de la Mer (SEMer)<sup>6</sup> normally linked with the MRHP.

**National Committee for the Integrated Management of Coastal Zones** (*Comité National de Gestion Intégrée des Zones Côtières pour la gestion intégrée des zones côtières et marines*, CNGIZ) has the objective to promote sustainable development of coastal and marine resources of Madagascar and the coordination of partners in coastal and marine areas. The CNGIZ is attached to the office of the Prime Minister of Madagascar.

<sup>6</sup>Conseil des Ministres du 4 mai 2016

## Box 4. Land tenure

Under formal law, most of Madagascar's forest and agricultural land is considered state property or "non-titled" land. Government-owned forest land falls in one of the three classes defined under the 1997 Forestry Law: State forests (forets de l'Etat); forests of decentralized entities (forets des collectivités territoriales décentralisées); and public forests (forets des établissements public). Individual property only exists as "titled land", and this is rare. According to estimates for agricultural land, the share of titled land is 7% (USAID 2010). Under customary law, the situation is different, however. 90% of farmers enjoy ownership rights, which are acknowledged by way of a quasi-formal system, the "petits papiers" mechanism. This is a fairly uniform practice across the country to state and trace the land, the origin of the land right, and the nature of the transaction by which it was conferred (USAID 2010). In forest areas, individual and communal claims based on customary law are mixed and less clearly defined as under the "petits papiers" system for agricultural land. Customary rights are, to some extent, recognized by formal law as "rights of use" (for mangroves, see Article 10.2 of the law concerning forest exploitation (supra)), but the practical dimension is often not clear, which gives rise to uncertainty and, at times, conflict (Mansourian et al. 2014).

Attempts to mitigate the situation led to the adoption of new land and land registration laws, on the one hand, and the introduction of new governance tools, GELOSE and GCF, in particular, on the other. The National Land Program of 2005 aims to decentralize the land registration process (formalized under Land Law No 2005-019), while the Land Law No 2006-031 (Loi No. 2006-031 de 24 Novembre 2006 fixant régime juridique de la propriété foncière privée non titrée) gives specific rights to individuals and groups to obtain land title on land, which is otherwise considered non-titled land. Note that the land law of 2005 does not apply and the land law of 2006 has little bearing (the latter) on forest land. For forest land, the dedicated programs GELOSE and GCF apply (see main text).

## 2.5 Coastal management laws

Madagascar embarked on a more integrated and sustainable development path for coastal zones by adopting decree N°2010-137 (Portant réglementation de la gestion intégrée des zones côtières et marines de Madagascar, GIZC) on integrated management of coastal areas. It lays the foundation for a comprehensive, multi-stakeholder and multi-sector planning approach, which includes coordination between relevant administrative levels and Ministries.

Article 14 of the GIZC reconfirms the need for specific authorization for any "change of [land] use" in sensitive areas. The competent Minister must allow the change after consultation with the National Committee for the Integrated Management of Coastal Zones (Comité National de Gestion Intégrée des Zones Côtières pour la gestion intégrée des zones côtières et marines, CNGIZ), created under the same law.

More recently, an additional body has been set up. The National Committee for Integrated Mangrove Management (Commission Nationale de Gestion Intégrée des Mangroves, CNGIM) was created by Decree No. 629/2015 with the mandate to explore policy options for better conservation and management of mangroves. It was put in place by a governmental initiative led by the Ministry for Fisheries and Marine Resources and mobilises several ministries, including the MEEMF (now MEEF), the Ministry for National Defence (Ministère de la Défense Nationale), the Ministry for Higher Education and Scientific Research (MESUPRES, Ministère de L'Enseignement Supérieur et de la Recherche Scientifique). The underlying assumption of the committee

is that mobilising research to improve understanding of mangroves will lead to better management of them and other marine resources (La Gazette 2015).

## 2.6 Fisheries

Earlier legislation from the 1990s (namely the order from 4 May 1993 detailing the regulation of fishing and aquaculture, Ordonnance 93-022 portant réglementation de la pêche et de l'aquaculture) was recently updated through the adoption of the Law on Fisheries and Aquaculture 2015 (Loi No. 2015-053 portant code de la pêche et de l'aquaculture). According to the law, the Minister in charge of Fisheries and Aquaculture (MRHP) must, in collaboration with other concerned ministers, prepare and maintain management and zoning plans with the aim of regulating and conserving fish stocks in the long term. These management plans must be based on up-to-date data that gives insight into the state of exploitation of fish species. Certain zones are reserved for customary fishing practices, permitted under Article 49 of the law. All commercial fishing and aquaculture activities are subject to government authorization. Reacting to high rates of foreign fishing boat intrusions, the law requires that vessels fishing in Malagasy waters be registered in Madagascar or belong to Malagasy people.

Article 19 makes reference to special regulations in place for "sensitive areas" (including mangroves, see above). The Fisheries Law, therefore, only addresses mangroves indirectly through penal provisions (infra) and a provision that requires aquacultures operations to not destroy mangrove areas in excess of 10% of their total production area (Article 112).

The Fisheries Law is otherwise evidence for the turn to more horizontal policymaking. It addresses local communities in a more participatory way and in terms of good governance, while the stakeholders in the fishery and aquaculture industries must all contribute to Malagasy economic growth, food security and poverty reduction (Loi no. 2015-053 portant Code de la pêche et de l'aquaculture).

## 2.7 Mining

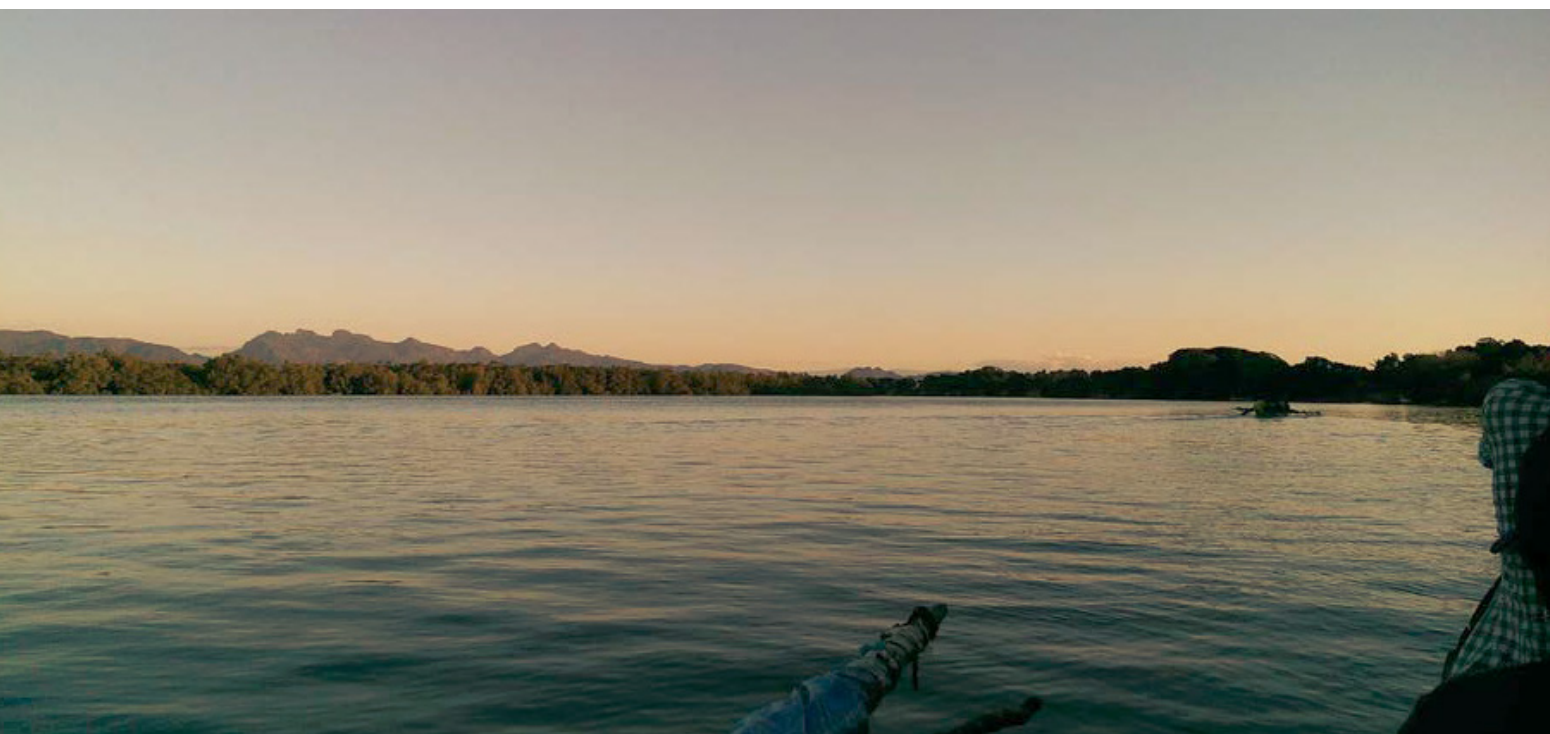
Mining law in Madagascar is regulated by the Mining Code and its implementing decree (Law No. 99-022 from August 1999, later amended by Law 2005-021 in October 2005, alongside Decree No. 2006-910, from December 2006). The mining industry is managed by the Ministry of the President in charge of Mines and Petroleum (Ministère auprès de la Présidence chargé des Mines et du Pétrole) and the Malagasy mining registry, known as the Bureau du Cadastre Minier de Madagascar. Under the 2005 amendment, potential mining operations must undergo a study of environmental impacts once an environmental commitment plan has been submitted by the applicant in order to receive a permit (African Law and Business 2015). At the time of writing, the code was once more under amendment. A range of issues has given rise to heated debates among stakeholders, including the relationship between industrial-scale and small-holder mining (Antsa 2016).

## 2.8 Individual responsibilities and sanctions

The Environment Charter 2015 obliges any individual – whether a natural person or a legal entity – to repair any damage it has caused and to rehabilitate, where necessary (Article 9). Article 10 explicitly enshrines the “polluter pays” principle.

Under the Fisheries Code of 2015, anyone who “cuts, collects, transports or sells mangrove wood without authorization” must pay between 10,000 and 20,000 USD per hectare of mangrove area destroyed “and/or” faces imprisonment between 6 to 12 months (Article 84). Customary rights of use are not affected (Article 84.2). Anyone who violates the 10% share rule for mangrove destruction for aquaculture production (see *supra*) faces the same punishment (Article 139).

On the side of customary law, “dina” is a social code incorporating certain provisions on enforcement and punishment. It governs interactions in the rural areas in Madagascar and applies to all community members, including executive members of the local governing associations. All community members over the age of 18 adopt the code in writing or in the form of a pact. This social code has been integrated into formal policy, including the GELOSE law and the code of protected areas. However, it is important to note that it can be difficult to apply the dina generally because every “fokontany” (a village or a bundle of villages) has its own interpretation of the code (Andriamalalala and Gardner 2010; Fritz-Vietta et al. 2009). In some areas, such as Mananara, different social codes can conflict one another. For example, the “fihavanana” states that disputes should be dealt with amicably, while the dina condones the application of fines (Fritz-Vietta et al. 2009). There can, therefore, be conflict between formal state law and local customary law.



### 3. Government initiatives

The importance of mangroves for flood and erosion control was recognized in the National Adaptation Programme of Action (*Programme d'Action National d'Adaptation au changement climatique*, PANA) from December 2006 (de l'Environnement, des Eaux et des Forêts 2006). The National Climate Change Policy of 2010 (*Politique nationale de lutte contre le changement climatique*, PNLCC 2010) highlights coastal zones as particularly vulnerable to climate change, and mentions the need to explore climate finance options at all levels, including voluntary carbon markets and REDD+ (Ministère de l'Environnement et des Forêts 2010).

The recently adopted National Development Plan (*"Plan National de Développement"*, PND, 2015-2019) assesses different drivers of degradation of forests and coastal ecosystems and lays out several strategic development axes for the country for the next five years. One of these is dedicated to the 'valuation of Natural Capital and disaster risk reduction'. A priority is the inclusion of natural capital assets into economic and social development planning processes and including them in the national accounting system (project WAVES) (PND 2015).

The concept of nature capital valorisation is also echoed in the National Policy for Sustainable Development (*Politique Nationale de l'Environnement Pour le Développement Durable*) of 2015 (issued through Decree No 2015-1308). The policy aims, inter alia, for the development of sustainable funding streams through instruments such as "payment mechanisms for environmental services" and "competitive carbon market" tools.

Note, however, that in this context the type of assets and environmental services – other than carbon asset generation – are not further defined. In 2015, the Fisheries Ministry, referencing the PND, issued its "Lettre de Politique Bleue", a White Paper on fisheries and aquaculture. The Ministry states that more than 800 villages exist in close proximity to mangroves and notes that there has been a "spectacular" increase in the number of wild crab permits issued since 2012, pointing to high demand from Asia, in particular. The paper does not include concrete plans for the increase in artificial production (aquaculture), but recommends the assessment of "potential zones" for aquaculture and investment support mechanisms.

#### 3.1 Intended Nationally Determined Contribution

Madagascar's Intended Nationally Determined Contribution (INDC) (Madagascar 2015) makes specific reference to the dual role of forest and biodiversity for ecosystem-based adaptation and mitigation. Mangroves are referenced at multiple levels: as a key element for ecosystem-based adaptation approaches, in terms of sustainable management, and with a view to deforestation-focused policies. The restoration of 35,000 hectares of "primary forest and mangroves" is among the priority actions for 2020, and 45,000 or 55,000 hectares by 2030.<sup>7</sup>

Madagascar intends to reduce overall GHG emissions from all sectors by 30 million tCO<sub>2</sub>eq below business-as-usual by 2030. In addition, Madagascar looks to increase the absorptions in the Land Use, Land Use Change and Forestry (LULUCF) sector by approximately 61 MtCO<sub>2</sub> by 2030, although it is unclear whether this calculation includes sequestration figures from mangroves or not. The submission uses the terms "forests" and "mangroves" as distinct from each other, and the text does not make reference to the 2013 Wetlands Supplement. Under the Clean Development Mechanism (CDM), Madagascar chose a restrictive forest definition, requiring a single minimum tree height of at least 5 m. That would exclude most mangrove trees native to Madagascar.

<sup>7</sup> The INDC document list both figures. It is also not clear, whether the target is supplementary to the 2020 target (35,000 hectares) or whether it expresses a total of the 2020 efforts and the 2030 efforts.

#### 3.2 National Biodiversity Strategy and Action Plan

Madagascar is currently in the process of renewing its National Strategy for Sustainable Management of Biodiversity (NSSMB), first established in 1996 and based on improving living standards by reducing poverty and conserving and valuing biodiversity, a document coordinated by the Biodiversity Commission and organised by Sustainable Valorisation of Biodiversity of the ONE (CBD 2016).

The National Strategy for Sustainable Management of Biodiversity in Madagascar (SNGDB) was developed with input from local communities, public institutions, the private sector, researchers, and international NGOs. The SNGDB was implemented in 2002 and has not been updated since then, although recent developments such as the 2010 CBD targets or the new national priorities under the Madagascar Action Plan (MAP) have been integrated into the implementation process.

The targets included in the SNGDB that relate to blue carbon protection include accelerating the finalisation of the GIZC plans and the process to create biosphere reserves, as well as putting in place a National Strategy on Wetlands by transferring the management powers to local communities, as well as preventing pollution in wetland areas. The document also sets out a plan to integrate sustainability plans into development plans, particularly coordination between the various international conventions that Madagascar is party to.

The plan also highlights the improved management of mangroves, including elaborating municipal bylaws for the protection of these blue carbon ecosystems, as well as applying the GELOSE (community management). Other coastal protection initiatives include controlling pollution and/or granting credit to artisanal fishermen to buy equipment for small-scale fishing.

### 3.3 REDD+

Madagascar is a participating country in the UN REDD Programme, in the context of which, in 2015, it completed its Country Needs Assessment. The assessment encouraged Madagascar to seek legislative and regulatory reforms, in particular in the land and forestry sectors (UN-REDD 2015). This falls in line with the current development of a new forestry code under project TCP/MAG/3501, a two-year project launched in 2014 to review and revise the existing legislation (see section 3.4 on Forestry Law) (FAP 2003).

Madagascar is also a partner country of the Forest Carbon Partnership Facility (FCPF). It finalised the Readiness Preparation Proposal (R-PP) in 2014 and the Emission Reductions Program Idea Note (ERPIN) in 2015. At the time of writing, it has prepared the Emission Reduction Program Document (ERPD), which will prepare a forest carbon-based purchase agreement. While the ERPIN does not focus on mangroves, they are included as one of four distinct and eligible 'ecoregions' in the R-PP.

Madagascar's REDD+ policy is managed by a set of government institutions. The Inter-Ministerial Environment Committee (*Comité interministériel de l'environnement*, CIME) was involved in the initial stages about what strategic aspects must be integrated into sectoral policies and programmes.

The Steering Platform for Readiness REDD+ outlined the best ways to manage a REDD+ strategy and development of the technical components, such as improving national policy framework, creating incentives for sustainable management of forest resources, enhanced monitoring, and promoting alternatives to deforestation. It also highlighted sectoral conflicts to bring to CIME for resolution.

The REDD+ National Coordination Office (*Bureau National de Coordination REDD-plus*, BNC REDD) manages the technical and operational coordination of all activities related to readiness (for example, managing consultants), as well as ensuring that the principles of environment, energy, security and health are followed (Andriamanjato et al. 2014).

#### REDD+ national strategy

A REDD+ national strategy is currently under development by the Technical REDD Committee and the Ministry of Agriculture. The REDD+ framework, to be negotiated with all stakeholders, will enhance alignment of policies and ensure strategy implementation. It will address the following main areas: (i) intersectoral coordination; (ii) the spatialized approach and monitoring of the framework; (iii) forest carbon ownership; (iv) allocation of funding to implement REDD+; and (v) management and sharing of carbon revenues (FCPF 2014).

#### REDD+ Pilot Projects

Madagascar hosts a number of REDD+ project activities (World Bank 2015). The Makira project, located in the eastern humid forests in the northeast of Madagascar, is managed by the Wildlife Conservation Society (WCS). It has a 30-year life span and expects some 38,000 tons of avoided carbon emissions during this period. The Ankeniheny Zahamena Corridor project is also located in the country's eastern humid forest and is being managed by Conservation International (CI). The project has certified over three million Emission Reductions (ER), of which the BioCarbon Fund (BioCF) has agreed to purchase 430,000. The government and the project entity are finalizing arrangements that will allow the payment to be completed. The Holistic Forest Conservation Program (PHCF) REDD+ initiative is being managed by the non-governmental organizations Etc Terra, the GoodPlanet



Foundation and the World Wide Fund for Nature (WWF) and is distributed over five sites from the northeast to the southeast of Madagascar.

Other projects have provided support in building capacity for REDD+. The MRV (Measurement, Reporting and Verification) development project, which is being implemented with the National Environment Office (ONE), aims to develop the capacities of national institutions to develop a national MRV system for Madagascar and a national emissions reference scenario (REL). The Foreca REDD+ Initiative closed in 2011 but represented an important methodological effort for Madagascar and supported national institutions in dialogue on REDD+ issues (REDD-FORECA Team 2010).

None of the REDD+ pilot and support projects cover blue carbon ecosystems. As explained above, mangroves are part of the forest definition in domestic law, but Madagascar's forest definition selected for the CDM excludes many mangrove areas, due to its minimum height definition of 5m. The R-PP states that "62 percent of the trees (of DHP > to 5 cm) are over 5 m in the Tapia stands and mangroves".

In reality, however, especially in the mangrove areas most under threat, this is not the case (Blue Ventures, personal communication). For REDD+ purposes, the situation is not yet fully clarified. The R-PP, nonetheless, includes mangrove-related information and also notes that the "[REDD+] implementation is of fundamental importance for the sustainable management of mangroves, which constitute a substantial reservoir of carbon and biodiversity, mainly on the country's west coast (260,000 ha)" (FCPF 2014).



## 4. Recommendations

The goal of this report is to showcase the myriad of legal and policy instruments with an influence on the management of blue carbon ecosystems (see Figure 6) – with a focus on better management of protected areas and marine and coastal resources on the ground. This report also looks to provide an outlook on gaps, challenges and opportunities of the existing framework (Figure 7).

### Increased data collection and knowledge

An opportunity for better management of blue carbon ecosystems lies in increased data collection and knowledge. Increased data on the distribution of both mangroves and seagrasses will likely contribute to a better understanding of both the causes and consequences of loss of these blue carbon ecosystems. A comprehensive overview outlining the key identifiable causes of deforestation would be beneficial so as to understand where gaps can be filled, building on Jones et al. (2016).

### Monitoring and evaluation

Monitoring the implementation of blue carbon projects on a decentralised level is difficult as the Malagasy State may lack the organizational and financial capacity to comprehensively monitor its environmental policy (Hrabanski et al. 2013). However, establishing a set of regional baselines would allow the government (at variable levels) to monitor changes in distribution and abundance of blue carbon ecosystems.

Though a specific REDD policy/law is not currently in place, the REDD-MRV system, that is, Measurement, Reporting and Verification, will require robust data collection and monitoring systems in order to reliably account for the changes in the amount of forest carbon over time. This will create transparency and allow for comparability to other blue carbon projects throughout Madagascar, as well as allow for accurate reporting to the UNFCCC. The attempts by the Malagasy government to build a forest carbon registry within the framework of the FCPF is welcome. A clear commitment to addressing and including mangrove related GHG fluxes will be of genuine relevance.

### Improving institutional capacity and enforcement, including through local communities

It is essential to have efficient enforcement bodies in order to ensure that environmental regulations are implemented and followed. The formal protection regime in mangrove (or “sensitive”) zones is relatively strong – construction requires EIAs, commercial logging and sales are explicitly forbidden – yet, in reality, it is hard to uphold the law. The EIA process is only robust when there is capacity to demonstrate, and assess, the scientific, technical, and socio-economic implications of a measure in order to eliminate, reduce and, if needed, compensate the negative consequences of any planned investment on the environment (Economic Development Board of Madagascar 2004). Also, EIA findings need to be followed through. If this does not happen, then the EIA will have no bearing on the overall consequences on fragile ecosystems.

Timber extraction bans need to be enforced in their own right. The government may not always have the resources to secure enforcement. Yet, the country’s recent move to participatory management instruments – including COA, GELOSE and GCF, in particular – and the new focus on local community governance can be remodelled to include a law enforcement mechanism, ideally combined with a results-based incentive scheme (e.g. special quotas to sustainably harvested timber).

The improvement of COAP, GELOSE and GCF is of particular importance, and the success of these instruments is critical. While the GCF was meant to simplify the conditions under which the management transfer is implemented, critics voice concern that the results have at best been mixed (Blanc-Pamard & Rakoto Ramiarantsoa, 2007; Hockley & Andriamarivololona, 2007; Brimont & Karsenty 2015). The process and the contractual tools used should be evaluated in close coordination with local management associations and the government, with the aim of releasing a consolidated approach in the near future. A stronger focus on incentive schemes – building on payment for ecosystem services (PES) approaches (see below) – is particularly recommended.

### Overlapping jurisdiction

While conflicting ministerial responsibilities are still to be resolved in Madagascar, it is important to clarify at the technical level, as much as possible, the jurisdiction of ministries for improved management of blue carbon ecosystems. The recent transfer of the remit over coastal and marine resources from MEEF to SEMer, which is a directorate of MRHP with a genuine ministry portfolio (Secretariat d’Etat), is not fully implemented and is likely to continue to create confusion, which in turn will hamper effective action. Within MRHP, SEMer and the MRHP cabinet are not always aligned in their management decisions, which adds ambiguity. As blue carbon is a cross-cutting policy approach, there will hardly ever be a single ministerial responsibility. Yet, the specific responsibilities for each administration should always be clear, and instruments of joint management which exist - CNGIZ and CNGIM are meant to coordinate action and should strive to increase their relevance – need to be strongly supported by the government. CNGIZ and CNGIM may also trigger broader blue carbon mainstreaming tools across policy sections (fisheries, trade and export, water and sanitation, etc.).

### Clarifying land tenure and ownership

The lack of clarity regarding land ownership creates difficulties in securing communities’ management rights or benefits of ecosystem services from blue carbon ecosystems. The current national land tenure reform programme (*Programme Nationale Foncière* - PNF) is commended for aiming at simplifying the land tenure recognition process. While this process will take years and decades to roll out, land management instruments, notably GELOSE and GCF but also participation processes provided by COAP, remain of highest importance both to empower local communities and to secure the sustainable

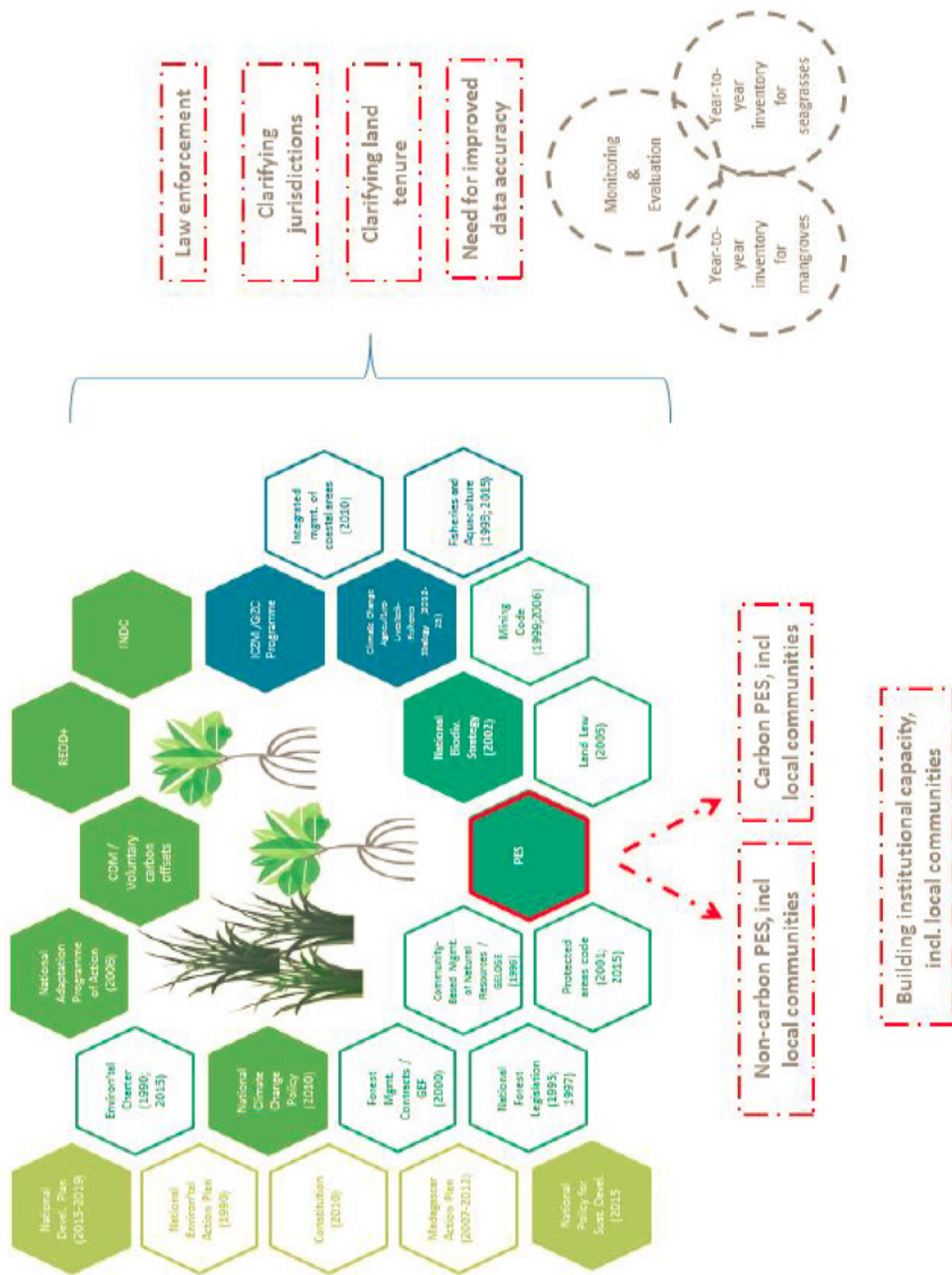


Figure 7: Overview - Main opportunities in national laws, policies and initiatives with an impact on blue carbon ecosystem management.

use of ecosystems (including blue carbon ecosystems). Management contracts should be simple, accessible, flexible to cater to local diversity, and transfer real authority; the renewal process should be practical; and the contracts should build in performance-based financial support mechanisms and other PES-based incentive schemes. A special focus on mangroves, as well as coastal seagrass environments, will be particularly valuable in the context of conserving and restoring blue carbon environments.

### **PES and the involvement with local communities**

The involvement of local communities is important in integrating the policies decided by the Malagasy government at an upper level (Barnes 2014). Ferguson and Gardner (2010) suggest that the policy processes should be more inclusive of Malagasy people of all levels of the development stage, drawing from the experience of other developing countries. Accepting input from multiple stakeholders at the developmental stage may help to encourage policy reform to create more realistic or effective policies. This would help to bridge, as Ferguson and Gardner mention, “discourse-practice divide” that currently exists in Madagascar (Ferguson and Gardner 2010).

Alongside this is the need to educate local communities about the long-term value of preserving blue carbon ecosystems and to demonstrate how they can contribute to existing protections in place. Short term economic solutions are equally required in economically sensitive environments to offset costs of resource management, i.e., supplementary or alternative livelihoods.

A gradual shift to PES approaches promises long-term engagement of local communities and long-term guarantees for natural, including blue, ecosystems. In ascertaining the possibility of payment for ecosystem services (PES) systems, it is important to know the wide range of values of these ecosystems, including “non-price” values. This process is known as Ecosystem Service Valuation (ESV) and it can be used as a tool to prioritise the conservation and good management of blue carbon ecosystems so as to determine potential compensation, or identify a willingness-to-pay between stakeholders. Blue carbon-related value factors include healthy fish stocks, permanent drinking water supply, timber and fuelwood resource, flood and erosion protection, as well as climate- and carbon-related services. Establishing a PES system – or a multitude of PES systems – involves the participation of both public and private sector actors, and the levying of service fees will only be successful if the entire drivers-of-degradation chain is taken into account. Long-term mangrove conservation will require the availability of fuelwood alternatives for local communities. Wide distribution of efficient cook stoves will likely prove a useful policy that would support mangrove reforestation activities, which will ultimately allow for sustainable wood extraction.

There are promising pioneering developments in Madagascar. Conservation International (CI) actively supported a “Biodiversity PES” relying on conservation agreements and ecological monitoring in the centre-east of the country so as to

compensate the populations living within areas where the use of resources is strictly governed. A “Blue Carbon PES” is under way in the north of the country. Blue Ventures, a UK-NGO that has been working in Madagascar since 2003, plans to develop community-based blue carbon projects at two demonstration sites as part of the UNEP/GEF Blue Forests Project: 1) Ambaro-Ambanja Bay – a large area (12,000 ha of mangroves) for development under the Verified Carbon Standard (VCS), and 2) Bay of Assassins – a smaller area (1,300 ha of mangroves) for development under the Plan Vivo carbon standard<sup>8</sup>. The specific goals are to develop the technical, organizational and financial capacities of local communities to sustainably manage their mangroves. Management plans have been developed for 10,492 ha of mangroves across these sites, and the management rights of over 23,000 coastal people have been secured through the establishment of a Marine Protected Area (MPA) and five management transfer contracts. These management plans form the basis of the blue carbon projects. To date, over 50 ha of mangroves have been restored through community volunteer reforestation programs. The project is also conducting research and stakeholder consultations to make community-led, rights-based blue carbon projects a reality. As part of the initiative, above- and below-ground carbon stock assessments were carried out.

The government is supportive of these pilot initiatives. It set up a national working group on PES (*Group de Travail sur les PSE*) and has widely engaged with stakeholders (Andriamahefazafy et al. 2012). Sustainable tourism, in particular, has been recommended by researchers and policymakers as a way to promote the goals of conservation and to become a PES nucleus (Scales 2014). The workings are further supported by wider attempts to integrate PES in larger economic and social development processes. PES may yet become the base structure of Madagascar’s future environment policy.

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<sup>8</sup>The Plan Vivo Standard certifies the implementation of project activities that enhance ecosystem services and allow communities to formally recognise and quantify carbon sequestration, biodiversity or watershed protection. <http://www.planvivo.org/>

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