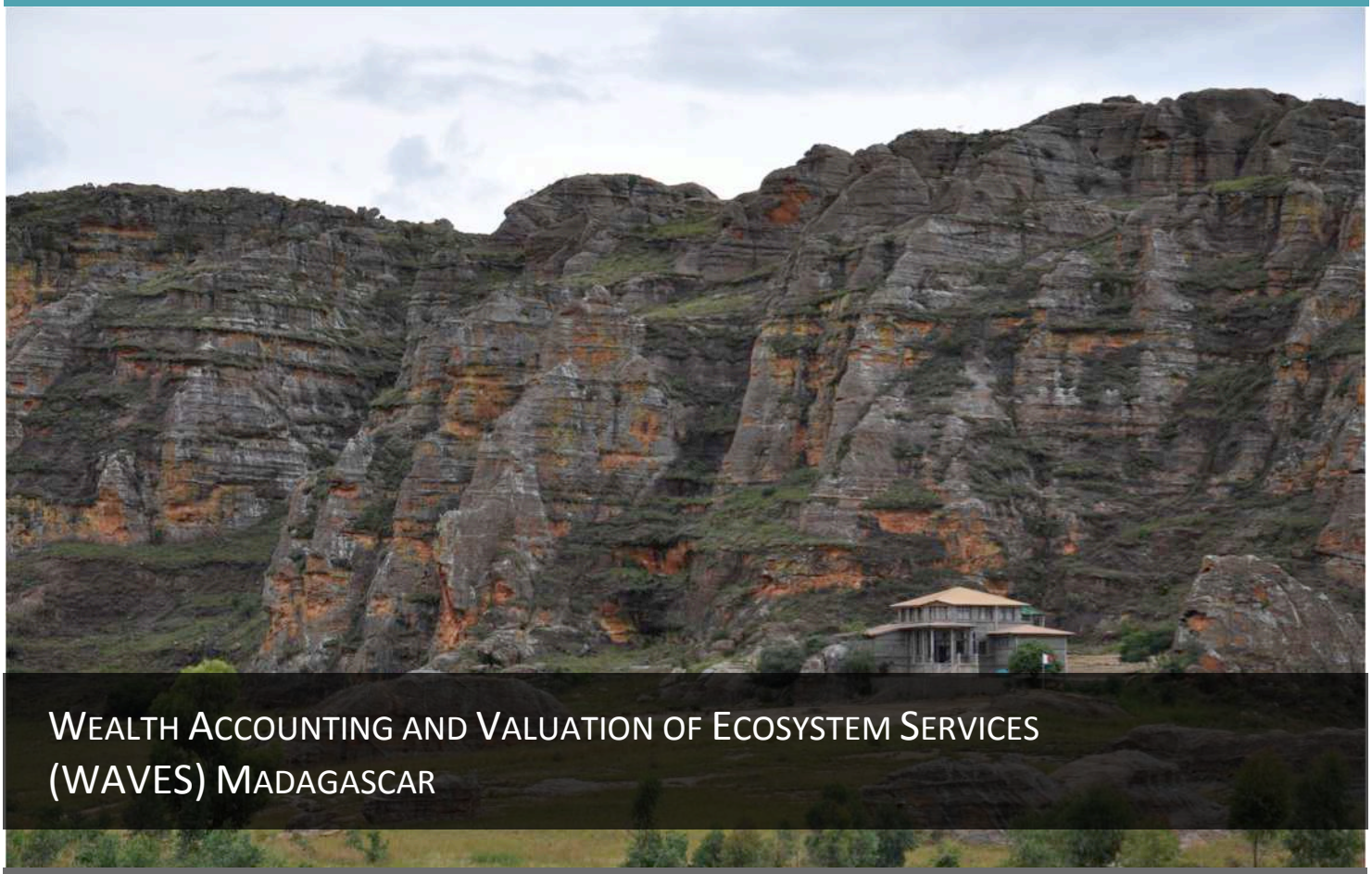

WEALTH ACCOUNTING AND VALUATION OF ECOSYSTEM SERVICES (WAVES) MADAGASCAR

PHASE 2 SCOPING STUDY AND WORKPLAN

February 2013

WAVES Madagascar National Steering Committee

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Cover photo: Visitors' center and landscape of Isalo National Park. Located in the southwest of the country, it is the most visited protected area in Madagascar

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Acronyms and Abbreviations

AfDB	African Development Bank
ANNI	Adjusted net national income
ANS	Adjusted net savings
CAZ	Corridor Ankeniheny-Zahamena
CNGIZC	National ICZM Committee
CREM	Madagascar Center for Economic Research
EP3	Third Environmental Support Program Project
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross domestic product
GEF	Global Environmental Facility
GNI	Gross national income
ICZM	Integrated coastal zone management
IDA	International Development Association
Instat	National Statistics Office - *Institut National de la Statistique de Madagascar*
MEI	Ministry of Economy and Industry
MFB	Ministry of Finance and Budget
MNP	Madagascar National Parks
NTFP	Non timber forest products
ONE	National Environment Office
SEEA	System of Environmental and Economic Accounting (of the United Nations)
SNA	System of national accounts
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
WAVES	Wealth Accounting and Value of Ecosystem Services Global Partnership
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

1 Introduction

1.1 Introduction to the WAVES Global Partnership

The overall objective of the Wealth Accounting and Valuation of Ecosystem Services (WAVES) Global Partnership is to promote sustainable development worldwide through the implementation of wealth accounting that focuses on the economic value of natural capital. The World Bank is leading this initiative in partnership with the United Nations Environment Program (UNEP), developing and developed partner countries, NGOs and other organizations.

The WAVES Partnership has four components: (i) implementation of ecosystem and natural capital accounting in selected partner countries; (ii) incorporation of ecosystem and natural capital accounting in policy analysis and development planning; (iii) development of a methodology for ecosystem accounting for the UN's revised *Handbook for the System of Environmental and Economic Accounting (SEEA)*[1]*;* and (iv) promotion of the adoption of ecosystem and natural capital accounting beyond the initial partner countries.

Madagascar has been selected as one of five partner countries[2] to participate in the WAVES Global Partnership. Partnership activities in Madagascar are being carried out in two phases:

(i) Phase 1- Preparation Phase (February 2011 to March 2012): during which time a country specific Scoping Study and WAVES Madagascar workplan has been prepared, together with two technical case studies for presentation to the *Rio+20 United Nations Conference on Sustainable Development*;

(ii) Phase 2 - Implementation Phase (July 2012 – December 2015): during which time technical project activities will be implemented in line with the agreed workplan.

1.2 WAVES in Madagascar and Activities to Date

WAVES activities in Madagascar commenced with an agreement in February 2011 between the Government of Madagascar and the World Bank to include Madagascar as a partner country. A partnership launch workshop was held at this time to raise awareness about WAVES in Madagascar and to start the process of identifying potential in-country partners.

The Government of Madagascar subsequently signaled its strong commitment to the WAVES Partnership through the Cabinet's endorsement of Madagascar's involvement, and its agreement to a co-financing of US$500,000 for WAVES activities as part of the additional financing to the IDA/GEF Third Environmental Support Program Project (EP3) that was approved by the World Bank Board in June 2011.

A WAVES Informal Working Group including representatives of Government agencies and NGOs was formed in March 2011 to guide Phase 1 activities. The main activities of the Working Group have included the supervision of two technical case studies – one evaluating water resource services of eastern humid forests ecosystems and one in the fisheries and coastal resources sector – that were carried out as a means of trialing different methodologies that could be implemented during WAVES Madagascar and the identification of priority policy objectives for inclusion in the workplan. In August 2012 the Informal Working Group was converted into a national Steering Committee with the mandate of overseeing implementation of activities in the WAVES Madagascar workplan.

1.3 Purpose and Structure of Report

This Scoping Study identifies the priority issues for inclusion in the second phase of WAVES based on a review of national policy objectives, existing data and natural capital accounting activities, and a review of the capacity building needs of Government and non-Governmental agencies in such

[1] United Nations Statistics Division. 2012. *Central Framework for System of Environmental and Economic Accounting*. https://unstats.un.org/unsd/envaccounting/seea.asp

[2] Madagascar is one of five developing country partner countries; the others are Philippines, Colombia, Costa Rica, and Botswana. A number of developed countries including Australia, Norway, UK and possibly Canada will also be partner countries for the Partnership.

activities, and contains a workplan that outlines the activities, schedule and budget for WAVES Madagascar.

The Scoping Study has been prepared in collaboration with key Government and non-Government stakeholders participating in the national Steering Committee, with the technical assistance of the World Bank. The report has been structured as follows:

- Section 2 presents an overview of the macro-economic and environmental context within which WAVES is being implemented in Madagascar. This section highlights the historic and current growth and structure of the national economy, as well as discussing the main influences on economic development. It includes an overview of the key natural resources in Madagascar, their importance to national and local economic development, and the main threats and pressures acting on them.

- Section 3 describes past and current natural resource accounting and ecosystem valuation activities in Madagascar, including a summary of the technical case studies prepared for Phase 1 of WAVES, the treatment of natural resources in the System of National Accounts, and the organizations involved in these activities.

- Section 4 describes the priority policy objectives to be addressed by WAVES Madagascar. For each policy objective it provides an overview of the issue and the potential opportunities for WAVES activities.

- Section 5 contains the WAVES Madagascar workplan and budget. For each of the policy objectives identified in Section 4 it describes the activities that will be carried out under WAVES Madagascar. It describes the crosscutting activities of capacity building, communications and project management that are included in the workplan and provides an overview of the workplan implementation schedule and institutional arrangements.

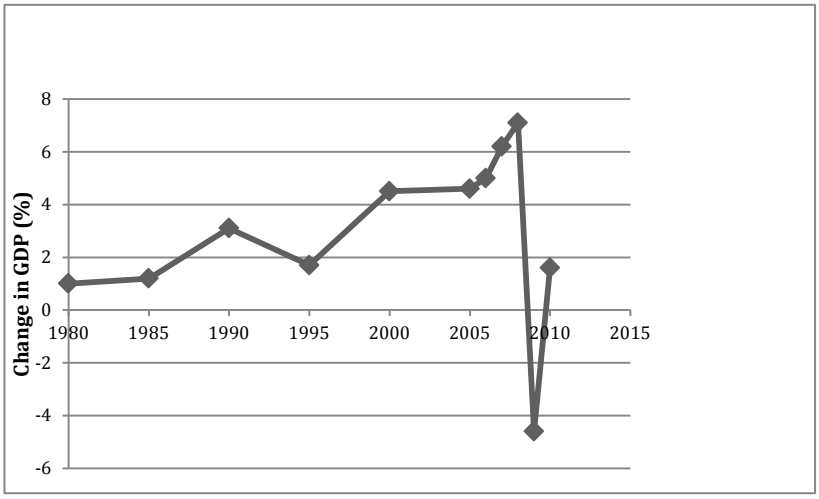
2 Overview of Economic and Environmental Context in Madagascar

2.1 Macro-economic Context in Madagascar

2.1.1 Past and Current Economic Performance

For the last thirty years, weak growth and fragility in the face of repeated political crises have characterized the macroeconomic performance of Madagascar. Between 1980 and 1995, average annual GDP growth was less than 2 percent (refer Figure 2.1), and 2010 GDP was lower in real terms than GDP in 1990. Improved GDP growth rates were evidenced from the late 1990s, and significant growth was seen between 2004 and 2008, with a peak in annual growth of 7.1 percent in 2008. With the onset of the political crisis in 2009, GDP growth dropped dramatically to -4.6%, before returning to positive growth of 1.6 percent in 2010, the same level as in 1995.

Figure 2.1: Annual Percentage Change in GDP (1980 – 2010)



Source: World Bank, 2010

The modest economic growth experienced by Madagascar in recent decades has been insufficient to compensate for the country's rapid population growth, currently estimated at 2.8 percent per annum. With GDP/capita estimated at US$453 in 2010[3], Madagascar is categorized amongst the poorest countries in the world. Since 1980, GDP/capita has decreased in real terms due to rapid population growth and modest economic performance. Between 1985 and 2005, GDP/capita was below US$300, and growth between 2005 and 2008 was abruptly halted and reduced by the onset of the political crisis; an 18 percent decreased in GDP/capita was evidenced between 2008 and 2010. The gap in terms of GDP/capita between Madagascar and the Sub-Saharan African region has widened over this period, with current national GDP/capita less than half the regional average.

76.5 percent of the population – representing 15.4 million persons - lives below the poverty line[4]. Rural areas experience the highest levels of poverty with 82.2 percent compared to 54.2 percent in urban areas. Between 2001 and 2008, there were 2 million additional poor persons, and between 2005 and 2010 poverty increased by 7.8 percent. Assuming population growth of 2.8 percent per year, an analysis of past economic performance indicates that GDP growth of at least 5 percent per annum would be required to reduce poverty to less than 35 percent by 2037: A scenario which compares unfavorably with the growth rates of recent years.

[3] INSTAT. 2011. *Tableau de Bord de l'Economie en 2011*.
[4] INSTAT. 2010. *Enquêtes auprès des ménages à Madagascar*.

2.1.2 Economic Structure

The tertiary sector is the predominant sector in the Malagasy economy representing 52.9 percent of GDP in 2010 (refer Table 2.1). Transport and service activities dominate the GDP of the tertiary sector and while tourism continues to play an important role, economic activity in this sector, which has traditionally been one of the largest sources of foreign exchange earnings, has been significantly affected by the current political instability.

Agricultural production – notably rice production – is the single largest contributor to GDP constituting 14.1 percent of GDP in 2010. The primary sector accounts for 25.7 percent of the national GDP, with agricultural activity the most important contributor, followed by livestock and fisheries and forestry activities. Agriculture is the main livelihood source for the rural population and is essential to meet subsistence needs. The contribution of coastal and marine resource exploitation has stagnated in recent years with economic activity decreasing annually by 2 percent between 2008 and 2010. The contribution of forestry to GDP has seen a net augmentation in the same period with annual growth of 30.4 percent linked to precious timber exploitation that had an export value of US$176 million in 2009[5].

Table 2.1: Structure of Madagascar's Economy

	2008	2009	2010
Population	19,071,811	19,601,026	20,142,015
GDP (US$ millions)	8,041	8,365	9,132
GDP (US$ per capita)	469	478	453
Structure of GDP (% of total)			
Primary Sector	22.3%	26.7%	25.7%
Agriculture	13.4%	14,9%	14,1%
Forestry	5.2%	5.4%	4.4%
Livestock and fisheries	3.7%	6.5%	7.2%
Non-primary Sector	77.7%	73.3%	74.3%
Food and agricultural feed industries	3.6%	3.9%	4.4%
Extractive industries	0.1%	0.2%	0.2%
Timber industries	0.2%	0.2%	0.1%
Production of mineral and metal products	1.7%	1.7%	1.4%
Transformation industries	7.0%	7.0%	6.8%
Other industries	1.9%	1.8%	1.8%
Services and others	54.6%	51.5%	52.9%

Source: Instat. 2012. *Tableau de Bord de l'Economie en 2012.*

Industrial economic activities are dominated by food, beverage and energy production. In 2010, the contribution from transformation of primary products remained relatively weak contributing 7 percent of GDP. An analysis of industrial economic activity reveals the growing importance of the mining sector, in particular in terms of direct foreign investment with investments by two large-scale mining operations (Rio Tinto's ilmenite mining operation in the south-east and Ambatovy's nickel and cobalt mining operation in the east) representing more than 65 percent of GDP. Exported production from these two operations is expected to contribute between 30 and 60 percent of national export earnings in 2012 and their contribution to the fiscal revenues of the State is expected to increase from 1 percent to 18 percent by 2018.

[5] World Bank. 2010. *Madagascar: Governance and Development Effectiveness Review*.

2.1.3 Causes of Economic Fragility

The national economy is not greatly diversified and is concentrated in several sectors and geographic regions that have become development hubs because of their higher population densities, their proximity to large development projects (such as mining projects) or their access to markets. The sectors that contributed 80 percent of GDP between 2003 and 2007 are construction, services (non-commercial or financial), transport, commerce and agriculture. The marginalization of other regions where poverty rates are significantly higher has influenced the poor economic performance of the entire country. This inequality of economic activity, particularly in rural areas, has led to a lack of employment opportunities for poor rural households, thus increasing their overall vulnerability.

Madagascar has an open economy and has favored regional economic integration, however exports to neighboring countries remain low. Despite adhesion to regional treaties through the Southern African Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA), Europe, the USA and Asia have to date remained the most important markets for Madagascar. In the last three years, the suspension of preferential trading treaties following the onset of the political crisis has negatively affected export activities.

Weak national savings and high fiscal pressure (estimated at 11 percent of GDP in 2010) are limiting factors to development of the private sector and investments in human capital. The economy remains highly dependent on external aid, which before the 2009 political crisis accounted for approximately two thirds of the public investment budget, and foreign direct investment in a limited number of sectors such as mining and to a lesser extent tourism. Following the onset of the political crisis, suspension of foreign aid has severely affected public investments with a decrease of 60 percent between 2008 and 2009.

The national economy is vulnerable in the face of climatic shocks such as droughts, cyclones and flooding that affect the country every year. These events provoke considerable damages in key economic sectors such as the transport and agricultural sectors and the effects are unequally distributed with poor, rural populations being the hardest hit. The 2008 cyclone season, which was the last season for which a comprehensive evaluation was carried out, caused losses equivalent to 4 percent of GDP and the 2012 season is expected to cause similar levels of losses. Other exogenous factors, including the volatility of prices of key imports and exports on global markets (e.g. vanilla, shrimp, rice and petrol) have also affected recent economic performance.

Finally, weak governance as characterized by corruption, weak institutions and political instability has favored capture of economic rents in key sectors, such as forestry and to a lesser extent mining, by political and private elites. This situation has led to a loss of potential revenue generation for the country as a whole, and has hindered the emergence of a strong and open private sector that could act as a motor for economic development.

2.2 Overview of Environment and Natural Resources in Madagascar[6]

Most natural resource sectors in Madagascar are made up of a number of sub-sectors and contribute both to national economic development and to the livelihoods of the 20 million, poor, predominantly rural population: Over three quarters of the population - representing roughly 15 million persons - depend on natural resources for their livelihoods predominantly through fishing and agriculture. This section presents a brief overview of the key environment and natural resources in Madagascar.

In terms of its natural resources Madagascar is perhaps best known for its unrivalled biodiversity. The country contains 5 percent of global biodiversity on just 0.4 percent of the world's landmass and has extremely high levels of endemism, particularly amongst terrestrial vertebrates. Despite its relatively small size, Madagascar harbors a wide diversity of vegetation types ranging from semi-arid spiny forest in the south, to dry forests in the west and far north and humid forests along the east coast. The

[6] The discussion in this section is drawn from World Bank. 2012. *Madagascar Country Environmental Analysis: Taking Stock and Moving Forward.*

majority of the country's native vegetation cover (estimated at 9 to 11 million hectares) is contained in the national protected area network that covers 12 percent of the national territory and that attracts up to 130,000 (mostly foreign) visitors per year. Forests are an important source of timber and non-timber forest products for both commercial and subsistence uses, and harbor important watershed values, particular along the eastern escarpment. Current deforestation rates are in the order of 0.53 percent per year with the main causes of deforestation being slash-and-burn agriculture and collection of fuelwood and charcoal production. In the last three years, illegal logging of precious timber has increased due to governance failures triggered by the onset of the political crisis in early 2009.

Marine and coastal biodiversity resources are also important, with coral reefs in the south, northeast and northwest of the country, and mangroves along the west coast, providing important coastal protection and habitat values. Fishing and collection of marine resources provides an important source of revenue or subsistence resources for a large part of the rural population; however, in recent years overexploitation of important products such as shrimp, sea cucumbers and reef fishes has been noticed. An increasing number of marine protected areas are being established, often with the dual aims of conserving important conservation targets and managing stocks of natural resources including fish, octopuses and sea cucumbers that are exploited by local communities, and that have been subject to significant stock declines in recent years. In certain parts of the country such as the northwest and southwest, conflicts exist in the coastal zone between small-scale and industrial fisheries, and in some cases between communities and tourism operators.

Water resources are heterogeneously distributed throughout the country and the south and west of the country experience recurrent water stress. Average annual rainfall varies from 350 mm/year in the semi-arid south, to more than 4,000 mm/year in the northeast. In the west and on the central highlands, 90 to 95 percent of annual rainfall falls during the wet season (October to April), while on the east coast there is no clear wet season, but a reduction in rainfall in the period September to October. In the deep-south rainfall is highly erratic from one year to the next, and although precipitation is typically constrained to the wet season, heavy falls representing nearly all the year's rainfall can fall outside this period.

Environmental pollution levels are relatively low due to the lack of a well-developed industrial sector. However, urban pollution associated with poor municipal solid and liquid waste management causes localized impacts; poor urban communities are the most affected by such pollution and municipal authorities lack the resources to implement adequate pollution control measures. The large-scale mining sector is developing rapidly and while to date the two foreign owned companies that are in development and operation have voluntarily adhered to international best-practice in environmental pollution control, the sector will require robust environmental regulation and control to avoid future industrial pollution incidents. Small-scale mining and mining rushes are often unregulated and result in localized water and soil pollution, and induced effects such as deforestation and hunting. Fortunately to date the unregulated use of highly polluting chemicals such as arsenic and mercury in these operations has not been observed.

The country is highly vulnerable to natural disasters - including cyclones, droughts and flooding; it is estimated that one quarter of the population currently lives in zones at high risk of natural disasters. Cyclones affect most of the coastal zones with the northeast, east and west coasts at highest risks. Drought is most prevalent in the semi-arid south of the country and causes high levels of food insecurity. Flooding is experienced throughout the country after cyclones and tropical storms and affects crops and transport infrastructure. The intensity and/or frequency of such events are expected to increase with the effects of global climate change.

With population growth of approximately 2.8 percent per year, historic pressures such as deforestation for slash and burn agriculture and collection of fuelwood, informal small-scale mining and mining rushes, and overexploitation of marine resources continue, and current governance frameworks have proven unequal to the task of effectively managing such threats. New challenges that have arisen in the last decade, such as the rapid development of a large-scale mining sector, the recent significant

expansion of the protected area network that has no ongoing, guaranteed sources of funding, or the increasing and conflicting pressures of over-exploitation, tourism development and climate change on fisheries and coastal resources will require increased attention to the protection and regulation of the environment and natural resources sector.

3 Ecosystem Valuation & Natural Resource Accounting in Madagascar

3.1 Past Ecosystem Service Valuation Studies

As part of the preparatory work for WAVES Madagascar, a literature review and analysis of 23 existing research studies containing data on ecosystem valuation in Madagascar was carried out[7]. For each research study an evaluation was carried out against the following criteria: geographic zone, ecosystem type, ecosystem service(s), data collection methodology, and the objectives/end-use of the research. While the range of studies reviewed in the study is not exhaustive, it is comprehensive enough to general conclusions about the state of research to be drawn and trends to be identified. The findings of the literature review in terms of these criteria were as follows:

(i) **Geographic Zone and Ecosystem Type:** All but two of the reviewed studies focus on terrestrial ecosystems. The vast majority of the reviewed studies (40 percent) have been carried out in the east of Madagascar in humid forest ecosystems. A particular focus on Andasibe Special Reserve / Perinet National Park is evident from the review of research with nine studies entirely or partially carried out in this area. Case studies in degraded woodland / grassland ecosystems in the central highlands have been the subject of five studies, and two landscape level studies have been carried out in the humid forests of the north-east. Two linked research studies have been carried out at the national level focusing on protected areas and the associated watersheds. Research into marine and coastal ecosystems is much less prevalent in the studies reviewed with only two studies; one of these studies is in preparation but is thought to be a national level study while the other focused on a protected area in the southwest of Madagascar.

(ii) **Ecosystem Service(s):** Hydrological functions – i.e. water supply, water quality and flood alleviation - were the most commonly studied ecosystem services in terrestrial ecosystems, and were addressed in seven studies. Soil fertility / erosion control and tourism were the second most commonly addressed services (five studies each), followed by non-timber forest products, terrestrial biodiversity, carbon and land for slash and burn agriculture, each of which were addressed in four studies. Other terrestrial ecosystem services that were addressed in two or fewer studies were timber and bio-prospecting. The coastal and marine research studies that are in finalization address a wide range of ecosystem services including fisheries, water, timber, climate, shoreline protection and cultural values.

(iii) **Data Collection Methodology:** Roughly half of the studies reviewed collected primary data through household surveys for use in their economic analyses, while the remaining studies relied on secondary data sources (from Madagascar and internationally) and applied benefit transfer methods to render data relevant for analyses.

(iv) **Objective and intended end-use of data:** The majority of the studies reviewed involved demonstration case studies that aimed to highlight the value of ecosystem services and many concluded with statements related to the need to integrate the outcomes into policy development processes; however, none of the studies reviewed contained concrete recommendations to achieve this. Over half of the studies reviewed were linked to aspects of protected area management or creation. Seven studies focused on valuation of benefits from protected areas and four focused on opportunity costs to local communities (and in some cases globally) of protected area creation. One coastal and marine ecosystem study that is in finalization aims to underpin protected area management.

[7] World Bank. 2010. *WAVES Madagascar - Research into Ecosystem Services in Madagascar: Literature Review and Data Gap Analysis.*

With the predominance of studies focusing on the humid forests of eastern Madagascar, significant data gaps exist in relation to other terrestrial ecosystem types. Dry western forests and south-western spiny forests cover relatively large areas and are important sources of ecosystem services to relatively large populations; these ecosystems suffer higher rates of deforestation than humid forests and are less well represented in the protected area network. Coastal and marine ecosystems including mangrove, coral reef, sea grass and open water ecosystems are virtually unrepresented in the literature available for review to date. Given the assumed importance of the services furnished by these ecosystems to local communities and nationally, they warrant greater representation in future research studies.

The studies reviewed to date revealed a lack of data on valuation of timber as an ecosystem service, despite its apparent importance in subsistence and commercial contexts. Updated research into carbon sequestration values and research specific to Madagascar on bio-prospecting values is also lacking in the existing literature. In terms of spatial coverage, there is a need for increased research at the regional or national scale. Only four studies contained regional or national level valuation analyses with the remaining studies carried out at the local scale.

The key conclusions that were drawn from the literature review that have guided development of the workplan were as follows:

(i) There is a unique opportunity for WAVES to move beyond locally specific case studies to the regional and national level, and to target concrete results in the integration of ecosystem valuation into the policy development process. The vast majority of existing literature relates to site specific case studies. While reference is commonly made to the need to integrate outcomes into policy development processes, there are very few concrete recommendations on how to achieve this or examples of where this has been done.

(ii) WAVES activities can apply experience and techniques that have proved suitable for use in Madagascar to important ecosystem types that have to date been poorly represented in the literature. There are a relatively large number of studies related to ecosystem service provision in the eastern humid forests of Madagascar that will provide useful background data for WAVES activities. However, other ecosystems notably coastal and marine ecosystems, western dry forest ecosystems and south-western spiny forest ecosystems, are poorly represented in the literature. While there is evidently a need to build on existing datasets to optimize technical activities, the lack of available data for these other ecosystems – which are important from a conservation point of view and for their provision of ecosystem services to local communities and nationally - should not preclude their inclusion in future WAVES technical activities.

(iii) WAVES activities have the potential to include a capacity transfer element to increase the involvement of local stakeholders in technical activities thereby increasing ownership of outcomes. The literature review indicates that ecosystem valuation techniques are not commonly carried out by Government or other national organizations and that international funding and expertise has been a key influence in the research that has been carried out to date. This undoubtedly reflects a lack of capacity on the part of national stakeholders to carry out such work and capacity building efforts should thus be included in future WAVES activities.

3.2 Outcomes of WAVES Phase 1 Technical Case Studies

In addition to the review of existing research into ecosystem valuation, two additional technical case studies were prepared during the Phase 1 work. These case studies are described briefly below.

3.2.1 Valuing Ecosystem Services in the CAZ Protected Area[8]

The Ankeniheny-Zahamena Forestry Corridor (CAZ) located in the country's east contains the largest remaining contiguous patch of humid forest in Madagascar. It is situated amidst a mosaic of land uses including agriculture, mining, forest plantations, community-managed zones and villages, as well as five government-managed national parks and reserves. With a surface area of 381,000 ha, its forests, wetlands, and rivers are home to over two thousand species of plants, many endemic to the region, as well as many species of mammals, amphibians and birds. CAZ is also home to around 350,000 people; mostly rural communities who practice a mix of subsistence agriculture and cash crop production.
A case study was conducted in the CAZ area as part of WAVES activities in Madagascar to demonstrate the economic importance of key ecosystem services including water supply, sediment retention and climate regulation. The CAZ area was selected for this case study because of: (i) its importance in providing ecosystem services including water supply, water and sediment regulation, and carbon stocks to external users; and (ii) the relatively large amount of available data related to the region in which CAZ is located when compared to other regions in Madagascar.

The biophysical analysis of water regulation and sediment was based on two representative sample sites; one within the CAZ area and one outside of the CAZ area. The analysis indicated that while current levels of water demand for irrigation, livestock, residential and tourism are essentially met both inside and outside of the protected CAZ corridor, areas within the CAZ corridor have the potential to sustain much greater water demand than sites outside the corridor, where critical levels of water demand are already being faced. The CAZ area also demonstrates a greater capacity to make precipitation available for irrigation of rice production; an important result given the high reliance of households on subsistence rice production.

Water quality, as represented by the average amount of contamination of freshwater by sediment, was estimated to be significantly better inside the CAZ corridor than outside. These results highlight the role of CAZ in preventing sediment contamination of the water supply; an important result in terms of hydroelectricity generation that relies on low sediment levels in water supply.

The economic analysis, showed water use efficiency to be greater in the region's agricultural and tourism sectors. The marginal economic value of water - a measure of the value of water per unit of output of the production sector in question - was greater in the mining and hydroelectricity sectors.

Carbon sequestration levels (above and below ground) are very high in CAZ, suggesting that the area has high biophysical value as a carbon pool. However, results also showed the potential for even higher releases of carbon if the area is managed unsustainably. The analysis revealed high economic values of carbon sequestration for the region – measured as the marginal benefit accrued to society associated with the emission reduction of one ton of carbon dioxide through sequestration or avoided deforestation. If converted to financial revenues, this could represent an important source of revenues both for protected area management and to improve livelihoods.

This case study highlighted the potential economic importance of water services in the eastern humid forests of Madagascar in relation to mining, tourism and agricultural activities and supported the inclusion of water resources issues in WAVES Madagascar. The case study also highlighted the potential economic importance of carbon services in these forests and the role that WAVES could play in contributing to policy dialogue on issues related to participation in carbon markets.

3.2.2 Economic and Policy Aspects of the Malagasy Fisheries and Coastal Resources Sector[9]

The fisheries and coastal resources sector was selected for this case study because of its importance to national economic development and subsistence resource use. The overall objective of the case study

[8] Portela, R., P. Nunes, L. Onofri, F. Villa, N.A. Shepard, and G-M. Lange. 2012. Assessing and Valuing Ecosystem Services in the Ankeniheny-Zahamena Corridor (CAZ), Madagascar: A Demonstration Case Study for the WAVES Global Partnership. World Bank, Antananarivo.

[9] Andrianaivojaona, C. 2012. Valorisation des resources halieutiques à Madagascar—Aspects politiques. World Bank, Antananarivo ; Le Manach, F. 2012. Valuation of fisheries resources in Madagascar. World Bank, Antananarivo.

was to demonstrate how a sector based approach could be used to identify policy objectives and data needs that could be integrated into the workplan. Specific objectives of the study included: (i) characterization of economic activity in the sector including contribution to national and local economic development; (ii) identification of data availability and data gaps in relation to economic activity in the sector; and (iii) analysis of strengths and weaknesses of current policy framework and identification of potential policy entry points where WAVES activities could contribute to strengthening the policy framework.

The case study concluded that fisheries and coastal resources are an important part of national economy, representing in the order of 2 percent of GDP in 2010, although a lack of accurate data again prevents accurate estimates of the annual flows. High levels of uncontrolled and illegal fishing represent significant economic losses for Madagascar. Poor data and declines in stock are a symptom of weak institutional capacity and poor coordination at all levels, which inhibit sustainable management. The fisheries and coastal resources portion of Madagascar's natural capital wealth stock is almost certainly diminishing due to overexploitation, habitat destruction, and pollution. Too few data exist to pinpoint the extent of the drawdown, but there is worrisome evidence of declining trends in exports and landings for many fisheries, indicating declining stocks. Most of the valuable species are exported to Asia and Europe, creating strong incentives to overfish. The policy and regulatory framework governing the sector is incoherent, and policy setting as well as regulatory authorities lack resources and capacity to implement their responsibilities. The lack of coordinated, effective management threatens the very sustainability of these important resources, as well as the livelihoods and food security of tens of thousands of people. Despite the example provided by the industrial shrimp sub-sector, where rents were reinvested in aquaculture development, in general Madagascar is missing opportunities to capture and reinvest rents from its fisheries and coastal resources, a requirement for sustainable economic growth.

The case study recommended that future WAVES activities consider addressing the data deficit, starting with better estimates of annual landings, initially targeting sources of existing data (such as government partners) and partnering with NGOs who have experience collecting statistics in some local areas. WAVES should consider building national capacity to gather, analyze, and use these data to better manage fisheries and coastal resources. Finally, WAVES should consider supporting activities that generate data for integrated coastal zone management planning which has yet to be implemented in a substantive manner in Madagascar.

3.3 Treatment of Natural Resource Issues within the System of National Accounts

3.3.1 Introduction to Malagasy System of National Accounts

A preliminary review of the Malagasy System of National Accounts (SNA) was carried out for the Scoping Study and is summarized below[10]. The SNA is developed and maintained by the Direction of Economic Synthesis within the National Statistics Institute (Instat). The current SNA was developed in line with the SNA1968 and uses a base year of 1984. Because the annual accounts derived from the SNA are based on the base accounts of 1984 and have become obsolete and do not reflect the current economic reality in Madagascar, Instat undertakes periodic surveys that it combines with data from line Ministries to feed into the development of annual accounts; however the results refer only to GDP and its components.

A process to re-base the SNA was commenced in 2008 with 2007 being selected as the revised base year. 2007 was selected due to the adoption of a new national accounting system (*Plan Comptable General 2005*), and the completion of a national household survey and agricultural census in 2005, and the fact that it was considered the first economically stable year following the political crisis of 2001 / 2002. Data collection for the re-basing commenced but was interrupted by the onset of the political crisis in 2009; data on small-scale and informal sector activity for certain sectors including

[10] This discussion is drawn from Andriamarozaka I. 2012. *Rapport provisoire sur l'état des lieux de la comptabilité national à Madagascar*. Refer Annex 1 for further details.

mining, fisheries and forestry was not collected. Instat is currently receiving technical support through a World Bank managed Trust Fund to complete production of national accounts for the period 2008 to 2011.

3.3.2 Treatment of Natural Resources Issues in the Malagasy SNA

The preliminary evaluation of natural resources issues in the SNA has considered: (i) the integration of data related to key natural resource sectors in the SNA (i.e. fisheries, forestry, mining, tourism[11], and agriculture); and (ii) the development of any satellite accounts relating to these key sectors and reached the following key conclusions:

- **Inclusion of Informal and Small-Scale Sectors:** The fisheries, forestry, tourism and mining sector analyses do not include any consideration of the informal sector. The inclusion of the informal sector in the SNA is only assured for the agriculture sector, and in the latter analyses do not include information on taxes, royalties or fees or compensation of employees. Small-scale mining activity is not currently included in the SNA despite the significant number of such mining operations (estimated to be at least 3,000). Data on small-scale mining activity is patchy and exists at the enterprise level. Similarly, small-scale tourism is not included in the SNA despite the importance of this activity to economic development and employment (particularly in rural areas).

- **Volume, Value and Value-Added of Production:** For all evaluated sectors excepting forestry, data on volume, value and value-added of production for large-scale activity is included in the SNA. In the forestry sector, such data is only available for timber. Within the fisheries and agriculture sectors, this data is also available for small-scale activity, whereas data is patchy for small-scale activities in the forestry sector and not available for the mining or tourism sectors.

- **Taxes, Royalties and Fees:** For the fisheries, forestry, and mining sectors is available only at the sector level and not by product or scale of activity. For the mining sector, data is only available for large-scale activity and no data is available for the agricultural sector.

- **Gross Operating Surplus and Compensation of Employees:** Apart from the large-scale mining and large-scale tourism sectors, information on gross operating surplus and compensation of employees is not included for the identified sectors in the SNA.

- **Balance of Payments:** Balance of payments data is available for the large-scale mining, large and small-scale agriculture, large and small-scale fisheries (excluding freshwater fish due to low exportation) and the large-scale tourism sector. In the forestry sector, data is patchy and does not cover all products across all scales of activity.

- **Satellite account development:** In 1997 satellite accounts, both biophysical and monetary accounts, were developed for expenses in forest management, and expenses in water management. The satellite accounts were developed in accordance with the European SERIEE[12] methodology of EUROSTAT. No updating of these satellite accounts has been carried out since their initial creation.

3.4 Organizations involved in Ecosystem Valuation and Natural Resource Accounting

Table 3.1 summarizes the role of key stakeholders involved in ecosystem valuation and natural capital accounting activities in Madagascar.

[11] While not typically considered as a natural resource based sector, tourism economic activity in Madagascar is inextricably linked to the protected area network and has thus been included in the analysis.
[12] SERIEE = Système Européen pour le Rassemblement des Informations Economiques sur l'Environnement

Table 3.1: Key Organizations in Ecosystem Valuation & Natural Resource Accounting

Organization	Overview of Current Role and Capacities and Future Involvement in WAVES
Ministry of Economy and Industry	The Ministry of Economy and Industry (MEI) has overall responsibility for economic policy and planning in Madagascar and is charged with: (i) the design, coordination, monitoring and evaluation of the implementation of Government policy regarding economic and social development, and economic forecasts; and (ii) private sector development, particularly for industry development, technology transfer and the competitiveness and integration of Madagascar into the world economy. The MEI will be the champion agency for WAVES in Madagascar and a Co-president of the Steering Committee. Certain representatives of MEI have skills in environmental economics and capacity building and awareness raising activities focused on ecosystem valuation and natural resource accounting will be continued with MEI representatives throughout WAVES Madagascar implementation.
Ministry of Finance and Budget	The Ministry of Finance and Budget (MFB) is responsible for the development, implementation and monitoring of the financial, budgetary and fiscal policies of the Government. The MFB has had little practical experience in natural resource accounting and will be targeted for involvement in capacity building and awareness raising activities related to the development and interpretation of macro-economic indicators and natural resource accounts, and in the use of natural resource accounting outcomes in policy development, including fiscal policy development. The MFB will be represented on the national Steering Committee.
Instat	Instat is the national statistical office that operates as a semi-private entity under the stewardship of the Ministry of Economy and Industry. Instat will be a key stakeholder in the implementation of WAVES activities as it is responsible for developing and maintaining the national System of National Accounts. To date, Instat staff have had some exposure to natural resources accounting through past short-term technical assistance projects, but will require additional training in the application of the SEEA and the development and communication of new macro-economic indicators including ANS, ANNI and natural capital wealth. Instat is represented in the national Steering Committee and will be involved in a number of technical and capacity building activities.
Sector Ministries and Government agencies	Sector ministries including the Ministry of Mines, Ministry of Water Resources, Ministry of Fisheries and Coastal Resources, and the Ministry of Environment and Forests are responsible for policy development and implementation, and data collection and management in their respective spheres of responsibility. These ministries currently provide data to Instat for the compilation of the SNA, but in general have had little exposure to natural resource accounting or ecosystem valuation activities. The National Environment Office (ONE) is an important actor in REDD+ activities in Madagascar, and in environmental regulation and environmental data management activities. Representatives of ONE have previously been involved in environmental valuation exercises in Madagascar and have expressed a strong interest in a continuing role in WAVES. The National ICZM Committee (CN GIZC) is responsible for the implementation of the national ICZM strategy and for assisting regional ICZM committees to develop and implement regional strategies and action plans. The CNGIZC has no experience in ecosystem valuation and natural resource accounting methodologies. These Ministries and agencies, who are all represented on the national Steering Committee, will be important partner agencies in the implementation of WAVES; a key requirement will be to ensure that the outcomes of WAVES align with these agencies' needs in policy development. Capacity building will be provided to these agencies to ensure that their data collection and management systems meet the needs of Instat for data compilation, in the development and interpretation of macro-economic indicators and natural resource accounts, and in the use of natural resource accounting outcomes in policy development. Of particular note will be the need for collaboration with Government agencies in the

Organization	Overview of Current Role and Capacities and Future Involvement in WAVES
	Western Indian Ocean region in relation to tuna fisheries as revenues generated in the tuna fisheries sub-sector are derived from a complex global value chain.
Civil Society / NGOs	NGOs including Wildlife Conservation Society (WCS), Blue Ventures, WWF and Conservation International have been involved in previous case studies on ecosystem valuation in Madagascar in both terrestrial and marine environments. Certain NGOs are currently undertaking activities – such as fish catch and productivity surveys by WCS and work on tuna industry valuation by WWF- that will potentially be useful sources of information to WAVES Madagascar activities. NGOs and civil society will be important partners in WAVES Madagascar activities both from a technical point of view and in terms of ensuring WAVES outputs are integrated into policy dialogue with the Government. Initial consultations with NGOs have commenced and concrete opportunities to collaborate with these organizations will continue to be identified throughout workplan implementation. Madagascar National Parks (MNP) is an association, chaired by the Minister for Environment, and which is charged with the management of 54 protected areas (two thirds of the network) in Madagascar. MNP will be main technical partner in the implementation of activities related to protected area valuation. As noted above, collaboration with regional civil society organizations in relation to data in the tuna fisheries sub-sector will be necessary.
Research Institutes	A number of local and international research institutes have been involved in ecosystem valuation or environmental economic research activities in Madagascar. These include IRD, CD3EM, University of Antananarivo, and CIRAD. The University of Antananarivo has a partnership with the University of Bordeaux in France with a dual degree being offered that in part addresses environmental economics. Involvement of local research institutes and researchers in the WAVES partnership activities is important as it represents an important opportunity to embed skills and capacity within the country. Opportunities to collaborate with these organizations will be identified throughout WAVES Madagascar implementation. As noted above, collaboration with regional research organizations in relation to data in the tuna fisheries sub-sector will be necessary
Private sector associations and individual enterprises	Private sector associations such as the Chamber of Mines, the national and regional tourism organizations or the shrimp producers association hold important datasets on natural resource stocks, production volumes and production value. In addition, the outcomes of WAVES will assist the private sector not only in their own planning, but also in policy dialogue with Government. Initial consultations with private sector organizations in the mining and shrimp industries have commenced and will continue throughout WAVES Madagascar implementation. Following validation of the final workplan and budget, contact will be made with additional private sector organizations notably in the tourism and fisheries industries to present WAVES and seek opportunities for collaboration.

Source: Report authors

4 Priority Policy Objectives for WAVES Madagascar

4.1 Overall Approach

The identification of priority policy objectives to be addressed in WAVES was undertaken in a participatory process with the Madagascar WAVES Steering Committee, with technical support from the World Bank. A long-list of priority policy objectives and activities was identified in consultation with the WAVES Informal Working Group (the predecessor of the WAVES Steering Committee). These policy objectives and activities were subsequently discussed and refined during a series of high-level meetings with sector agencies based on the following criteria: (i) alignment with current sector-level Government priorities; (ii) the ability to generate apolitical information that would be beneficial for a wide range of eventual policy development activities (particularly for short-term activities carried out in the period of political transition); and (iii) political and technical feasibility of achieving concrete results in the WAVES Madagascar implementation period.

The approach that was adopted was influenced by the current political context. In the lead-up to elections, which are envisaged to be held in 2013, a transition Government is in place. The transition Government is focusing on day-to-day management of the country rather than strategic or long-term development planning and as such, has neither formally adopted the current National Poverty Reduction Strategy (the Madagascar Action Plan - MAP), nor announced any plans to replace it with a new national strategy. In the absence of a national multi-sector development framework, WAVES activities propose to focus on priority sector-level policy objectives. In the longer term, should the political situation be resolved and a decision taken to prepare a new national poverty reduction strategy or socio-economic development strategy, the WAVES workplan could be reviewed and modified in consultation with Government in order to support such a process.

The following sections describe the policy objectives that will be addressed by WAVES, and the rationale for their inclusion, together with a description of the main entry points for WAVES activities.

4.2 Macro-economic Indicators

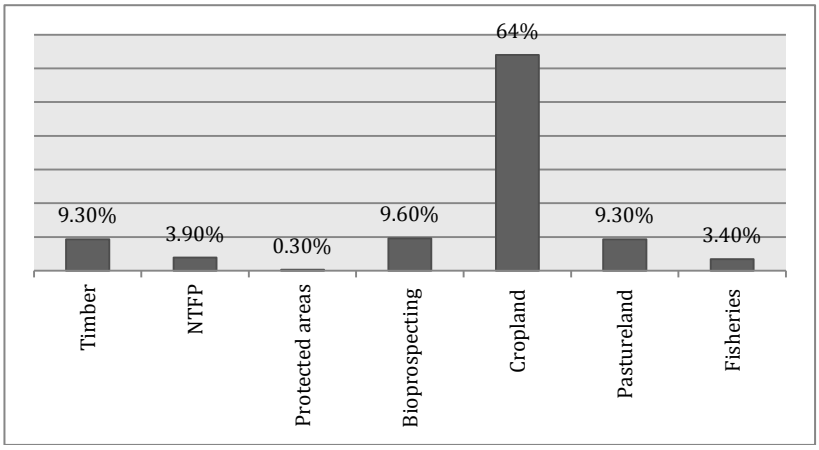
4.2.1 Overview of Current Issue

In 2005 natural capital in Madagascar accounted for 49 percent of total wealth[13] or roughly US$2000 / capita. This preliminary result was obtained without the inclusion of sub-soil assets, which in a geologically rich country such as Madagascar would increase the overall natural capital value. The main components of natural capital in Madagascar were agricultural land (73 percent); forestland (23 percent); and fisheries resources (3 percent). Cropland was found to be the single largest contributor to natural capital value, representing 64 percent of the total value of natural capital (refer Figure 4.1).

Two initial estimates of ANS and comprehensive wealth have been prepared by the World Bank, one in 2005 as part of the analyses contained in 'The Changing Wealth of Nations[14]' and one in 2010, but which was developed using data from 2005, for use in the Madagascar Country Environmental Analysis (CEA) (refer above)[15]. These estimates, which used readily available data from global level databases and excluded consideration of sub-soil assets because of a lack of information, produced varying results with ANS ranging from +7% of GNI to - 6.5% of GNI and comprehensive wealth ranging from US$2,056 / capita to US$3,489 per capita. These discrepancies highlight the need to develop refined and robust estimates of these macro-economic indicators.

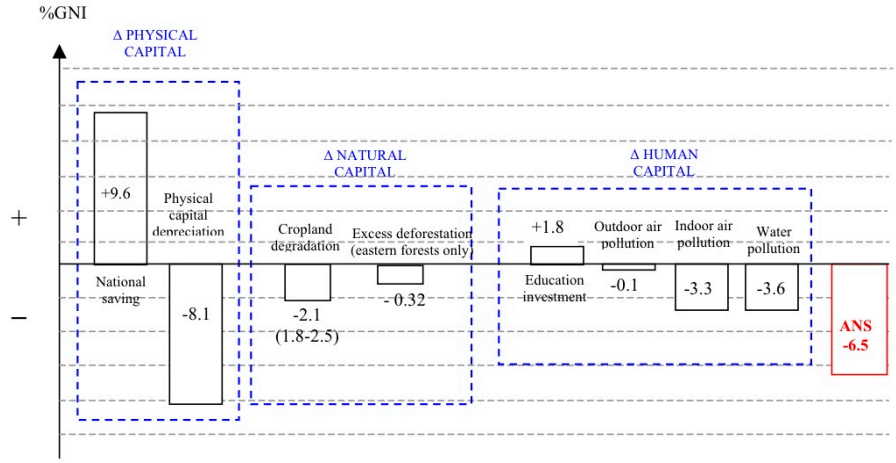
[13] Based on an initial analysis that includes forestland, protected areas, agricultural land and fisheries.
[14] World Bank, 2010
[15] World Bank, 2012. *Madagascar Country Environmental Analysis: Taking Stock and Moving Forward (in prep.)*

Figure 4.1: Sub-Components of Natural Capital (2005)



Source: World Bank, 2012. Madagascar Country Environmental Analysis: Taking Stock and Moving Forward (in prep.)

Figure 4.2: Components of ANS as a Percentage of Gross National Income (2005)



Source: World Bank, 2012. Madagascar Country Environmental Analysis: Taking Stock and Moving Forward (in prep.)

Madagascar's system of national accounts and macro-economic indicators currently make scant reference to natural capital values. An initial evaluation of the treatment of natural resource indicators in the SNA has concluded that while data on volume and value of production is available for certain sub-sectors (e.g. large scale mining, large-scale forestry, large-scale and small-scale fisheries and agriculture), data on potentially important small-scale and informal activities in the mining, forestry and fisheries sectors is missing, and there is little information on royalties, fees and taxes or gross operating surplus for natural-resource based sectors.

Macro-economic indicators in Madagascar are confined to traditional measures such as GDP and GNI, and no attempt has yet been made at the national level to develop complementary indicators that incorporate natural capital values such as ANS or ANNI. Past national development has thus not been developed in the consideration of such indicators or with the benefit of quantitative data related to natural capital depletion or sustainability of different development pathways.

4.2.2 Opportunities for WAVES Madagascar Activities

There is an opportunity for WAVES to contribute to the development of new, complementary macro-economic indicators in Madagascar that will assist in the monitoring of sustainable development and natural resource management. Given the estimates of the contribution of natural capital to total wealth that in the order of 50 percent, and the growing importance of certain natural resources based sectors such as mining, to economic development, the development of such indicators for Madagascar is auspicious.

WAVES Madagascar will build on initial estimates of ANS, ANNI and natural capital wealth to incorporate missing sectors (including sub-soil assets) and use tailored, national level data to develop refined estimates. Macro-economic development indicator development will be carried out in a progressive manner with annual updates being carried out to incorporate the results of WAVES activities.

4.3 Mineral Resources

4.3.1 Overview of Issue

Madagascar is a geologically rich country that is generally considered to be on the cusp of a major mining boom. With three large-scale operations underway, and several more in exploration phases, the mining sector's contribution to GDP is expected to grow from less than 1 to 15 percent in coming years[16].

Table 4.1: Existing and Potential Large-Scale Mining Activities in Madagascar

Operator	Mineral(s)	Location	Estimated Reserves (tons)	Status of Project
Kraomita Malagasy SA (Kraoma)	Chromium	Andriamena, Region Betsiboka	Approx. 140,000 t/year	Exploitation (Commenced in 1969)
Rio Tinto / QIT Madagascar Minerals (QMM) SA	Ilmenite / zirsill	Fort Dauphin, Region Anosy	500,000t / year ilmenite currently, with capacity of 750,000t 25,000t / year zircon	Exploitation (Commenced in 2009)
Ambatovy Minerals SA / Dynatec Madagascar SA	Nickel / cobalt	Ambatovy, Regions Aloatra Mangoro and Atsinanana	60,000t / year nickel 5,600 t/year cobalt	Development – exploitation due to start in 2012
Mainland Mining	Ilmenite	Manakara, Region Vatovavy-Fitovinany	n/a	Exploitation – commenced in 2010 activities suspended due to lack of environmental permit
Toliara Sands / Madagascar Resources MRNL	Ilmenite, rutile, zircon	Ranobe, Region Atsimo-Atsinanana	n/a	Exploration
Mainland Mining	Ilmenite	Anjahabe / Fenerive Est, Region Analanjirofo	n/a	Exploration
Wuhan Iron and Steel Corporation (WISCO)	Iron	Soalala, Region Boeny	n/a	Exploration
Energizer Resources	Vanadium / graphite	Fotadrevo, Region	n/a	Exploration

[16] World Bank, 2010

Operator	Mineral(s)	Location	Estimated Reserves (tons)	Status of Project
Inc.		Atsimo-Andrefanana		
Asia Thai Mining Ltd / Madagascar Consolidated Coal Mining Madagascar	Coal	Sakoa, Region Atsimo-Andrefanana	n/a	Exploration

Source: World Bank, 2012. Madagascar Country Environmental Analysis: Taking Stock and Moving Forward

In the medium term, Madagascar is tipped to join the ranks of "resource rich" countries[17]. Between 2007 and June 2010, economic returns to the Government from three mining operators amounted to US$116 million[18] and depending on mineral prices, QMM's and Ambatovy's exports are expected to account for the equivalent of 30 to 60 percent of Madagascar's total exports in 2012[19], and by 2018 products from these mines are expected to generate 18 percent of total Government revenues (compared to 1 percent currently).

In addition to the large-scale mining sector, there is an active artisanal and small-scale mining sector, which generates permanent or seasonal employment for up to 500,000 persons and significant economic benefits that are generally not captured through royalties or taxes. Illegal gemstone mining is significant. While there is little information on the value of gold and gemstones mined in illegal mines, in 1999 alone US$100 million worth of sapphires were thought to have been produced and exported from Madagascar[20].

The transformation of the country's non-renewable mineral natural capital to other productive forms of capital, requires a strong and consensual policy framework with policy needs in fours areas[21]: (i) policies to promote efficient resource extraction in order to maximize resource rent generated by the extractive sector; (ii) a system of taxes and royalties that allows Governments to recover equitable and proportionate shares of rents; (iii) a clear policy for the investment of resource rents in productive assets; and (iv) policies to control adverse effects of resource extraction on other components of natural capital. Currently little information on the economic values of mineral resources exists to underpin policy dialogue on rent recovery, distribution and reinvestment.

Royalties captured by the State from existing large-scale operations (1 – 2 percent) are low compared to other countries[22] and there is no clear policy for earmarking or investment of revenues to facilitate sustainable growth. The provisions of the national Mining Code do not provide clear guidance on the means of distributing revenues. Notwithstanding Madagascar has played a pioneering role in the African region in terms of revenue sharing to regional and local communities. A revenue sharing scheme has been established for the revenues of the QMM operation in Anosy region, and while conflicts exist in terms of the proportion of revenues earmarked for different levels of the administration and the mechanisms used for revenue sharing, different mechanisms such as participatory budgets and regional trust funds are being trialed. Investigations are currently underway as to the mechanisms that could be put in place for revenues generated by the Ambatovy project.

If mineral revenues become a sufficiently large share of government revenue and GDP, then the question of managing volatility in mineral prices becomes important. Mechanisms such as natural

[17] The definition of a "resource-rich" country is taken from the IMF "Guide on Resource Revenue Transparency". A country is classified as such on the basis of meeting either of the following criteria: (i) an average share of hydrocarbon and/or mineral fiscal revenues in total fiscal revenue of at least 25 percent during the period 2000-2005 or (ii) an average share of hydrocarbon and/or mineral export proceeds in total export proceeds of at least 25 percent during the period 2000-2005.
[18] Ernst & Young, 2011
[19] World Bank, 2010
[20] Duffy, 2005
[21] World Bank. 2011. *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*. World Bank, Washington DC, pp 221.
[22] World Bank, 2010

resource funds can be used to manage such volatility. The outcomes of WAVES supported satellite accounts in the mining sector could contribute to the development of a future policy framework to manage such volatility.

4.3.2 Opportunities for WAVES Madagascar Activities

Regardless of the outcome of the current political situation, mining sector issues – and particularly issues related to rent capture, sharing and investment – will remain center-stage of the Government's and communities' agendas. As such, there is a clear opportunity for WAVES to support this sector through the generation of information on the economic value of mineral resources through the development of mineral accounts. The SEEA has recently formally adopted a methodology for the development of mineral accounts that would be used as the basis for account development[23].

The mineral accounts methodology includes only proven reserves and it is proposed that at this time, account development would include only large-scale mining operations. Due to the economic significance of large-scale mining resources and the timing of sector development there currently exists a unique window of opportunity to influence the policy framework for this nascent industry. It is not proposed to attempt to incorporate artisanal and small-scale mining activities in the accounts due to the significant data gaps that exist because of the large number of informal operations. WAVES Madagascar would develop satellite accounts for the large-scale mining. WAVES would also support policy analysis in the sector related to issues of rent capture and reinvestment, and other specific issues requested by the Government. In the later stages of WAVES, consultation could be carried to out to determine the feasibility and possible sources of support for the expansion of accounts to include artisanal and small-scale mining in the future.

4.4 Water Resources

4.4.1 Overview of Current Issue

At the national level, internal renewable water resources are in the order of 337 cubic kilometers per year, 99 percent of which is surface water and the remaining 1 percent is groundwater. Water resources and availability throughout Madagascar are highly heterogeneous because of marked regional differences in rainfall. The east and north of the country typically have abundant rainfall, while the west and south are drier and experience recurrent water stress. National level data therefore mask important disparities at the basin and even sub-basin level.

Total water use is estimated at 14.97 cubic kilometers per year, or 4.5 percent of renewable water resources. The agricultural sector has the highest water use (estimated at 96 percent in 2000), followed by municipal use (3 percent) and industrial use predominantly for the textile, hydroelectricity generation and mining industries (2 percent). Domestic water – as used by households and small enterprises – is predominantly distributed by the State owned company JIRAMA, although contracts are also established with the private sector to supply water because of the lack of capacity of JIRAMA. In 2010, 45 percent of households had access to a secure water supply; although the rate was significantly higher in urban areas than in rural areas. The irrigated agricultural surface in Madagascar, predominantly for rice growing, is estimated at 1 million hectares or 30 percent of the total of cultivated land. Irrigation infrastructure is generally small-scale and while nominally managed by local water users associations, such infrastructure is often in poor condition because of lack of financing for its maintenance. The growing large-scale mining sector will have significant water needs and availability of adequate secure resources will be essential to the development of this industry. Initial studies carried out by the World Bank and others indicate that the hydroelectric potential of the country's water resources is under-exploited and could be significantly increased. Currently hydroelectricity accounts for only two thirds of the national electricity production despite its potential economic advantages over thermal power production. Efficiency of existing hydroelectric power stations, such as the Andekaleka station that alone produces 43 percent of national electricity, is increasingly affected by sedimentation of dams.

[23] UN SEEA, 2011

Madagascar's national water policy dates from the mid 1990s and was developed without full consideration of the economic values of water resources, nor of equity considerations in terms of pricing policy and availability to water. Data availability in the sector is weak due to the number of actors in the sector and the lack of a coordinated approach to data collection and analysis. The Ministry of Water Resources is interested in the application of the principles of integrated water resources management, but has not yet developed national level integrated water basin management policy or plans. Agricultural water use, water use for mining, and hydroelectricity generation are issues of particular interest to integrated water resources management planning. Policy development and pricing decisions could be strengthened by a clearer understanding of the relative economic contribution of water to these different user groups.

4.4.2 Opportunities for WAVES Madagascar Activities

There is an opportunity for WAVES Madagascar activities to contribute to increased knowledge of the water resources sector in Madagascar, through the development of national, basin and/or sub-basin water resources accounts. Such accounts would assist the Ministry of Water Resources in its objective of developing principles of integrated water resources management and could also contribute to discussion on pricing policy and policy for granting of concessions to the private sector for example for domestic water supply or hydroelectricity generation. Due to the scale of the data collection and analysis work, it is proposed to collaborate with other actors – such as UNDP[24] and African Development Bank – who are working in the sector. The results of the water resources accounts would feed into analyses being carried out under other objectives of WAVES, notably analyses into protected area and forest ecosystem valuation (Objective 4) and analyses in the mining sector (Objective 2).

4.5 Protected Areas and Forestry Ecosystems

4.5.1 Overview of Current Issue

Total native forest cover in Madagascar is in the order of 9.0 to 10.7 million hectares of which 6.9 million hectares is included in the national protected area network. Madagascar's forestry resources play an important role in water and sediment regulation, water supply, and provision of timber and non-timber forest products for commercial and subsistence use. Based on preliminary calculations, it is estimated that forest resources account for approximately one quarter of natural capital or between US$476 and US$688 per capita[25]. Despite reductions in clearing rates of certain forest types over the last two decades (refer Table 4.2), deforestation continues throughout the country mainly due to slash and burn agriculture and fuelwood collection. Recent attention has been focused on the illegal exploitation of rosewood and ebony timber that has escalated during the current political crisis. Exportation of this timber has generated significant financial returns for a small number of private timber barons (in the order of US$220 million in 2009), and significantly lower revenues for the Government (in the order of US$22 million in 2009). The policy framework for the forestry sector is particularly complex. It has been developed in a largely ad-hoc and reactive manner and does not incorporate a true understanding of the use and non-use economic values of forest resources, nor of the relative benefits of competing land uses (e.g. forestry vs. mining or agricultural land use). As a result the policy framework struggles to regulate the ways in which resources should be used, shared or delegated to maximize efficiency and equity.

[24] UNDP has recently completed detailed inventories of water accessibility and demand in the south of the country with a view to developing basin level water management plans. Discussions are ongoing as to the possibility of a partnership between UNDP and WAVES to facilitate collaboration in the development of such plans in the south of the country, with eventual replication of the process in the north.

[25] World Bank. 2011. *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium*. World Bank, Washington DC, pp 221.

Table 4.2: Evolution of Forest Cover and Deforestation

Vegetation Cover (ha)				Rate of deforestation (% per year)	
Forest Type	***1990***	***2000***	***2005***	***1990-2000***	***2000-2005***
Humid forests	5 270 599	4 787 771	4 700 430	0.79	0.35
Spiny forests	2 123 630	1 871 735	1 756 884	1.19	1.23
Dry forests	3 320 582	3 084 976	3 027 505	0.67	0.40
TOTAL	10 714 811	9 744 482	9 484 819	0.83	0.53

Source : MEFT, Conservation International and USAID, 2009

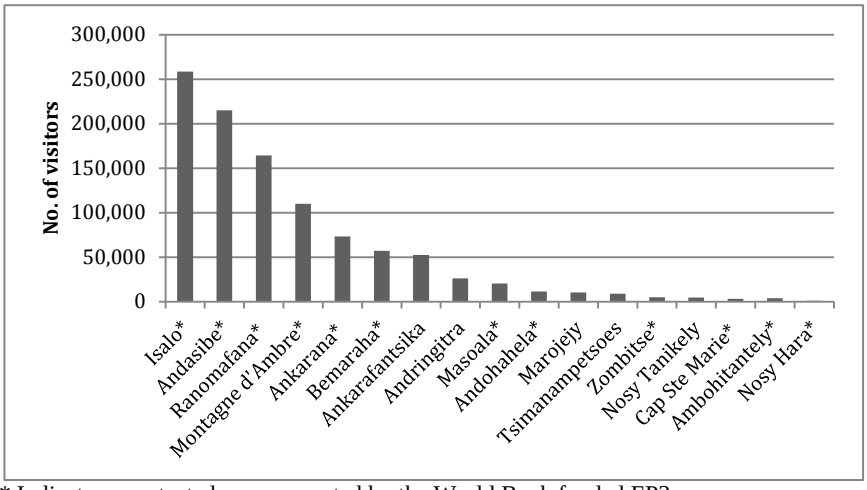
Madagascar's protected area network harbors unrivalled biodiversity, is the main draw-card for international tourists, provides essential watershed benefits to downstream users, and harbors significant forest carbon stocks. However, the network has not achieved financial autonomy and relies heavily on external aid for its operation. The current annual operating cost of the network is roughly US$14 million and of this around 90 percent is sourced from external sources. However, the network represents a largely untapped source of economic benefits that, when converted into financial returns, could be used both to improve its own financial sustainability, and for the natural resources sector more generally.

The potential economic benefits from tourism and watershed values across the entire network are in the order of US$48 million per year of which US$28 million could be generated by ecotourism[26]. Tourism to Madagascar's protected areas generated direct revenues of US$1.05 million in 2010, and indirect revenues in the forms of salaries of guides and induced employment opportunities of over US$5 million. Nature based tourism, and in particular tourism associated with protected areas, is the leading sub-sector of tourism activity in Madagascar: Over half of visitors in a 2000 visitor survey had chosen their travel in function of the ability to take part in ecotourism activities. In 2010, around 110,000 tourists visited Madagascar's protected area network; despite the ongoing political crisis this figure was near the maximum visitation level of 130,000 recorded in 2008. The country has a high rate of return of visitors and relatively long average stay duration – both factors which contribute to the potential economic benefits of the sector.

Tourism activities in protected areas are concentrated in a small number of zones; between 2004 and 2010, six protected areas attracted more than 90 percent of visitors. Across the network, there are 13 protected areas that attracted more than 500 visitors and within this group there are distinct sub-groups; a small number of well-established and highly visited protected areas that between 2004 and 2010 attracted more than 100,000 visitors each; a group of protected areas with average visitation – roughly 20,000 to 70,000 between 2004 and 2010; and a group with low visitation ranging from several hundred to 10,000 visitors over the seven year period.

[26] In USD (2003) and based on a network size of 6.9 million hectares, sourced from Carret & Loyer. 2003. *Comment financer durablement les aires protégées à Madagascar?* Agence Francaise de Developpement, Paris.

Figure 4.3: Tourist Numbers in Madagascar's Protected Areas from 2004 to 2010



* Indicates a protected area supported by the World Bank funded EP3
Source: World Bank, 2012. Madagascar Country Environmental Analysis: Taking Stock and Moving Forward (in prep.)

Economic rents generated by ecotourism in Madagascar are potentially high compared to other tourism rents because of the unique nature of the tourism experience. Rents from tourism in Madagascar are captured through entry fees to protected areas and fiscal instruments in the form of visa fees and hotel taxes. Fifty percent of visitor entry fees are earmarked for protected area management and the remainder are distributed to local communities for development projects. However, anecdotal evidence indicates that given the outstanding nature of the tourism attractions the rents being captured are inferior to the willingness-to-pay of (particularly foreign) tourists[27]. The revenues generated by fiscal revenues are not earmarked for conservation purposes (refer below). There is scope therefore to develop a legislative and policy framework that correctly values the tourism experience and ensures that captured tourism rents are funneled into financing for the protected area network.

Downstream rice farmers and water consumers in urban centers, where water is supplied by rivers with their source in a protected area, are the main beneficiaries of the watershed protection service provided by the protected area network. Farmers benefit from the services offered by the protected areas in the retention of sediment and regulation of water supply, while downstream urban users benefit from potable and industrial water supply. It has been estimated that US$20 million could be generated across the protected area network by watershed protection[28] and the total willingness to pay for watershed protection services across the network is estimated at approximately US$2.8 million per year[29].

Less is known about the economic values of carbon stocks within and outside the protected area network, although an initial sale of carbon credits from the Makira protected area in the northeast of the country raised US$600,000 in 2008; representing 4 percent of the annual operating cost of the network in a single sale. Carbon stocks vary greatly by different ecosystem types in Madagascar: recent estimations are 90tC/ha for humid forests and 17tC/ha for dry forests are assumed for carbon stocks[30]. The policy framework for participation in international carbon markets / performance payment mechanisms are in the initial stages of development and could benefit from improved understanding of the potential economic values of carbon services provided by forests.

[27] For example, foreign tourist entry fees to protected areas are set at US$10 per day; a rate well below that of protected areas in comparable countries and below foreign tourists' willingness to pay.
[28] Carret & Loyer, 2003
[29] World Bank, 2012 in preparation
[30] Asner et al, 2012

4.5.2 Opportunities for WAVES Madagascar Activities

There is a clear opportunity for WAVES activities to generate information that could (i) underpin future policy dialogue in the forestry sector; and (ii) contribute to the development of policy and legislation that embodies sustainable financing mechanisms for the protected area network. WAVES activities would focus on refining and consolidating existing estimates of forest ecosystem valuation through analysis of the contribution of timber, non-timber and carbon to overall forest valuation. Links to activities on water resources would allow information to be generated on the water related biophysical and economic values of forest ecosystems.

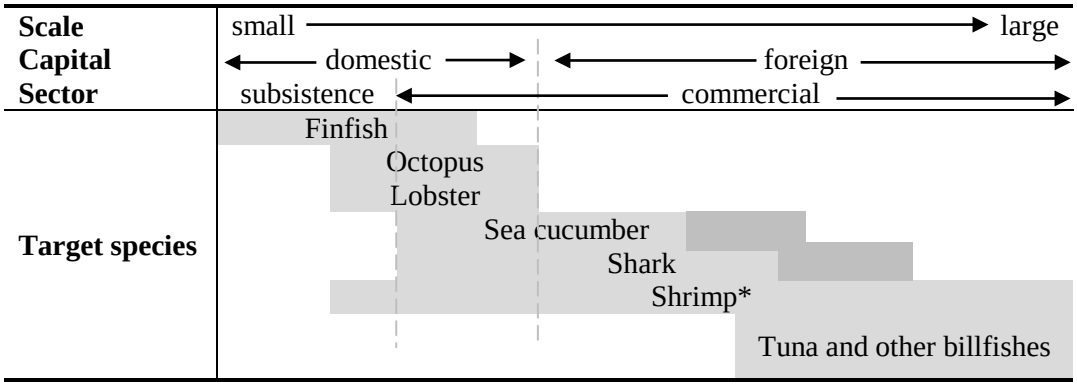
At the level of protected areas, comprehensive tourism surveys would allow a detailed understanding of the tourism related benefits generated by protected areas. At the national level, such information would provide information on the overall economic value of the protected area network and provide data for a policy dialogue on the need to, and the means of, assuring the network's financing. For individual protected areas, economic valuation profiles will be developed that can be used to identify sources of benefits, assist in decisions on allocation of funding and underpin business planning at the level of protected areas.

4.6 Fisheries and Coastal Resources

4.6.1 Overview of Current Issue

The Malagasy fisheries and coastal resources sector is comprised of large-scale and small-scale, commercial and non-commercial sectors that target a range of species (refer Figure 4.4). In the last ten years, it is estimated that domestic fishers caught an average of 135,000 tons annually, and foreign fishers an additional 80,000 tons annually. Domestic fisheries are mainly comprised of subsistence, artisanal, and small-scale commercial fishers (representing 77 percent of domestic catch), largely concentrated along the west coast. Official estimates are that there are 102,000 fishers in Madagascar, although this is certainly a gross underestimate as there has been no recent census and many rural households practice fishing as seasonal or part-time occupation or as a means of supplementing their subsistence needs.

Figure 4.4: Structure of the Malagasy Fisheries and Coastal Resources Sector



Source: LeManach 2012

* Most shrimp are caught by domestic industrial vessels, many of which are financed by foreign capital.

Based on official statistics, the fisheries and coastal resources sector contributed US$146 million or nearly 2 percent of GDP (refer Table 4.3); this is a decrease of 2006 when this sector is calculated to have contributed in the order of 7 percent of GDP. According to official data, finfish is by far the most economically important fishery, estimated at $53.6 million per year. Tens of thousands of households depend on this fishery for their income and food security. The shrimp fishery's value has dropped in recent years, from ~$50 million per year in 2003 to ~$33 million in 2008, following a collapse in stock

productivity. Tuna exports bring in $20.8 million annually, including foreign concession fees (US$3.3 million per year). The total annual value of the remaining fisheries and coastal resources (sharks, sea cucumber, octopus, spiny lobster, and other invertebrates) is unknown. Finfish, consumed domestically, represented the bulk of annual domestic landings (65 percent), a large portion of which was caught by non-commercial fishers. Other target species were mainly destined for the export market. Most shrimp were caught by domestic industrial vessels (many of which are financed by foreign capital), nearly all large pelagic fishes including sharks were caught by foreign-owned vessels (although not all catch is systematically landed in Madagascar), while small-scale, artisanal, and subsistence fishers caught most sea cucumbers, octopus, and lobsters. A small proportion of total landings (~15%) was officially exported, although many exports were illegal and thus unreported, so this statistic is likely far too low.

Notable economic losses to Madagascar are experienced due to discarded by-catch and illegal fishing by foreign vessels. Foreign vessels are estimated to illegally catch in the order of 50,000 tons a year, the value of which is thus lost from the Malagasy economy. Estimates of by-catch are around12,300 tons a year, much of which is discarded or illegally sold in Asian markets. While no stock assessments have been done, the limited amount of data available indicates that most fisheries seem to be in decline with overfishing, habitat destruction, and pollution amongst the most commonly cited direct causes, and climate change and high rates of population growth inarguably amongst the most important penultimate drivers of decline.

In interpreting the above data, it is essential to bear in mind that national statistics are weak and chronically underreport landings due not only to lack of resources to enforce quotas, but by ignoring most small-scale and subsistence catch, and discarded by-catch. The total economic value of fisheries and coastal resources stocks and annual flows is thus very difficult to estimate due to lack of data; not only are official statistics not regularly collected but a large portion of fish are traded or sold in informal markets, or sold and exported illegally.

Table 4.3: Quantity and Value of Fisheries and Coastal Resources Exports in 2010 and 2011

	Quantity (t)		Value (thousand USD)	
Commodity	**2010**	**2011**	**2010**	**2011**
Shrimp	7,696.8		89,405.0	
Farmed shrimp		4,046.2		49,919.6
Canned tuna	6,712.6	8,847.2	20,785.5	29,733.5
Wild shrimp		3,070.3		21,664.5
Fish	4,436.9	1,722.6	21,446.0	9,995.8
Crab	917.9	1,014.8	3,927.0	3,934.7
Octopus	1,204.5	1,105.5	3,693.3	3,419.3
Sea cucumber	412.5	341.4	1,988.0	3,314.0
Spiny lobster	212.0	201.7	3,181.8	2,778.8
Shark fin	31.9	31.7	423.6	470.8
Squid	56.7	67.5	264.6	342.5
Wild eel		11.1		120.7
Swim bladder	5.3	4.8	99.9	36.2
Glass eel	1.7	0.8	65.3	29.7
Farmed eel		1.8		16.7
Slipper lobster	0.9	0.5	20.5	14.7
Bichique	0.3		2.0	
Eel	39.9			
TOTAL	**21,729**	**20,467**	**145,302**	**125,791**

Source: LeManach, 2012

The current policy and legislative framework in the fisheries and coastal resources sector is complex and incomplete and is not based on a clear understanding of the true economic value of the country's resources. The national sector strategy expired in 2008 and while the current Government has issued an internal discussion paper that recognizes the need to update and coordinate fisheries and coastal resources policy, it is not clear how or when this will be achieved. Additionally, proposed new sector-wide legislation has failed to gain consensus amongst stakeholders. The institutional and governance sector of the structure is complex.

Agreements with foreign operators are not based on a clear understanding of resource value and are not subject to ongoing monitoring. The shrimp industry is an important element of the sector, both in terms of revenues and foreign exchange earnings generated and employment, but significant challenges remain in its management and conflicts between industrial and traditional shrimp fishing activities exist. Aquaculture, which is an increasingly important activity, receives only limited treatment in the policy framework. Activities in the tuna fisheries sub-sector require particular consideration given the regional nature of the sub-sector; there is a need to have minimum regional level collaboration to consolidate statistics. Revenues generated from the tuna sector derivate from a complex global value chain, where the tuna processed in Madagascar do not systematically comes from the Madagascan waters. In addition since tuna consists of highly migratory species regional approach is needed to consolidate and crosscheck catch and landing data.

Legislation for integrated coastal zone management (ICZM) has existed since 2010 and has received strong political support through the creation of a high-level national ICZM Committee. However, little translation of the policy into tangible actions on the ground has been carried out in the form of regional or local level ICZM planning despite its potential as a tool to resolve conflicting resource management and land use issues in the coastal zone. Regional ICZM Committees have been put in place in pilot zones in Madagascar, but these committees lack the capacity to integrate ecosystem accounting into policy and action plan formulation. Simultaneously, NGOs are working with local communities to develop local protected areas and local natural resource management contracts that ideally would be integrated into an overall national vision for the sector, but no guiding policy exists for such activities. Research into climate change effects in the coastal zone has been limited to date, but initial results combined with the results of global research indicate that coral bleaching and mangrove dieback could significantly affect coastal and marine resources.

4.6.2 Opportunities for WAVES Madagascar Activities

The fisheries and coastal resources sector is of economic importance to Madagascar both at the national level, and in terms of household livelihoods and provision of subsistence resources. In theory, the sector could benefit from ecosystem and natural capital accounting activities as a means of generating data on the economic value of the sector as a whole, and of important sub-sectors. However, the institutional, capacity and data availability constraints within the sector are considered to be significant and the associated risks could undermine the ability to achieve tangible results in the sector and/or to assure the sustainability of processes put in place during the WAVES partnership. The sector is thus not considered a priority for substantive technical activities at this time.

Notwithstanding, there is an opportunity to draw on the technical support that will be provided by the WAVES partnership to prepare the way for future ecosystem and natural capital accounting activities in the sector should existing constraints be removed or reduced. WAVES Madagascar will support a detailed Scoping Study and Action Plan for ecosystem and natural capital accounting in the fisheries sector that identifies the data needs (and means of generating data), capacity and resource needs, possible collaborations with national and regional partners, and associated institutional strengthening needs (i.e. in data collection, management, and analyses) that would facilitate future ecosystem and natural capital accounting activities. During the implementation of WAVES Madagascar the evolution of the sector would be monitored and discussed during annual workplan reviews, and should it be considered feasible, the contingency fund included in the WAVES budget could be used to support more substantive technical work in line with the activities in the Scoping Study and Action Plan.

5 WAVES Madagascar Workplan, Schedule and Budget Estimate

5.1 Introduction

This section provides a description of the workplan for WAVES Madagascar. For each policy objective it provides a description of the activities that would be carried out over the four-year WAVES implementation period. It also describes the institutional arrangements and the workplan schedule.

The guiding methodological framework for WAVES activities will be the UN SEEA Central Framework (2012). Activities will be undertaken in a progressive manner whereby activities in each work area will commence with a detailed scoping study that will allow data availability, data needs, and methodological options and uncertainties to be examined, and choices made as to the most suitable approach to be taken bearing in mind the local context, data availability and technical capacities within Madagascar. The need to contribute to the overall WAVES program objective of testing new environmental accounting methodologies will also influence the choice of methodologies.

Once methodologies have been selected, early activities will use existing data to fill out skeleton satellite accounts and activities in latter years will be aimed at generating new data to refine and improve satellite accounts. For each of the WAVES work areas an Action Plan will be developed at the time of account preparation to identify the means of ensuring the sustainability of the work carried out.

Activities are described below in terms of four priority objectives, and two cross-cutting themes.

5.2 Objective 1: Macro-economic Indicators

Objective: To develop new macro-economic indicators that integrate economic values of natural resources, and that are complementary to existing indicators, are developed to guide and facilitate monitoring of sustainable development.

The following activities will be carried out as part of the WAVES Madagascar workplan to achieve this objective:

i. Review estimates already prepared and compile revised estimates of complementary macro-economic indicators – ANS, ANNI and natural capital wealth – using available data at the national level.
ii. Progressively add the results of mining, tourism and water accounts into macro-economic indicator development.
iii. Disseminate regular updates of macro-economic indicators.
iv. Provide comprehensive training on macro-economic development, maintenance and interpretation.

5.3 Objective 2: Mining sector

Objective: Information on the economic value of sub-soil assets is generated to contribute to policy dialogue on rent recovery, distribution and reinvestment and other relevant issues.

The following activities will be carried out as part of the WAVES Madagascar workplan to achieve this objective:

i. Evaluate available data[31] against SEEA methodology for mining sector accounts, identify data gaps and prepare action plan for data collection.

[31] Refer Annex 2 for a preliminary review of data availability.

ii. Liaise with private sector, Ministry of Mines and other stakeholders to collect required data.
iii. Carry out first compilation of mining accounts for large-scale mining activity.
iv. Undertake annual data collection and updating of mining accounts.
v. Undertake policy analysis of issues related to rent recovery, distribution and investment and other issues in collaboration with Government, private sector partners and the EITI initiative
vi. Prepare feasibility study and action plan for possible future inclusion of small-scale and artisanal mining in mining accounts.

5.4 Objective 3: Protection of watersheds

Objective: Information on the biophysical and monetary value of water resources is generated to contribute to regional and national integrated water resources management planning.

The following activities will be carried out as part of the WAVES Madagascar workplan to achieve this objective:

i. Undertake detailed scoping study including a roadmap and action plan for the preparation of water accounts at the national, basin and/or sub-basin level. This process will include identification of priority zones for account development, evaluation of data needs and availability, definition of selected methodological approaches, resource and training needs, and collaboration with partners.
ii. Undertake biophysical data collection and prepare first compilation of biophysical accounts for priority zones.
iii. Undertake monetary data collection and prepare first compilation of monetary accounts for priority zones.
iv. Progressively complete and consolidate accounts across other zones in line with the defined action plan.

5.5 Objective 4: Value of protected areas and forest ecosystems

Objective: Information on the economic values of protected areas and forests is generated to contribute to sustainable financing of national protected area network and forestry sector policy dialogue.

The following activities will be carried out as part of the WAVES Madagascar workplan to achieve this objective:

i. Evaluate available data[32] for ecotourism accounts, identify data gaps and prepare action plan for data collection.
ii. Plan, pilot and implement comprehensive national tourism sector surveys with tourist and enterprises.
iii. Prepare ecotourism accounts, and update regularly.
iv. Plan, pilot and implement willingness to pay surveys across the network and analyze the results.
v. Undertake desk-top data review and consolidation to reach conclusions on forest ecosystem valuation including contribution of different services – timber, non-timber forest products, and carbon and prepare action plan for future development of forestry sector satellite accounts.
vi. Develop detailed protected area level economic valuation profiles that identify the potential benefits derived from tourism, watershed values, and carbon at the protected area level.
vii. Provide assistance to translate results for WAVES outcomes into the policy framework for sustainable financing of the protected area network.

[32] Refer Annex 2 for a preliminary review of data availability.

5.6 Objective 5: Fisheries and coastal resources

Objective: Scoping of the data and resource requirements for implementation of ecosystem and natural capital accounting in the fisheries and coastal resources sector is carried out.

The following activities will be carried out as part of the WAVES Madagascar workplan to achieve this objective:

i. Preparation of a detailed scoping study, roadmap and action plan for the preparation of fisheries accounts at the national level. This process will include evaluation of data needs and availability, definition of selected methodological approaches, resource and training needs, and needs for collaboration with Government and non-Government partners.

5.7 Cross-Cutting Activity 1: Capacity Building

A key objective of WAVES activities will be to ensure that local technical capacity across the range of activities that will be carried out as part of the workplan. Achievement of this objective will be essential to ensuring that the outcomes of WAVES are sustainable and that the databases and tools that are produced are regularly maintained, and are distributed and utilized following the completion of the workplan implementation. Approximately 18 percent of the budget has been earmarked for capacity building activities that would be focused around three themes:

(i) Development, maintenance and interpretation of natural capital accounts and complementary macro-economic indicators including data collection, storage and management
(ii) Use of natural capital accounts and macro-economic indicators in natural resource and fiscal and economic policy development
(iii) Downscaling of ecosystem and natural capital accounting and macro-economic indicator interpretation to allow WAVES outcomes to be used in regional scale planning and policy development

The targets of individual capacity building activities include Government officers (Instat, MEI, MFB, line ministries), civil society and researchers. Capacity building mechanisms will favor hands-on training for technicians through intensive "learning by doing" training seminars, and inclusion of locally based researchers and consultant teams in technical activity implementation. A learning exchange will be organized to allow key stakeholders to observe the operation of a functional natural capital accounting system in a selected WAVES partner country, and observe the relationship between this accounting system and policy development. To support local researchers and academic institutes, the workplan provides for yearly research grants for students and/or researchers at the University of Antananarivo to undertake a research project that aligns with WAVES activities. Opportunities to contribute to academic course development and for WAVES researchers to present guest lectures and seminars to University and other researchers will be identified during the course of the workplan implementation.

5.8 Cross Cutting Activity 2: Communications Activities

Communications activities will be used to raise broad awareness of the objectives of WAVES and the outcomes of key technical activities. A national communications strategy will be developed to support the partnership level strategy and will include activities targeted at a national audience. The communications strategy will have two aims:

i. <u>To carry out issues-specific communications with targeted groups including decision makers, civil society, development partners, and researchers:</u> These groups will be provided with technical information on WAVES outcomes and provided with a forum within which policy implications can be discussed together with priorities for future WAVES activities. Annual national workshops and sector-based technical working sessions, together with distribution of published materials on WAVES outcomes, will be used as the main vehicles to achieve this objective.

ii. To reach a broad audience and raise awareness about the economic value of natural resources in Madagascar: Activities will target media / journalists, community leaders, civil society and the general public to facilitate their involvement in policy debates and dialogue. To achieve this aim, the national communications strategy will include staging of press conferences, preparation and distribution of posters and brochures on key outcomes, distribution of non-technical report summaries, press releases and media briefings.

5.9 Institutional Arrangements for WAVES Implementation

Implementation of the WAVES Madagascar workplan will be overseen by a national WAVES Steering Committee that was established by a Decree of the Minister of Economy and Industry. The Steering Committee, which comprises representatives of Government, civil society and the private sector, and will be co-presided by the Ministry of Economy and Industry and a civil society representative, and will meet at least quarterly including an annual working session to plan for the next years' activities. The Steering Committee will have the following principle responsibilities:

i. Establish and review annually the policy priorities for WAVES in the country through a process of consultation and review of technical reports;
ii. Provide guidance and advice on the technical work of the project and the opportunities for supporting policy decision-making;
iii. Review Terms of Reference for consultants participating in WAVES activities;
iv. Endorse the annual country reports to the Secretariat, prepared by the Country Coordinator, and the annual work plan and budget for the implementation phase of WAVES;
v. Identify appropriate partners in government and other partners (NGOS, academic institutions, and others) to assist the country team in carrying out its work, and facilitate establishment of working relationships with these partners; and
vi. Support dissemination of project outputs through an annual workshop open to all interested parties in the country and other appropriate forums.

The Steering Committee will establish Technical Working Groups as required to oversee specific technical activities or to provide technical inputs to WAVES activities. The Terms of Reference for the national Steering Committee is included in Annex 3.

The identified institutional home of WAVES will be the Ministry of Economy and Industry, primarily through the national statistics institute, Instat. WAVES will aim to put in place a framework for satellite accounts and provide adequate capacity building to ensure that by the end of the WAVES intervention, MEI and Instat will be in a position take the lead both on annual updates of established satellite accounts within these sectors, and the eventual expansion of natural capital accounting to other sectors.

With co-financing from the EP3 the Government will recruit a national coordinator to act as the Government focal point and contribute to project management and technical activities, liaise with Government and partners, and work closely with the World Bank to implement the workplan. The WAVES National Coordinator will also act as the secretariat of the Steering Committee.

The World Bank will provide technical support to the implementation of the activities and liaison both with other partner countries and with technical and financial partners working on related issues. Project management and technical coordination support will be provided by the WAVES Country Coordinator.

5.10 Annual Workplan Review and Monitoring

Annual review and planning meetings will be carried out during the implementation of WAVES Madagascar. These meetings will involve the Steering Committee and the Bank technical support team. The objective of these meetings will be to review progress in the previous period against the agreed workplan, review and refine upcoming priority actions for the next year in line with

Government priorities and specific data needs, and confirm budget allocations for each activity (including allocation of contingency funds included in the budget). A country-level monitoring and evaluation framework is in preparation and will be used to guide monitoring of workplan progress.

5.11 Workplan Budget

The total estimated budget for the WAVES Madagascar workplan is US$2 million including US$1.5 million from the WAVES core budget and US$0.5 million from the EP3 co-financing. The allocation from the WAVES core budget includes a contingency fund of US$235,000. The use of the contingency budget will be determined during annual workplan reviews as program activities for subsequent years are refined in response to Government policy needs and objectives. Table 5.1 summarizes the budget allocated to each project component.

Table 5.1: Summary of Workplan and Budget

Component	Policy Objective	Expected Outputs	Estimated Budget (US$)	
			WAVES Core Budget	EP3 Co-financing
1. Macro-economic indicators	To develop new macro-economic indicators that integrate economic values of natural resources, and that are complementary to existing indicators, are developed to guide and facilitate monitoring of sustainable development.	Macro-economic indicator development and annual revision including adjusted net savings (ANS), adjusted net national income (ANNI) and natural capital wealth	30,000	0
2. Mining sector	Contribute to medium to long-term policy dialogue on rent recovery, distribution and investment	Satellite account development for proven resources in large-scale mining sector and integration into macro-economic indicators	65,000	0
3. Managing watersheds and water resources	Contribute to regional and national integrated water resources management planning	National and river basin level monetary and physical accounts for water resources and integration into macro-economic indicators	290,000	220,000
4. Value of protected area & forest ecosystems	Contribute to sustainable financing of national protected area network and forestry sector policy dialogue	Ecotourism accounts and integration into macro-economic indicators Analysis of combined ecosystem service values in selected protected areas to feed into fiscal policy analysis	260,000	217,000
5. Fisheries and coastal resources	Scoping of the data and resource requirements for implementation of ecosystem and natural capital accounting in the fisheries and coastal resources sector is carried out.	Detailed scoping study and Action Plan for ecosystem and natural capital accounting in fisheries and coastal resources sector	50,000	0
6. Capacity Building and Communications (cross-cutting)		Technical training, awareness raising and communications activities	240,000	0
7. Project Management, Coordination and Communications (cross-cutting)		Project management and technical coordination, technical support Steering Committee and Technical Working Group operation Travel and miscellaneous expenses	330,000	63,000
Unallocated contingency – use to be reviewed during annual program review			*235,000*	*0*

Component	Policy Objective	Expected Outputs	Estimated Budget (US$)	
			WAVES Core Budget	EP3 Co-financing
TOTAL ESTIMATED BUDGET			1,500,000	500,000

5.12 Activity Schedule

Substantive implementation of the workplan would occur over a three-year period from January 2013 to December 2015. Table 5.2 summarizes the key expected outputs from workplan implementation. A detailed workplan for Year 1 activities, and indicative programs for subsequent years, will be prepared on formal project commencement with annual program reviews carried out to allow detailed planning for subsequent years.

Table 5.2: Summary of Workplan Schedule and Outputs

Year 1 (2013)	• Creation of first mining sector accounts • Initial estimates of new macro-economic indicators (ANS, ANNI, natural capital wealth) • Data needs assessment and commence preparation of water accounts • Commencement of data collection for tourism accounts • Preparation of scoping study and action plan for forestry sector accounts • Capacity building on macro-economic indicator development and interpretation, account development and data collection & management
Year 2 (2014)	• Updated mining accounts • Creation of first tourism sector accounts • Updated estimates of macro-economic indicators incorporating updated accounts and new tourism accounts • Continue preparation of water accounts • Capacity building on policy development and integration of ecosystem and natural capital accounting into policy frameworks
Year 3 (2015)	• Updated mining and tourism accounts • Complete national water resources accounts • Updated estimates of macro-economic indicators incorporating updated accounts and new water sector accounts • Undertake valuation for selected priority protected areas (carbon, timber, watersheds and tourism services) • Capacity building on use of outcomes in regional planning and development
Annual Events	• Quarterly Steering Committee meetings • Annual program review and work planning • Steering Committee Annual Planning Meeting • National workshop to disseminate results of activities and discuss future activities • Sector based technical workshops to set priorities, validate results and investigate policy implications

Annex 1: Overview of Natural Resources Data in Malagasy SNA

Sector: Mining																
Scale	***Large Scale***			***Small Scale***						***Informal***						
Products	*Chrome*	*Graphite*	*Illmenite*	*Sapphire*		*Gold*				*Sapphire*			*Gold*			
Data inc. in SNA:																
Volume of production	✓	✓	✓	X		X				X			X			
Value of production	✓	✓	✓	X		X				X			X			
Value-added	✓	✓	✓	X		X				X			X			
Gross operating surplus / compensation of employees	✓	✓	✓	X		X				X			X			
Taxes, royalties, fees[33]	✓									X			X			
Balance of Payments	✓	✓	✓	X		X				X			X			
Sector: Forestry																
Scale	***Large Scale***				***Small Scale***						***Informal***					
Products	*Logs*	*Charcoal*	*Fuelwood*	*Precious timber*	*Logs*	*Charcoal*	*Fuelwood*	*Precious timber*	*Medicinal plants*	*Essential oils*	*Logs*	*Charcoal*	*Fuelwood*	*Precious timber*	*Medicinal plants*	*Essential oils*
Data inc. in SNA:																
Volume of production	✓	X	X	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X
Value of production	✓	X	X	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X
Value-added	✓	X	X	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X
Gross operating surplus / compensation of employees	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Taxes, royalties, fees[34]				✓					X	X	X	X	X	X	X	X

[33] Total taxes, royalties, fees for the sector as a whole included
[34] Total taxes, royalties, fees for the sector as a whole included

Balance of Payments	✓	X	X	✓	✓	X	X	✓	✓	✓	X	X	X	X	X	X	
Sector: Fisheries and Coastal Resources																	
Scale	***Large Scale***					***Small Scale***					***Informal***						
Products	*Freshwater fish*	*Ocean fish*	*Shrimp*	*Lobster*	*Other*	*Freshwater fish*	*Ocean fish*	*Shrimp*	*Lobster*	*Other*	*Freshwater fish*	*Ocean fish*	*Shrimp*	*Lobster*	*Other*		
Data inc. in SNA:																	
Volume of production	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X		
Value of production	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X		
Value-added	✓	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X		
Gross operating surplus / compensation of employees	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Taxes, royalties, fees[35]	✓										X	X	X	X	X		
Balance of Payments	X	✓	✓	✓	✓	X	X	X	X	X	X	X	X	X	X		
Sector: Agriculture																	
Scale	***Large Scale***					***Small Scale***					***Informal***						
Products	*Rice*	*Cloves*	*Vanilla*	*Sugar cane*	*Cofee*	*Rice*	*Cloves*	*Vanilla*	*Potatoes*	*Coffee*	*Rice*	*Manioc*	*Potatoes*	*Coffee*	*Cloves*	*Vanilla*	*Sugar cane*
Data inc. in SNA:																	
Volume of production	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Value of production	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Value-added	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X
Gross operating surplus / compensation of	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

[35] Total taxes, royalties, fees for the sector as a whole included

employees																	
Taxes, royalties, fees	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Balance of Payments	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X	X	X	X	X
Sector: Tourism																	
Scale	***Large Scale***					***Small Scale***					***Informal***						
Products	*Hotel / restaurant*					*Hotel / restaurant*					*Hotel / restaurant*						
Data inc. in SNA:[36]																	
Volume of production	✓					✓					X						
Value of production	✓					✓					X						
Value-added	X					X					X						
Gross operating surplus / compensation of employees	X					X					X						
Taxes, royalties, fees	X					X					X						
Balance of Payments	✓					X					X						

[36] Foreign currency exchanges by tourists are evaluated by the Central Bank using declarations from national banks and the Ministry of Tourism

Annex 2: Preliminary Review of Data Availability for Key Sectors

This annex presents the results of a preliminary review of data availability across key sectors that are included in the workplan. It has been used to guide development of the workplan but will require updating, completion and validation on the onset of WAVES Madagascar activities.

Sector: Mining

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
Permis minier	Société	Province National	2000-2011	Annuelle	Registres de BCMM	Base de données BCMM	Données difficilement accessibles
Frais d'administration Minière en Ariary	Permis minier, Société	Province National	2000-2011	Annuelle	Registres de BCMM	Base de données BCMM	Données difficilement accessibles
Redevance minière en Ariary	Sociétés, Substance	Province National	2000-2011	Mensuelle Annuelle	Déclarations des exploitants auprès de la Direction provinciale, laissez-passer	Base de données Direction des Mines Direction provinciale	Données centralisées à la Direction des Mines mais non-informatisées et incohérentes après recoupement des données provinciales
Exportation en Kg et Ariary	Sociétés, Substance	Province National Pays de destination	2004-2011	Mensuelle Annuelle	Par demande et vérification des Certificats de Conformité auprès de la Direction provinciale et centrale	Base de données Direction des Mines Direction provinciale	Données centralisées à la Direction des Mines mais non-informatisées et incohérentes après recoupement des données provinciales

Production minière en Kg et Ariary	Substance, Société	Province National	2004-2011	Annuelle	Déclarations des exploitants auprès de la Direction provinciale, laissez-passer	Base de données Direction des Mines Direction provinciale	Données centralisées à la Direction des Mines mais non-informatisées et incohérentes après recoupement des données provinciales
Proven resource estimates	Society	Individual mining locations / large-scale only	n/a	n/a	Data held by societies	Data held by societies	Difficilement accessibles

Géographique : *data can be produced, disaggregated at the level of the 7 provinces if mentioned "province", but cannot be disagreggated by region if "region" is not mentioned in the column. So this column tells you the highest and the lowest level of disaggregation of data available. Data aggregated at province level cannot be disaggregated by region unless "region" is mentioned in the column.*

Sector: Water Resources

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
Nb de sites de production d'eau	site d'eau & électricité combiné ou non	province et ville	2002- 2011	annuelle	étude technique	JIRAMA – Base de données de la Direction de l'exploitation de l'eau	Facilement accessible et bien documenté sur plusieurs périodes
Capacité de production en m3	zone de distribution des centres JIRAMA (1)	province et ville	2002- 2011	annuelle	étude technique	JIRAMA - Direction de l'exploitation de l'eau : base de données d'exploitation eau	Facilement accessible et bien documenté sur plusieurs périodes
Volume en m3 d'eau produite (entrée réseau)	Zone de distribution des centres JIRAMA	province et ville	2002- 2011	mensuelle	traitement des données des opérations	JIRAMA - Direction de l'exploitation de l'eau: base de données d'exploitation eau	Facilement accessible et bien documenté sur plusieurs périodes
Rendement	Zone de distribution	province et ville	2002- 2011	mensuelle	calcul du volume des	JIRAMA - Direction	Facilement accessible

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
d'exploitation en %	des centres JIRAMA				ventes / volume d'eau produite nette	de l'exploitation de l'eau: base de données d'exploitation eau	et bien documenté sur plusieurs périodes
Nb d'abonnés	Zone de distribution des centres JIRAMA	province et ville	2002- 2011	mensuelle	traitement des données des opérations	JIRAMA - Direction de l'exploitation de l'eau : base de données des ventes et commercialisation	Facilement accessible et bien documenté sur plusieurs périodes
Coût de traitement de l'eau	Zone de distribution des centres JIRAMA	province et ville	2002- 2011	mensuelle	traitement des données des opérations	JIRAMA - Direction de l'exploitation de l'eau: base de données d'exploitation eau	Facilement accessible et bien documenté sur plusieurs périodes
Charges de production totale	Zone de distribution des centres JIRAMA	province et ville	2002- 2011	mensuelle	traitement des données des opérations	JIRAMA - Direction de l'exploitation de l'eau : base de données d'exploitation eau	Facilement accessible et bien documenté sur plusieurs périodes
Tarif par m3	tranche consommation (2)	province et ville	2002	annuelle	fixés par la direction générale	JIRAMA - Direction de l'exploitation de l'eau	Facilement accessible et bien documenté sur plusieurs périodes
Chiffres d'affaires en Ar	zone et type de client (3)	province et ville	2002	mensuelle	traitement des données des opérations	JIRAMA - Direction de la planification stratégique	Facilement accessible et bien documenté sur plusieurs périodes
Nb de compteur	zone et type de client	province et ville	2002	mensuelle	traitement des données des opérations	JIRAMA - Direction de l'exploitation de l'eau : base de données des ventes et commercialisation	Facilement accessible et bien documenté sur plusieurs périodes
Coût d'exploitation	zone	province et ville	2002	mensuelle	traitement des données des opérations	JIRAMA - Direction de la planification :données de production	Facilement accessible et bien documenté sur plusieurs périodes
Production nette en Ar	zone	province et ville	2002	mensuelle	traitement des données des opérations	JIRAMA - Direction de la planification : données de production	Facilement accessible et bien documenté sur plusieurs périodes
Nb de points d'eau	type d'ouvrage	Southern Madagascar	2007- 2011	annuelle	enquêtes effectuées	PNUD (4), base de	Facilement

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
					par les maires, 15 régions du Sud, 3 régions Est, commune et villages ont été inventoriés par PNUD	données de l'Eau (BDEA) du Min Eau	accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD
Nb de points d'eau fonctionnels	type d'ouvrage	Southern Madagascar	2007-2011	annuelle	enquêtes effectuées par les maires, 15 régions du Sud, 3 régions Est, commune et villages ont été inventoriés par PNUD	PNUD (4), base de données de l'Eau (BDEA) du Min Eau	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD
Nb de populations desservies	fokontany, commune	Southern Madagascar	2007 - 2011	annuelle	enquêtes effectuées par les maires, 15 régions du Sud, 3 régions Est, commune et villages ont été inventoriés par PNUD	PNUD (4), base de données de l'Eau (BDEA) du Min Eau	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD ; Pas de recoupement de la fiabilité des données sur la fonctionnalité des points d'eau dans la BDEA.
Taux de desserte en %	fokontany, commune	Southern Madagascar	2007- 2011	annuelle	calcul	PNUD(4), base de données de l'Eau (BDEA) du Min Eau	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD. Nombre de population

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
							à mettre à jour par de nouveaux recensements (qui dataient de 1993).
Tarif par m3	type de branchement	Southern Madagascar	2010	annuelle	15 régions du Sud, 3 régions Est, commune et villages ont été inventoriés par PNUD	PNUD (4)	Facilement accessibles, méthodologie d'enquêtes standardisée. Echantillons insuffisants pour déterminer les tarifs appliqués pour les bornes fontaines lors des enquêtes de PNUD
Charges de gestion	type d'ouvrage, mode de gestion	Southern Madagascar	2010	annuelle		PNUD (4)	Facilement accessibles, méthodologie d'enquêtes standardisée. Peu de gestionnaire des bornes fontaines tiennent une comptabilité des charges de gestion lors des enquêtes de PNUD
Nb d'ouvrages hydro-agricoles	type d'ouvrage et équipement	région, commune in Southern Madagascar	2009- 2010	non définie	enquêtes dans 15 régions du Sud, 3 régions Est, commune et villages ont été inventoriés par PNUD, recensement agricole en 2004	PNUD (5),	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD
Surface de périmètres irrigables/aménagés	surface > 25ha, 100 ha, etc.	région, commune in Southern Madagascar	2009- 2010	non définie		PNUD (5)	Facilement accessibles,

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
en ha							méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD
Surface de périmètres irrigués en ha	surface > 25ha, 100 ha, etc.	région, commune in Southern Madagascar for 2009 surveys national, province, region, district for the 2004 agricultural census	2009- 2010	non définie		PNUD (5), Ministère de l'Agriculture, Recensement de l'agriculture : campagne 2004-2005, octobre 2007	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD
Nb d'usagers de l'eau		région, commune in Southern Madagascar	2009- 2010	non définie		PNUD (5)	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD
Superficie des cultures principales des périmètres irrigués en ha	type de culture	région, commune in Southern Madagascar for 2009 surveys national, province, region, district for the 2004 agricultural census	2004 et 2009- 2010	non définie		PNUD (5), Ministère de l'Agriculture, Recensement de l'agriculture : campagne 2004-2005, octobre 2007	Facilement accessibles, méthodologie d'enquêtes standardisée et échantillons représentatifs pour les enquêtes de PNUD et le recensement agricole
Production agricole en kg	type de culture	région, commune in Southern Madagascar for 2009 surveys national, province, region, district for the 2001-2004	2001- 2005 et 2009- 2010	non définie		- PNUD (5), - INSTAT, Enquête de productivité agricole, Madagascar, 2005 ; - Ministère de	Facilement accessibles. Echantillonnage des enquêtes de productivités agricoles en 2009 et

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
		agricultural production survey, region for the ROR surveys, region and district for the rice survey in 2009				l'Agriculture : Annuaire Statistique Agricole 2004 ; - Fiches des Réseaux des Observatoires Ruraux (ROR) des 15 régions de Madagascar ; -Centre National de Recherche Appliquée au Développement Rural Service de la Statistique Agricole : rapport final du projet de Renforcement de la Disponibilité et de l'Accès aux Statistiques Rizicoles, JICA, 2009	2010 encore basée sur le recensement agricole qui datait de 2004.
Prix des principaux produits agricoles en Ar	type de culture	région, commune	2004 ; 2007 - 2010	non définie		PNUD (5), Fiches des Réseaux des Observatoires Ruraux de 15 régions	Facilement disponible. Peu de régions couvertes par les enquêtes (en moyenne 15 régions)
Charges de gestion en Ar	Surface irriguée, type d'ouvrage	région, commune	2009- 2010	non définie		PNUD (5)	Facilement disponibles
Coût de maintenance en Ar	Surface irriguée, type d'ouvrage	région, commune	2009- 2010	non définie		PNUD (5)	Facilement disponibles

(1) Zones de distribution des centres JIRAMA : les zones peuvent être des communes, des villes ou des districts suivant la localisation des centres de distribution de l'eau par la JIRAMA
(2) Tranche de consommation en eau : les tarifs diffèrent suivant les catégories de consommateurs (particuliers, administration) qui consomment plus ou inférieur à 1000 mètre cube d'eau par mois.
(3) Type de client : les clients de la JIRAMA sont classés globalement en catégories de consommateurs : particuliers, administration, bornes fontaines et autres ;

(4) PNUD : résultats des inventaires (traitement de données en cours) des points d'eau dans les grands bassins du Sud en 2011 ; Bilans diagnostics de la situation de l'accès à l'eau potable urbaine et à l'assainissement urbain du grand Sud malgache, rapport provisoire, 2011
(5) PNUD : résultats des inventaires (traitement de données en cours) des périmètres irrigués

Sector: Forest Ecosystems and Protected Areas

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
Volume en m3 du bois potentiel	type de bois	région	1996-2005	non-définie	traitement images Landsat 5 et 7; enquêtes par sondage	IEFN 0 en 1996 et IEFN 1 en 2000	Facilement accessibles.
Rendement en m3 par ha	type de bois	région	1996-2005	non-définie	traitement images Landsat 5 et 7; enquêtes par sondage	IEFN 0 en 1996 et IEFN 1 en 2000	Facilement accessibles.
Nb de permis d'exploiter en cours	transfert de gestion ou adjudication	région, CIREEF	2003-2010	annuelle	comptage dans le registre administratif	Sommier des exploitations DREEF, DVRN	Facilement accessibles et données régulièrement mises à jour
Durée en année des permis d'exploiter	transfert de gestion ou adjudication	région, CIREEF	2003-2010	annuelle	comptage dans le registre administratif	Sommier des exploitations DREEF, DVRN	Facilement accessibles et données régulièrement mises à jour
Surface exploitée en ha	durée de validité permis	région, CIREEF	2003-2010	annuelle	somme des superficies exploitées des permis en cours au cours d'une année	Rapport de suivi-évaluation des exploitations DREEF, PV de fin d'exploitation des permis	Facilement accessibles et données régulièrement mises à jour
Volume en m3 du bois commercialisé local	type de bois	région, CIREEF	2003-2010	annuelle	Comptage par vérification des laissez-passer et autorisation de transport, enquêtes sur le marché	Rapports d'activités et base de données de production de produits forestiers non ligneux de DREEF et DVRN	Facilement accessibles. Les volumes exploités hors du circuit formel qui représentent une part importante de la production totale ne sont pas comptabilisés.

Prix des bois en Ar par m3	type de bois	site	2003-2008	non-définie	enquêtes sur le marché	- Base de données de DVRN sur les exportations des produits forestiers - USAID, Etude sur la production et la consommation en produits forestiers ligneux à Madagascar, 2009	Faible nombre des marchés enquêtés et données limitées à quelques produits seulement (ex : palissandre, pin, eucalyptus, etc.). Pas de données mises à jour disponibles.
Chiffres d'affaires en Ar sur bois	type de bois, transfert de gestion	région	2005-2007	annuelle	enquêtes des entreprises	- Direction Générale des eaux et Forêts/Conservation International : Etude sur la Politique de Conservation des Ressources Forestières à Madagascar, Juin 2000 - INSTAT, Rapport de l'Enquête sur les Entreprises à Madagascar, Année 2004, avril 2005	Facilement accessibles ; données insuffisantes en raison de la non-inclusion du secteur informel de commercialisation de bois
Redevances sur exploitation en Ar	type de bois	région, CIREEF	2001-2010	annuelle	Cumul et calculs du % par permis	Base de données de DREEF sur les redevances des exploitations forestières	Facilement accessibles ; non-inclusion des exploitations informelles
Quantité de charbon produite en tonne		région	2003-2010	annuelle	rapport d'activités des CIREEF	rapport d'activités des CIREEF, DVRN	Facilement accessibles ; non-inclusion des exploitations informelles
Quantité de bois de chauffe commercialisé en tonne		région	2003-2010	nnuelle	rapport d'activités des CIREEF	rapport d'activités des CIREEF, DVRN	Facilement accessibles ; non-inclusion des exploitations informelles
Couverture forestière en ha	écosystème	tous niveaux	1990-2005	5 ans	traitement images Landsat 5 et 7	MEFT, Evolution de la couverture de forêts naturelles à Madagascar – 1990-2000-2005, USAID, 2009	Facilement accessibles
Taux de déforestation	forêt	tous niveaux	1990-2005	6 ans	traitement images Landsat 5 et 7	MEFT, Evolution de la couverture de forêts naturelles à Madagascar – 1990-2000-2005, USAID, 2009	Facilement accessibles

Surface des peuplements artificiels en ha	type de bois	tous niveaux	1999	non définie	Revue biblio et estimations	Etat des plantations villageoises et familiales malgaches d'aujourd'hui - Bruno Ramamonjisoa - FAO - 1999, étude sur l'état des lieux des grands périmètres de reboisement de Mcar 2010, Randriantsoa Ranto Herilahatra	Documents facilement accessibles ; difficultés d'inventorier les plantations villageoises et familiales en raison de leur éparpillement et le manque d'information pour les localiser. Données non mises à jour pour ces plantations villageoises.
Volume en m3 du bois exporté	type de bois, travaillé ou brut		2003-2010	annuelle	déclarations des exploitants ayant des permis valides lors paiement des redevances (% FOB)	Base de données de DREEF, DVRN sur l'exportation des produits forestiers	Données facilement accessibles mais la fiabilité des données est basée sur les déclarations des exploitants.
Valeur d'exportation de bois en Ar	type de bois, travaillé, produit fini	région	2003-2010	annuelle	Déclarations des exportateurs auprès de la Banque Centrale, redevances d'exportation perçues	Rapport de la Banque Centrale sur les exportations, Base de données de DREEF, DVRN sur l'exportation des produits forestiers, étude sur l'état des lieux des grands périmètres de reboisement de Mcar, 2010, Randriantsoa Ranto Herilahatra	Données facilement accessibles mais la fiabilité des données est basée sur les déclarations des exploitants.
Redevances sur exportations en Ar	type de bois	région	2001-2010	annuelle	Déclarations des exportateurs auprès de la Banque Centrale, redevances d'exportation	Base de données de DREEF, DVRN sur l'exportation des produits forestiers	Données facilement accessibles mais la fiabilité des données est basée sur les déclarations des exploitants.

Consommation des ménages en m3	utilisation (construction, chauffe, charbon, etc.)	rural et urbain	1993-2000	non définie	Enquêtes et estimations	USAID, Etude sur la production et la consommation en produits forestiers ligneux à Madagascar,2009	Document disponible ; données non mises à jour et uniquement basées sur des estimations de quelques études spécifiques qui dataient entre 1993 et 2000
Biomasse en tonne métrique	écosystème	National, Région	2000 et 2010	non définie	Directives FAO et valeur internationale, estimations par type d'écosystème	Rapports d'inventaire des forêts de Maroantsetra et Morondava - DGEF - 2000, Combined biomass inventory in the scope of REDD" Madagascar conservation and development 5: 23-34 Plugge, D et Balfaud, T 2010	Documents facilement accessibles. Echantillonnage de forêts sur 3 sites pour extrapoler les estimations de biomasse au niveau national.
Quantité de produits vendus localement (bambou, raphia, miel, plantes médicinales, etc.)	type de produit, statut CITES	région	2005-2010	annuelle	Déclarations des producteurs auprès de DVRN	Rapport d'activités de CITES, Direction de la Valorisation des Ressources Naturelles	Données facilement accessibles mais n'incluent pas le secteur informel assez important dans ces filières.
Quantité d'exportation en kg	type de produit, statut CITES	région, district	2005-2010	annuelle	Déclarations des exportateurs auprès de DVRN	Rapport d'activités de CITES, Direction de la Valorisation des Ressources Naturelles	Données facilement accessibles et régulièrement mises à jour.
Valeur d'exportation PFNL en Ar	type de produit, statut CITES, fini/brut	région, district	2005-2010	annuelle	Déclarations des exportateurs auprès de la Banque Centrale et DVRN	Rapport d'activités de CITES, Direction de la Valorisation des Ressources Naturelles	Données facilement accessibles et régulièrement mises à jour.
Redevances sur exportations en Ar	classe	région, district	2005-2010	annuelle	Déclarations des exportateurs auprès de DVRN	Rapport d'activités de CITES, Direction de la Valorisation des Ressources Naturelles	Données facilement accessibles et régulièrement mises à jour.
Nb de visiteurs internationaux	nationalité	national	1995 -2011	mensuelle	Fiches de	MinTourisme, Direction	Données facilement

					débarquement et d'embarquement à l'aéroport	du système d'information, Statistiques du tourisme, Organisation Mondiale du Tourisme	accessibles et régulièrement mises à jour.
Nb d'entrées/ visiteurs dans les parcs	nationalité	national, aire protégée	1996- 2011	mensuelle	Données opérationnelles MNP	MNP, base de données de la direction des opérations sur les visites des parcs et les DEAP	Données facilement accessibles et régulièrement mises à jour.
Nb de nuitées par touriste	nationalité	national, aire protégée	2002- 2011	mensuelle	Fiches de débarquement et d'embarquement à l'aéroport, enquêtes des touristes	MinTourisme, Direction du système d'information, Statistiques du tourisme, Organisation Mondiale du Tourisme	Données facilement accessibles et régulièrement mises à jour.
Dépenses sur site par touriste	nature des dépenses	national, aire protégée	2008- 2009	non-définie	enquêtes des touristes, statistiques des changes de la Banque Centrale	- MinTourisme, Direction du système d'information, Statistiques du tourisme, ATW, Enquête visiteurs pour la filière tourisme à Madagascar, Projet Pôles Intégrés de Croissance, Banque Mondiale, ONTM, 2009 - Statistiques des rentrées de devises de la Banque Centrale, - Conservation International, Increasing competitiveness of micro and small enterprisein the tourism industry of Madagascar, USAID, 2009	Documents facilement accessib
Dépenses moyennes par typologie de touriste	nature des dépenses, nationalité	national	2008- 2009	non-définie	enquêtes des touristes, statistiques des changes de la Banque Centrale	- MinTourisme, Direction du système d'information, Statistiques du tourisme, ATW, Enquête visiteurs pour la filière tourisme à Madagascar, Projet	

						Pôles Intégrés de Croissance, Banque Mondiale, ONTM, 2009 - Statistiques des rentrées de devises de la Banque Centrale, - Conservation International, Increasing competitiveness of micro and small enterprisein the tourism industry of Madagascar, USAID, 2009	
Valeur moyenne des changes de devise		national	2003-2011	annuelle	registres administratifs de la Banque Centrale	Statistiques des changes de la Banque Centrale	Données facilement accessibles et fiables.
Masse salariale MNP	parc, direction	aire protégée MNP	1996-2011	annuelle	Traitement des données opérationnelles de MNP	MNP, base de données de la direction des opérations	Données facilement accessibles et fiables.
Impôts et taxes de MNP	parc	aire protégée MNP	1996 -2011	annuelle	Traitement des données opérationnelles de MNP	Etats financiers de MNP	Données facilement accessibles et fiables.
Charges de gestion de MNP	parc, direction	aire protégée MNP	1996 -2011	annuelle	Traitement des données opérationnelles de MNP	MNP	Données facilement accessibles et fiables.
Valeur ajoutée des restaurants et hôtels autour des parcs	services offerts	aire protégée	2000	non-définie	enquêtes des touristes et des opérateurs	ANGAP, Evaluation de l'Impact Economique des Aires Protégées, WWF, 2001	Données non mises à jour.

Sector: Fisheries and Coastal Resources

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
Permis de pêche	Société	Province National	1980- 2011	Annuelle	Registres administratifs	Ministère Pêche	Facilement accessibles, données à mettre à jour.
Droits d'exploitation en Ariary	Société, produit	Province National	1980-2011	Annuelle	Registres administratifs et conventions	Ministère Pêche	Facilement accessibles
Quotas de capture en tonne	Société, produit	Province National	1980-2011	Annuelle	Registres administratifs et conventions	Ministère Pêche	Facilement accessibles
Volume de capture en tonne	Société, produit	Province National	1980-2011	Annuelle	Registres administratifs et conventions	Ministère Pêche	Données insuffisantes car certains produits capturés ne sont pas rapportés dans les statistiques officielles dans les années passées (ex : requins, thon, poissons en accompagnement des chalutages de crevettes, etc.). De même pour les captures des pêcheurs traditionnels et de la petite pêche.
Valeur de capture en Ariary	Société, produit	Province National	1980-2011	Annuelle	Registres administratifs et conventions	Ministère Pêche	Données insuffisantes car certains produits capturés ne sont pas rapportés dans les statistiques officielles dans les années passées (ex : requins, thon, poissons en accompagnement des chalutages de crevettes, etc.). De même pour les captures des pêcheurs traditionnels et de la petite pêche.
Prix de vente en Ariary	produit, marché	Régional	2010 - 2011	Annuelle	Enquêtes sur les marchés de la région de la côte ouest	Blue Ventures, Ministère Pêche	Données accessibles mais limitées à certaines régions dont la côte Ouest

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
Prix de vente à l'exportation en devise étrangère	Société, produit, marché	International	2000 - 2011	Annuelle	Conventions des opérateurs	Blue Ventures, Ministère Pêche	
Exportations en tonne	Société, produit, destination	Province National	1980-2011	Annuelle	Registres administratifs, enquêtes des entreprises	Ministère Pêche, AHS[37],OEFC[38]	Données accessibles mais insuffisantes car certains produits capturés ne sont pas rapportés dans les statistiques officielles dans les années passées
Exportations en Ariary	Société, produit, destination	Province National	1980-2011	Annuelle	Registres administratifs, enquêtes des entreprises, balance des paiements	Ministère Pêche, AHS,OEFC, Banque Centrale	Données accessibles mais insuffisantes car certains produits capturés ne sont pas rapportés dans les statistiques officielles dans les années passées
Production transformée ou traitée en tonne	Société, produit	Province National	2001 - 2011	Annuelle	Registres administratifs, enquêtes des entreprises dans le secteur de la pêche crevettière et thonière	Ministère Pêche, AHS,OEFC	Données accessibles limitées à la pêche industrielle
Production transformée ou traitée en Ariary	Société, produit	Province National	2001- 2011	Annuelle	Registres administratifs, enquêtes des entreprises dans le secteur de la pêche crevettière et thonière	Ministère Pêche, AHS,OEFC	Données accessibles limitées à la pêche industrielle
Taxe à l'exportation en Ariary	Société, produit	Province National	1980-2011	Annuelle	Registres administratifs	Ministère Pêche	Facilement accessibles
Impôt sur les bénéfices en Ariary	Société, produit	Province National	1980- 2011	Annuelle	Registres administratifs	Direction des contributions directes	Facilement accessibles
Liste des sociétés d'exploitation	produit, pavillon, capacité de tonnage	Province, national, international	2000-2011	Annuelle	Registres administratifs, enquêtes des entreprises	Ministère Pêche	Facilement accessibles mais base de données à mettre à jour.

[37] Autorité Sanitaire Halieutique
[38] Observatoire Economique de la Filière Crevettière

Type de données	Catégorisation par	Niveau géographique	Période couverte	Fréquence de collecte	Méthode de collecte	Documents sources	Observations
Nombre de vaisseaux	Pavillon, capacité de tonnage	Province, national, international	2000-2011	Annuelle	Registres administratifs, enquêtes des entreprises	Ministère Pêche	Facilement accessibles mais base de données à mettre à jour.
Nombre d'emplois	Société, produit	Province National	2001 - 2011	Annuelle	Enquêtes des entreprises dans le secteur de la pêche crevettière	OEFC	Données accessibles limitées à la pêche industrielle
Nombre de pêcheurs	produit, type d'équipement	région ?	1987-1988	non-définie	Recensement	Ministère Pêche	Données de recensement à mettre à jour

Note: Data on gross operating surplus and compensation for employees, as well as other datasets for the shrimp sub-sector, are held by OEFC.

Annex 3: Terms of Reference for WAVES National Steering Committee

Wealth Accounting and Valuation of Ecosystem Services (WAVES) Partnership

Comité national de pilotage (CNP) WAVES

Termes de Reference

Version: 1.0
Date: 30 June, 2012

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1. Préambule et contexte

L'objectif global de WAVES est d'appuyer les gouvernements dans les pays partenaires à parvenir à un développement durable en élargissant leurs systèmes de comptes nationaux d'intégrer les valeurs des ressources naturelles à la fois pour les indicateurs macro-économiques et pour la gestion des ressources naturelles. Madagascar est l'un des cinq pays en voie de développement qui a été choisis comme pays partenaires de participer dans WAVES. Madagascar a été choisi pour être impliqué dans WAVES parce que même si les ressources naturelles de Madagascar représentent potentiellement une source importante de richesse pour le pays, aucune analyse quantitative de l'ampleur de cette richesse n'existe. Le gouvernement de Madagascar a manifesté son intérêt fort d'être un pays partenaire de WAVES à travers une approbation du Cabinet en août 2011.Un comité national de pilotage (CNP) WAVES a été désormais établi par Arrêté N° 9260/2012 du 14 mai 2012 délivré par le Ministre de l'Economie et de l'Industrie.

2. Les membres du CNP WAVES

Les membres du CNP WAVES sont nommés dans Arrêté N° 9260/2012 du 14 mai 2012. Les changements éventuels à la composition du CNP WAVES devraient être édicté par un Arrêté.

3. Rôles et responsabilités du CNP WAVES

a. Le rôle principal du CNP WAVES est de fournir des orientations générales et des conseils sur le travail stratégique et technique, de faciliter les communications et la liaison avec le gouvernement et d'organisations non gouvernementales pour soutenir le programme, et promouvoir la synergie et la collaboration entre WAVES et d'autres activités dans le pays. Les rôles et responsabilités spécifiques sont les suivants:

   i. Établir et examiner chaque année lés activités prioritaires pour WAVES dans le pays et valider le plan de travail et le budget annuel ;
   ii. Fournir des orientations et des conseils sur le travail technique du projet et les possibilités de soutien à la politique de prise de décision;
   iii. Examiner les termes de référence pour les consultants techniques;
   iv. Valider les rapports annuels du pays préparé par le coordonnateur national WAVES ;
   v. Identifier les partenaires appropriés au sein du gouvernement et d'autres partenaires (ONGs, institutions universitaires et autres) pour aider l'équipe de

pays dans l'accomplissement de son travail, et faciliter l'établissement de relations de travail avec ces partenaires ; et

vi. Soutenir la diffusion des résultats du projet par le biais d'un atelier annuel ouvert à toutes les parties intéressées dans le pays et d'autres forums appropriés.

b. Tous les membres du CNP WAVES participeront sur une base volontaire sans compensation financière. Les membres seront remboursés des frais de déplacement raisonnables pour assister aux réunions et les coûts de toutes missions éventuelles afin de visiter les activités WAVES sur le terrain ou participer à des réunions nationales ou internationales.

c. Lorsque cela est possible, les décisions du CNP WAVES seront pris sur la base de discussion et avec un consensus plutôt que par un vote formel. Dans le cas où un consensus ne peut être atteint et un vote formel est nécessaire, une décision sera considérée comme validée si elle est votée par une majorité des membres.

d. Les membres du CNP WAVES sont censés de se réunir au moins trimestriellement, et pourrait établir un comité de gestion pour gérer les communications et les activités quotidiens.

e. Les membres du CNP WAVES devraient se conformer aux principes de transparence et d'objectivité dans leur rôle. Les membres du CNP WAVES devrait divulguer tout conflit d'intérêt entre leur rôle en dehors du CNP et de toute question en discussion par le Comité, et devrait se dispenser de toute discussion ou décision relative à une telle question.

4. Les co-présidents du CNP WAVES

a. Les co-présidents du CNP WAVES sont nommés dans Arrêté N° 9260/2012 du 14 mai 2012. Changements à la nomination des co-présidents doivent être édicté par un Arrêté.

b. En plus de leurs rôles et responsabilités en tant que membres du Comité directeur, les co-présidents ont les responsabilités spécifiques suivantes:

i. Co-présider les réunions de CNP WAVES
ii. Agir en tant que les points focaux pour le CNP WAVES en communication avec le coordonnateur national et le secrétariat mondial
iii. Représenter le CNP WAVES sur le comité de pilotage mondial WAVES, et lors d'événements tel que la réunion annuelle du partenariat WAVES

5. Les groupes de travail techniques

a. Le CNP WAVES pourra établir un ou plusieurs groupes de travail techniques pour l'aider dans son rôle de supervision des activités du partenariat WAVES. La mise en place d'un tel groupe, il faudra le consensus des membres du comité de pilotage.

b. Le CNP WAVES sera responsable de la nomination des membres et des termes de référence pour tout groupe de travail technique qui est créé.

6. Secrétariat du CNP WAVES

a. Le Secrétariat du CNP WAVES sera assuré par le coordonnateur national WAVES.
b. Le Secrétariat consultera avec les co-présidents sur les dates et l'ordre du jour des réunions du CNP WAVES et enverra des invitations à membres au moins une semaine à l'avance des réunions.

c. Le Secrétariat élaborera un ébauche de procès verbale (PV) de chaque réunion du CBP WAVES et le faire circuler pour commentaires à tous les membres dans la semaine de la réunion. Le PV modifié sera signé par les coprésidents.
d. Le Secrétariat est un membre *ex officio* du CNP WAVES et aura le droit de contribuer aux discussions lors des réunions, mais il ne dispose pas de droits de vote.