COASTAL LIVELIHOODS IN THE REPUBLIC OF MADAGASCAR

GENERAL INTRODUCTION

The Agulhas and Somali Current Large Marine Ecosystems (ASCLME) project is focused on the two large marine ecosystems of the Western Indian Ocean (WIO) region, covering nine countries that are directly influenced by these current systems. It is estimated that at least fifty-six million people are reliant either directly or indirectly on the goods and services provided by these two current systems. The ASCLME project aims to support these countries in their efforts to collectively manage the marine resources on which their people and economies depend. Fisheries and other key coastal activities, including various forms of tourism, aquaculture, shipping and coastal transport, the energy sector, agriculture and forestry, are very important contributors to the economies of the countries of the WIO. In recognition of the complexity and importance of these activities, a Coastal Livelihoods Assessment (CLA) component was developed for the ASCLME project.

The CLA component had three main objectives:

- to collect as much existing information as possible about the main coastal activities in the nine participating countries as a contribution to the national Marine Ecosystem Diagnostic Analyses (MEDAs);
- to make input into ensuring that this information is stored and organised in a manner that will allow easy access and maximum utility to multiple stakeholders, both during and after the lifetime of the ASCLME Project;
- to review and sythesise the information collected in order to provide useful inputs to the TDA and SAP processes.

In order to achieve these objectives, the CLA component was separated into three distinct phases, with the first phase kicking off in May 2009. During phase one, a “desktop” review of available data was conducted by the regional project coordinators, input was made into the design of a literature management tool to facilitate the storage of information, and preparations were made for the in-country data gathering process. Planning meetings were held between the core CLA team and the in-country Data and Information (D+I) Coordinators in August 2009. The processes involved in the in-country component of recruitment and data gathering was discussed and confirmed at this stage.

Phase two involved in-country personnel having been identified and recruited through a regionally inclusive recruitment process. Nominations were invited and received from country focal points and D+I Coordinators. Twenty three consultants were recruited to assist with the project. For some sectors international experts (drawn from the region where possible) were asked to provide information for all countries in the region while in others, where good local capacity existed, in-country consultants were recruited. This group of consultants collected information from existing resources, such as published articles, government reports, regional reviews, project reports and outputs, policy documents as well as a range of other grey literature that was likely to be useful.

Phase three involved the organisation of the information into country Coastal Livelihood Reports where individual sector reports have been assessed and the key elements from each sector extracted and presented in a summarised format. These country reports will be reviewed by project representatives in each country and once accepted, will be incorporated as a separate Coastal Livelihoods chapter in the overall country MEDA documents. It is anticipated that the

information collated in these reports will allow examples of best-practice to be identified for application in other parts of the region. The objective is to build on approaches that work rather than to duplicate efforts. Information gaps will be identified and addressed in subsequent phases of the ASCLME, including during a Cost/Benefit Analysis (CBA) exercise designed to weigh up the costs and benefits of various development options. Key information from these reports will feed into the CBA and hopefully provide useful guidelines for the Transboundary Diagnostic Analysis (TDA) and the development of Strategic Action Plans (SAP) for the overall ASCLME project.

The following country report begins with an overview of coastal livelihoods in Madagascar, which provides a concise overview of the seven sector reports and the findings of the in-country and regional consultants. This overview ends with a conclusion which summarizes the collected information as it relates to the coastal zone in Madagascar in general. This overview is followed by the more detailed sector reports, which represent the original contributions by the in-country and regional consultants. The sectors are organized in the following order: Small-scale Fisheries, Tourism, Mariculture, Agriculture and Forestry, Energy, Ports and Coastal Transport and Coastal Mining.

Each sector report has been prepared by specialists in that particular sector drawn either from the country or internationally. Sector reports have been prepared according to a pre-determined template to ensure that the relevant aspects of that sector were captured by the consultants. Reports include descriptive sections on the biophysical environment, human environment, policy and governance, planning and management, and development, trade and projects related to that sector. Each report is concluded with a SWOT analysis which provides a summary of the Strengths, Weaknesses, Opportunities and Threats facing that sector. It is the outputs of these SWOT analyses that are of particular importance to the strategic planning aspects of the overall ASCLME project. These reports were initially submitted to the regional coordinators for review and have subsequently been corrected and updated by the consultants themselves.

Finally, each sector report has a bibliography containing key references and links to relevant information. Full details of the information resources collected during compilation of each sector report, as well as electronic copies of literature (where available), are included in the overall ASCLME reference management system.

OVERVIEW OF COASTAL LIVELIHOODS IN MADAGASCAR

I. Small-Scale Fisheries

The small-scale fishery in Madagascar, which covers subsistence, artisanal/traditional and recreational fishing, is largely concentrated on the country's west coast, making up 36% and 27% of the workforce in the province's of Toliara and Mahajanga respectively. Traditional fishing, undertaken on foot or canoe, represents nearly 68% of total fish production, largely focusing on export products, such as crustaceans, holothurians and cephalopods, with men making up 97% of the workforce. In 2003, the small-scale fisheries, as a whole, contributed nearly 26% of the total tonnage of fisheries export production and nearly 9% of the total value of exports, worth an estimated $142 million USD.

One clear constraint in the sector is the lack of information, data and socio-economic research available, which is perhaps a reflection of the country's weak institutional capacity. The lack of information coming out of the sector makes proper planning and management very difficult,

evident in the fact that no policies have been designed solely for small-scale fisheries. This lack of capacity has also affected the ability to monitor the sector, whereby, over-fishing, particularly of sea cucumber and shellfish, continues to go unchecked. This problem is further magnified with the lack of existing coordination between the fisheries and environment ministries. Similar constraints can be seen in infrastructure, with massive post-harvest losses being documented as a result of poor storage facilities, particularly prevalent in remote areas. Increased fuel prices, and inflation in general, are threats that could intensify these problems.

Overall, despite the multiple problems caused by weak capacity and infrastructure, there are numerous strengths and opportunities in the sector that could be capitalized on moving forward. For example, there are lucrative resources, such as crab and rock lobster, that are not being utilized by the industrial fishery. This is even more promising for the traditional fishery, which requires significantly less expenditure in comparison to other sub-sectors. High demand for fish products should also provide incentive to grow the sector, particularly in areas associated with mining developments. International demand is also strong, highlighting the potential for increased exports. The ASCLME project itself also has the potential to generate information and facilitate better management in the sector. However, a lack of microfinance, along with inadequate training, could present further obstacles in the sector moving forward.

II. Tourism

Tourism and the hotel sector represented 3.7% of GDP in 2008, an increase from 2.8% in 2003. The sector is the second largest source of foreign exchange in the country, bringing in $116 million in 2009, which is, however, down from $210 million in 2007 and $303 million in 2008. The sector also directly employed nearly 27,300 people in 2009, an increase of over 6,000 people from 2005, which largely correlates to the 5% annual growth rate in the sector as a whole. Antananarivo, Toliara and the national park of Isalo are the most frequented destinations, while France is the largest visitor market, representing 70% of all arrivals.

Numerous constraints have been identified in tourism, despite the documented growth in the sector. For example, not only does the rainy season correspond to winter in the Northern Hemisphere, but the risk of cyclones and tropical diseases have all been identified as constrictive to activity. Poor international accessibility and weak infrastructure also inflate costs for visitors, particularly in comparison to other tourist destinations in the region. A lack of appropriate facilities has also been highlighted as a weakness in the sector. Despite these challenges, the strengths prevalent in Madagascar's natural landscape and culture are highly conducive to a successful tourism sector. For example, different climate zones, diversified landscapes and ethnic cultures, as well as extensive biodiversity, all highlight the great natural and social vitality present in the country. These natural strengths also have the potential to be accentuated by potential upgrades in infrastructure, the revival of cultural heritage, as well as the diversification of products being offered in the sector.

As a whole, the ability of tourism to generate income outside of the hotel sector, notably in agricultural goods, fishing and sailing, is clearly an advantage, particularly as a means to include local communities who may not be directly employed in tourism. And while the destruction of rainforests and the pressure being placed on natural resources from internal migration are pertinent issues, it is positive to note that a green charter was jointly signed by the ministries of environment and tourism in 2006, which made commitments to promoting sustainable development as a key facet of tourism in the future. Thus, while both political instability and the domestic monopoly maintained by Air Madagascar could continue to be problematic, the

opportunity for increases in quality control and service delivery highlight the potential for further growth in tourism in the coming years.

III. Mariculture

Mariculture is a developing sector in the Malagasy economy with research and pilot projects ongoing in mud crab, sea cucumber, blue-green algae, oyster and eel. There are also commercial activities present, seen with the large scale farming of prawn for export and domestic consumption, as well as small-scale production in seaweed. Prawn farming, in particular, has been very successful in providing employment for rural communities, supplying 4,325 permanent and 30,000 part time jobs in 2003. The sub-sector also has a strong export component worth an estimated $62 million USD.

As it is a developing sector, numerous constraints still remain prevalent in mariculture. For example, improvements in research and development capabilities, as well as wider access to finance, are both required to further develop the sector. Theft and vandalism, as well as a lack of an overarching sector plan, have also become problematic. Environmental degradation has also become an issue. For example, the physical alteration and destruction of mangroves, as well as biosecurity in general, have been highlighted as foreseeable problems in prawn farming. The sustainability of crablet supply, as well as juvenile harvesting, have also become issues in the farming of mud crab. Likewise, unsustainable farming practices across all sub-sectors has also been highlighted as a threat.

As a whole, despite these documented constraints, mariculture holds much promise in Madagascar. High quality seawater, larges areas suitable for development, as well as numerous potential candidate species, all highlight the strengths that are prevalent.. Private-sector involvement, particularly in prawn farming, also magnifies the interest and potential surrounding the sector, which is further reinforced by the extensive bi-lateral support coming from donors and various European universities. The potential for sea cucumber ranching, as well as commitments from government and communities, also highlight the positives inherent in mariculture moving into the future. Thus, while priorities in sub-sector planning and common codes of practice need to be established, the opportunity for mariculture to become a significant substitute sector in the Malagasy economy is clearly evident.

IV. Agriculture and Forestry

Agriculture and forestry is clearly a significant facet of the Malagasy economy, providing a base for employment and subsistence for over 75% of the population and contributing 35% to total GDP. Traditional agriculture makes up between 30% - 60% of total production, whereby, rice is cultivated by 86% of households, accounting for 37% of agriculture cash income. Small business accounts for less than 10% of household income along the coast, thus, over-dependence on natural resources is clearly a problem in the coastal zone. 34% of the population also lives within 100Km of the coast, which, in conjunction with extensive population growth, places even further strain on the country's coastal resources.

Due to the aforementioned over-dependence, the over-exploitation and degradation of coastal resources has inevitably become problematic. Madagascar has lost much of its forests due to illicit logging and tavy agriculture, which has had a serious impact on adjoining ecosystems. It has been estimated that, if this trend continues, the country's natural heritage could disappear within the next century. Aside from population pressure and a lack of alternative income

generating activities, weak capacity has also contributed to the degradation of the country's forests. For example, weak regulation has led to the over-exploitation of forests in commercial timber production, while the ability and capacity at the community level to implement sustainable practices remains inconclusive. Similarly, limited information on government planning and management in the sector also suggests that domestic capacity is highly uncertain.

Despite these challenges, numerous strengths and opportunities are apparent in the sector. For example, the country's vast coastal resources and unique species offer great potential, particularly as a means to generate activity in the tourism sector. Similarly, a strong civil society and the presence of NGO's highlight the dedication on the ground to preserving the country's unique landscape, while the promotion of substitue sectors, particularly mariculture, also holds much promise in terms of its ability to generate employment away from more exploitative sectors. Expansion into more industrial-intensive agriculture could also be fruitful for both exports and livestock production. Overall, in most cases, there is an emphasis being placed on alternative income generating activities, which holds potential not only in terms of reducing the strain being placed coastal resources, but also in terms of having a broad impact on poverty in the Malagasy coastal zone.

V. Energy

Oil, gas and biofuel activity is currently minimal in Madagascar, with no data available on the contribution of the sector to GDP. Unconventional oil reserves have been discovered in Bemolanga, estimated at 9.8 billion barrels, and Tsimiroro, estimated at 2 billion barrels, while light oil has also been discovered inland, East of Tulear. There are also prospects for offshore oil fields on the Western and Northern coasts. While state-owned companies have historically been dominant in the sector, most activities, particularly around oil, have been privatized since 2000. Downstream activity is concentrated in importation, processing, storage and sales, with all refined oil being delivered to Toamasina port. The Toamasina refinery was, however, closed in 2004. In 2009, eighteen planned biofuels projects were identified throughout the country, all focusing on jatropha production. Many of these projects were, however, cancelled due to the country’s political crisis.

Numerous constraints have been identified throughout the energy sector. Political instability has been highly detrimental to activity, as it has not only delayed the implementation of the Integrated Coastal Management program and other development policies, but it has led to the cancellation of many biofuels projects, as well as prompted the suspension of international budgetary support. Government capacity is also relatively weak, which makes it difficult to enforce law and monitor the EIA process. Poor education and a lack of local employment in the sector has also been highlighted as a challenge, which is particularly relevant considering the high levels of poverty in coastal communities. In-migration of the workforce, a lack of land access for foreign companies in biofuels, as well as a weak private sector and recurrent natural disasters, have all also been identified as serious constraints in the sector.

There are, however, several strengths and opportunities that could be utilized to mitigate some of the aforementioned constraints. For example, sparsely inhabited oil fields, as well as strong environmental regulations, are both factors that could alleviate the exposure of coastal communities to spills. The government also continues to monitor attributes of the Dutch Disease which, in conjunction with the country’s commitment to the EITI process, should ensure that policy and revenue is well managed in the sector. Similarly, despite the difficulties of land access for biofuels investors, the country’s extensive land availability should be conducive to the

resumption of biofuel activities in the future, while the experience of oil and gas companies in other regions should contribute to enhanced safety and efficiency in the sector. Nevertheless, political instability continues to present major challenges, thus, it is likely that many of these strengths and opportunities will not be realized until stability is re-established.

VI. Ports and Coastal Transport

Ports and rail have been documented as the two key modes of transport in the Malagasy coastal zone. Six ports have been identified, all of which are crucial to economic life due to the difficulty of inland movement. The most important ports, in terms of cargo and trade, are Mahajanga and Toamasina. Toamasina is highly significant as it is not only connected to Antananarivo by rail, but it is also an important point for both exports and imports. Mahajanga also provides transshipment services, however, a cyclone in 2006, as well as limited water depth, has constrained activity. Ports in Madagascar are largely state-controlled, however, some privatization has been seen with the ports in Toamasina and Ehoala, while further concessions are being made to the private sector due to capital constraints and a need for modernization. In regard to rail services, the private company Madarail is the most significant provider, carrying 94% of rail freight and 86% of passenger rail traffic in the country. In 2008, the transport of commercial and consumer goods by rail accounted for 45% of total tonnage in the country, a clear testament to the importance of rail services in the country.

Political instability and ethnic tension have been highlighted as weaknesses influencing the sector, as both have the potential to deter investment and private-sector activity. Cyclones and tsunamis have also been problematic, which pose serious threats to infrastructure and overall economic activity, while capital limitations have also been cited as a weakness, particularly prevalent in ports and in sea-based economic activities. Nevertheless, the country does posses a comparative advantage in its geographical position, evident in its strategic proximity to sea lanes linking the Far East with Africa and South America, as well as its easy access to a vast expanse of ocean.

Challenges are clearly apparent, however, there are numerous opportunities in the sector that could be capitalized on moving forward. For example, growth in the mining sector in Sakoa and Toamasina, as well as development in the oil and gas sector, could potentially facilitate development in the country's ports and adjacent coastal communities. Many mineral reserves in the country also remain unexploited, which again highlights the potential for future growth in sectors, such as ports and coastal transport, that compliment mining activity. Similarly, the port in Ehoala has recently been upgraded with a joint venture between Rio Tinto, the World Bank and the Malagasy state government, again a testament to not only the significance of mining activity as a facilitator of growth in the sector, but also the potential for further private-sector participation in ports and coastal transport. Thus, while political instability does remain a challenge, the commitment to developing the country's ports and coastal transport, from both the private sector and the government, should accentuate the other strengths and opportunities identified in the sector.

VII. Coastal Mining

Mining contributes less than 1% to GDP in Madagascar, however, the $5.5 billion total investment in the Illeminite mine in Tolagnaro and the nickel-cobalt mine in Moramanga and Toamasina was documented as the largest investment in Madagascar’s history. Expenditures on construction, for both mines, have been estimated to be the largest sources of hard currency in the

country. Actual production has already begun at the Tolagnaro mine, while production will begin in Moramanga and Toamasina in 2011. Sapphire, ruby, gem and gold are also prevalent in the country, with over 500,000 artisanal miners identified to be mining gold on a part-time basis. The production of heavy minerals from sands, and limestone in Toliara, as well as iron in Soalala, are all currently in the study and permitting phase.

Direct and indirect employment is clearly one great benefit from coastal mining. In Tolagnaro, the construction phase provided over 6,000 jobs, while over 2,000 jobs are provided in the operation phase. Construction at the mines in Moramanga and Toamasina have provided over 11,000 direct and indirect jobs. The companies operating the mines, Qit Minerals Madagascar and Ambatovy, are also large contributors to community development. Qit Minerals Madagascar has not only developed an enterprise development program, but it has also developed initiatives around microfinance, education and health care. Likewise, Ambatovy has developed a project to assist local populations in developing job skills, as well as created a center for agricultural training. Both mines do, however, present environmental challenges, particularly around the destruction of flora and fauna, which could certainly become problematic in the future.

Strong environmental and mining regulations, as well as a rich source of natural resources, both highlight the great strengths Malagasy mining moving forward. Perhaps, however, the greatest obstacle in the sector is political instability. Due to the current absence of a legal government, international donors have ceased to provide assistance, coastal zone management plans have gone on standby, all development strategies have been postponed and mining investments have declined. Current political instability is, in this respect, a threat to not only coastal mining activity, but to coastal development as a whole.

Conclusion

There are clearly numerous opportunities for sustainable economic development in the Malagasy coastal zone, many of which have the potential to create alternative forms of employment and mitigate the pressures being placed on coastal resources. At the same, there are also many challenges and constraints prevalent in the country, some of which, if left unchecked, could become deleterious to the development process.

One clear challenge prevalent across all sectors is the over-exploitation of renewable natural resources and the degradation of the coastal environment. For example, in the small-scale fisheries, overfishing in sea cucumber and shellfish, as well as overexploitation in trawling zones, have been identified as weaknesses in the sector. Similarly, unsustainable farming practices, juvenile harvesting and the destruction of mangroves have all been documented as threats in mariculture, while illicit logging and tavy agriculture have been highlighted as key practices in facilitating the massive degradation of Malagasy forests. While all these cases appear unrelated, the common explanation for all has been the degree to which impoverished coastal communities are dependent on natural resources for subsistence and employment. Without alternative forms of employment, coastal residents have no other choice but to perpetuate the over-exploitation of their natural resources. This is also why substitute sectors, such as mariculture and eco-tourism, have been heavily emphasized in the report, as they not only have the potential to create alternative streams of income, as seen with prawn farming on the west coast, but they can also reduce the strain being placed on coastal resources.

Weak capacity and infrastructure have also been identified as key constraints across sectors. For example, a lack of capacity to monitor and regulate the small-scale fisheries has, in some cases,

facilitated the deleterious practices noted above, while massive post-harvest losses have largely been attributable to weak storage infrastructure. Similarly, extension capacity, as well as a need for improvements in research and development capabilities, have both been highlighted as weaknesses in mariculture activity, while the lack of capacity to effectively monitor the EIA process in the energy sector has been documented as a constraint. Weak capacity at the national and local level has also been identified as problematic in agriculture and forestry, particularly in relation to the regulation of timber production, while a need for modernization in the country's ports has been highlighted as a key factor motivating the government to privatize some of the country's ports.

Despite these constraints, numerous strengths and opportunities are prevalent across sectors, the most obvious being the country's extensive biodiversity and geographical placement. For example, lucrative resources of crab and rock lobster have been highlighted as a huge opportunity for the small-scale fishery moving forward, while numerous candidate species, as well as high quality seawater, highlight the potential for expansion and development in the mariculture sector. Similarly, the country's unique wildlife and vast coastal resources have been identified as key factors through which to develop a strong eco-tourism sector, while the country's strategic geographical position makes it a vital link between the Far East, Africa and Latin America. The country's easy access to a vast expanse of ocean has also been highlighted as a key strength in the ports and coastal transport sector. The country also has untapped oil reserves offshore and onshore, which could be economically fruitful in the future.

The development of the mining sector has also been highlighted as a key opportunity across sectors, particularly in the small-scale fishery and ports and coastal transport sectors. For example, the growth of new consumption centers from mining activity has the potential to increase demand for fishery products, which could allow greater value to be realized from the small-scale fishery. The development of the mining sector has also had a great effect on ports and coastal transport in the country, highlighted by the upgrades facilitated by Rio Tinto in the Ehoala port. Future mining development is also expected to open up similar opportunities for adjacent ports.

The potential for exports is also very promising in some sectors. In the small-scale fishery, international demand for fishery products has the potential to incentivize export development, while the potential for expansion in export crops has been highlighted as a strength in the agriculture and forestry sector. Both prawn and seaweed are also currently being produced for export in the mariculture sector, while research and pilot projects are currently ongoing in mud crab, sea cucumber and eel, all of which are being developed for export.

Overall, there are clearly strengths and opportunities apparent that, if capitalized on, could facilitate sustainable socioeconomic development in the coastal zone. Capital, particularly for the government, does, however, remain a constraint, which means a continuation of private-sector activity is required to effectively utilize these strengths and opportunities. Such activity is well underway in both the mariculture and ports and coastal transport sectors, and the development of the mining sector should facilitate similar activity. Political instability, weak capacity and the over-exploitation of natural resources all, however, remain constraints, which has consequences for all socio-economic activity considered in this report. Nevertheless, as this summary and report highlight, these constraints can be mitigated with proper planning, management and policy, which certainly magnifies the potential of the coastal zone in Madagascar.

DETAILED SECTOR REPORTS

I. Small-Scale Fisheries – Prepared by Charles Andrianaivojaona,

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1. Introduction

Malagasy law[1], according to an order made in 1993 and a decree issued in 1994, makes a very clear distinction between the following kinds of fishing:

- Subsistence fishing; done on foot or non-motorized dugout canoes and of which the catch will not be sold. The catch is only used to provide food for the fisherman and/or his dependants.
- Commercial fishing can be divided into :
    1. Traditional fishing on foot or canoe. The use of a dugout canoe equipped with an outboard motor is classified within this fishing category;
    2. Artisanal(small-scale) fishing involves the use of a boat equipped with an engine of which the power is less than or equal to 50 Hp;
    3. Industrial fishing involves the use of a boat equipped with an engine of which the power is superior to 50Hp.
- Recreational fishing on foot or with a motorized or non-motorized boat and of which the catch will not be sold; it is often linked to tourism activities.

To summarize; according to the law, small coastal fisheries in Madagascar include (i)subsistence, (ii)commercial, be it traditional or artisanal, as well as (iii)recreational fishing, on foot or by using a boat equipped with an engine of which the power is less or equal to 50Hp.

Originally, the distinction between artisanal and industrial fishing based on horsepower (50 Hp) was adopted by the legislator in order to allow individual fishermen to have access to Malagasy coastal shrimp trawling, the prerogative of joint venture companies, by using small vessels of which the purchase price and operating costs were considered to be within their reach. Currently, artisanal shrimp trawling has disappeared. 49 Industrial and Artisanal Malagasy boats, fishing for demersal fish on the continental shelf, whether fishing with hand lines, trawl lines and / or gillnets, employ traditional fishermen, who make up the majority of their crew, according to Andrianaivojaona et al. [2] *(2009).*

The figures, mainly collected by Bellemans[3] between 1987 and 1990, covering all Malagasy small coastal fisheries have been summarized by Andrianaivojaona et al[4]. in 1992. A complete update of the data, originally planned every five years, has never been done. The data refers to fishing numbers (people involved in fishing), socio-economic aspects (gender ratio, average age, average family size of the fishermen, schooling levels, secondary activities), production (overall, for economically important species), the marketing of products (home consumption, marketing and sales channels). These figures are now completely obsolete, given the changes undergone by Malagasy fisheries and the living conditions of coastal communities.

[1] Order 93-022 of the 4th of May 1993 on the regulation of fisheries and aquaculture ; decree 94-112 of the 18th of February 1994 on the general organisation of maritime fishing activities
[2] See bibliography : 2 et 3
[3] See bibliography : 6
[4] See bibliography : 1

Case studies on certain resources (shrimp, rock lobster, cephalopods ...) and in some specific areas also provide data, more or less recent, referring to small coastal fisheries. We should mention, among others, the monographic data on some regions collected by the Ministry of fisheries[5], figures that were used to establish fishermen registers in certain districts[6] and for the elaboration of development diagrams / plans[7] as well as the results of research on fishing socioeconomics conducted by the national shrimp research programme that was summarized by Chaboud[8](2004).

The production export statistics of small coastal fisheries are published annually by the government (tonnage and turnover)[9]. However, the data on overall equipment imports for this line of business has never been compiled.

The contribution of small coastal fisheries to the economy (GDP) has not been studied.

We only have disparate and non homogeneous data on recreational fishing. There is a temporary conversion of fishermen into tourist guides to offer visits of the islets, coral reefs, the lagoon or the flat coral reef. In terms of catch, no significant competition was observed between the recreational / sports fishing activities and the small coastal fisheries.

The differentiation between small coastal fisheries and industrial fishing occurred at the beginning of shrimp trawling in the Malagasy waters, in the late 60s. This trawling activity raised, on the one hand, the issue mentioned by Ralison[10](2000), of the prohibition of trawling in an area within two miles of the coast, this area containing important shrimp populations and also being dedicated to the development of small coastal fisheries. On the other hand, it was what led to the definition of artisanal fishing (less than 50Hp engine).

The motorization of small coastal fisheries, other than shrimp fisheries, and the introduction of fibreglass reinforced hulls started thanks to grants / donations to the fishermen (Japanese donations, various projects.) Many of these boats, used for fishing, have not been maintained and were quickly abandoned by their users as it was too difficult to make them profitable.

The most significant small coastal fishing relates to artisanal fishing for shrimp and fish, on the one hand, and, on the other hand, to the activities of traditional fishermen who exploit export products such as crustaceans (shrimp, rock lobster and crabs), holothurians and cephalopods.

The majority of the 42 556 fishermen identified is concentrated on the West Coast because of more favourable fishing conditions, especially in the provinces of Toliara (36% of the workforce) and Mahajanga (27%). 72.2% uses boats while the rest work on foot. It is in the province of Mahajanga that you will come across the most fishermen fishing on foot (41% of the total number); this is because of the importance of fishing for crabs, very small shrimps, shrimps and sea cucumbers. The total production of traditional fisheries was estimated at 73 000 tonnes[11] in 2003, representing 68.5% of the total fishery and marine aquaculture production.

[5] See bibliography : 16
[6] See bibliography : 17 and 18
[7] See bibliography : 21 and 24
[8] See bibliography : 9
[9] The publication of this data stopped in recent years
[10] See bibliography : 22
[11] Annual reports by the Department of Fisheries and Fishery Resources

Traditional fishermen use a huge variety of devices, but these are mainly gill nets and seine nets (draw or tow nets). Gill nets, found almost everywhere, are used to catch fish. With seine nets, the fishermen of Antsiranana and Mahajanga catch shrimp and those of the other provinces use them to catch fish. At Taolagnaro, basket traps are used to trap rock lobster, and in Nosy-Be, to catch some types of fish (Siganidae - Rabbitfish). The barriers, many on the west coast in the Antsiranana and Mahajanga provinces, are used to catch shrimp. Most of the time the women use mosquito nets to catch very small shrimps and small juvenile fish.

Generally, in villages situated close to major consumption centres, the fresh fish are sold on the local market, actually by the fisherman's family. In remote villages, the products are salt-cured or smoked (for better preservation rather than for increasing the value thereof) and purchased by merchants who visit more or less regularly. The lucrative export products (shrimps, rock lobster and crabs) are collected by companies with a well-organized network, to be processed and packaged in their factories.

Artisanal fishing concerns shrimp trawling and fishing for Demersal fish. Of the 36 artisanal prawn trawlers, recorded in 2000, each employing 5-6 crewmembers, all became the property of industrial fishing companies that process their catches in their factories to prepare them for export. They operated in shrimp areas such as Ambaro Bay, Narindra Bay, around Mahajanga, off the coast of Maintirano and North of Morondava (West coast). Artisanal shrimp trawling has disappeared, because it is not profitable. Artisanal fishing for Demersal fish concerns 37 boats, 30 on the West coast and 7 on the East coast, with 6-8 fishermen on board, using hand lines (with or without a ledge line) and / or gillnets. Six (6) boats belong to two limited liability companies that own processing and packaging plants authorized for exportation. The rest is owned by individual owners who own, each, one or two boats, have no facilities on land, purchase the ice, food and fuel, and work with fishermen who sell them the fish they catch on the basis of an agreed price. Their products are marketed fresh or frozen, on the domestic market (city markets, super markets in the capital).

2. Biophysical Environment

The traditional fishermen, from the 1 250 villages that are spread out along the 5 000 km of Malagasy coastline, are working mainly in the lagoons, barrier reefs or fringing reefs. They go fishing outside the reef whenever conditions permit it. Those who use nets never move further than a mile offshore. Those who fish with lines, generally remain in a coastal strip of less than 2 miles. Some, particularly in Morondava, go beyond the territorial seas, to seek waters with more fish than the industrial shrimp trawling areas where fish are becoming scarce.

Regarding shrimp fishing areas, according to Domalain et al.[12] (2000) more than 600 sites of traditional shrimp fishing were identified on the Malagasy coast. Four areas are particularly important: on the West coast from North to South, the Ambaro Bay, Narinda Bay and the Belo-sur-Tsiribihina region; on the East coast, Antongil Bay (see map Appendix).

According to Mara[13] (1993), coastal rock lobster living on rocky bottoms and reefs, are found in southern Madagascar between latitudes 24 ° S and 25 ° 06 S and longitudes 43 ° 41 E and 47 ° 28 E, along more or less 500 km of coastline between Toliara and Isandravinany (see map Appendix). They are mainly caught by the fisheries of South Madagascar, North and South of

[12] See bibliography : 12
[13] See bibliography : 15

Tolagnaro, which produces two thirds of the national output. There are also fishing areas in the Northern parts of the West Coast in the vicinity of Nosy-Be, and on the East Coast, in the areas of Sainte Marie, Manakara, Farafangana and Vangaindrano.

The Mangrove or Mud crab (Scylla serrata) is caught in several regions in Madagascar (in the bays and the delta): Ambaro Bay, Maromandia, Mahajamba Bay, Bombetoka Bay, Maintirano, Tsiribihina Delta, Mangoky Delta, Farafangana.

Octopus fishing is an emerging sector in Madagascar. Fishing, on foot or with a canoe, is done close to the coast in the reef area; shore fishing on foot takes place on the coral reef at low tide during spring tides. The monthly fishing window is limited to 4 or 5 days before and after the full moon. Once spotted in its hole, the octopus is speared. In the intertidal zone, the majority of catches are of small sized individuals. Over time, this fishing activity (trampling of the area and searching the holes) will cause significant degradation of the reef flats. On the reefs of the sub-tidal zone, fishing is done underwater, in a few feet of water. It is here that the larger individuals are caught. Bemiasa[14] (2009) states that octopus occupy all the different reef habitats (micro-atoll, inner built reef, detritus levee, sandstone and limestone base of small islets).

Currently, the octopus and squid fishing areas (lagoon and flat coral reefs) are in the Southwest, from Morombe to Androka as well as on the North-eastern coast of the island.

As for sea cucumbers, the major fishing areas are concentrated in the North, around Nosy Be, in the centre of the West coast, around Mahajanga and around Toliara.

The latest statistics released by the government[15] concerning the production of small coastal fisheries do not give details for each zone.

[14] See bibliography : 7
[15] Annual Reports by the Ministry of Fisheries and Fishing Resources

Sectors	1996	1997	1998	1999	2000	2001
Artisanal Fishing	**557,0**	**809,0**	**623,0**	**630,0**	**587,0**	**620,2**
- Shrimps	334,0	609,0	446,0	480,0	412,0	437,2
- Fish	223,0	200,0	177,0	150,0	175,0	183,0
Traditional Fishing	**62 977,0**	**63 190,0**	**59 833,0**	**64 907,0**	**70 501,0**	**70 551,6**
- Shrimps	2 000,0	2 000,0	2 242,0	2 139,0	3 412,0	3 450,0
- Crabs	1 000,0	1 000,0	1 500,0	868,0	1 030,0	1 346,6
- Rock lobster	390,0	390,0	341,0	338,0	329,0	359,0
- Sea cucumbers	1 800,0	1 800,0	482,0	512,0	838,0	851,0
- Seaweed	787,0	1 000,0	2 510,0	1 933,0	5 792,0	5 045,0
- Fish	50 000,0	50 000,0	50 000,0	55 000,0	55 000,0	55 000,0
- Other	7 000,0	7 000,0	2 758,0	4 117,0	4 100,0	4 500,0
Total Production	**63 534,0**	**63 999,0**	**60 456,0**	**65 537,0**	**71 088,0**	**71,718,0**

3. Human Environment

- **Socioeconomic Environment**

According to Bellemans et al.[16] (1990) who carried out the only socio-economic study conducted on Malagasy traditional fishing, traditional fishing in canoes is practiced almost exclusively by men (94%) with an average age of 36. Women are engaged in marine fishing, representing 6% of the total. This percentage is relatively higher in Fianarantsoa (16%), where women are attracted by the capture of very small shrimps, small juvenile fish and small fish. The average family unit, exclusively dependant on the fisherman, is around 8 people including on average, 3 children. 88% of the fishermen have received formal education (where of 42% have completed primary school and 23% junior high school).

Data provided recently by several studies and projects related to different periods and places, are very disparate and heterogeneous.

[16] See bibliography : 5

A survey by Randriambololona[17](2008) covering the coastline of three (03) Districts of the Atsimo Andrefana Region (in Toliara province) for a distance of 350 km, with regard to 88 villages in 5 rural and 2 urban districts, 21 777 Fishermen out of a population of 90 400 inhabitants, provided information on the HIV / AIDS problem in fishing communities. *"For the whole area, just over half of the villages (52%) have already benefited from actions to increase the awareness and prevention of HIV / AIDS. In spite of these various awareness and prevention campaigns, few villages participated in HIV / AIDS (17%) detection programmes. The main reasons given by the fishermen for not partaking in detection campaigns are their doubts about the existence of HIV / AIDS and also the fear engendered by blood sampling. The main factors increasing their vulnerability and therefore that may exacerbate the spread of HIV / AIDS are primarily their loose moral standards (54%), followed by sexual relationships with passing visitors (34%). In general, on the coast, first intercourse occurs at a relatively young age. For lack of distraction/entertainment in the villages, fishermen are using the sexual act to "kill time" (especially the youth). Polygamy and infidelity are also part of the list of factors increasing vulnerability and causing the spread of HIV / AIDS."*

In the same area, Consulting Plus[18] (2009) has identified 311 schools for 62 716 pupils taught by 9 496 teachers. *The schooling rate is 46.3% for boys and 52.6% for girls. The illiteracy rate is about 45%. 64% of the fishermen have attended primary school and 10% secondary school, 26% said that they have received no formal education. The remoteness of health centres and maternity hospitals reinforce the habit of people to resort to traditional healers and midwives. Each municipality has communal pharmacies and / or a medical depot. Coastal communities, living in very insecure clay houses, have difficulty finding drinking water, causing serious health problems.*

With an estimated annual dugout canoe production of 3 tons - an annual average estimated at 2.1 tons by Andrianaivojaona et al. (1992) -, using data provided by Consulting Plus, the average fisherman would earn more or less 390 U.S. $ / year.

The Ministry of Agriculture, Livestock and Fisheries' 2004-2007[19] Master Plan, said that there is no data available on the income and living standards of traditional fishermen. However, it can be argued that the level of poverty of fishermen, living in isolated areas and not exploiting export products, is generally higher than that of rural areas.

Concerning traditional shrimp fishermen, Courtois et al.[20](2000) indicates that during the same period (1998-2000), their income appears relatively higher compared to the average rural income and unskilled urban income, with an average of more than 880 U.S. $ / year.

For this sector, Goedefroit et al. (2002) estimated that in the village of Ankazomborona in Ambaro Bay, the biggest traditional shrimp fishing village (largest production) of Madagascar, *in 1999 there was a 68% population growth rate between the period of low shrimp activity and the period of high intensity. The migrants are individuals from outside the region, without much fishing knowledge, coming on behalf of independent collectors or collection companies who provide them with their fishing equipment and then have priority to purchase their catch. Source of wealth, this migration is also a source of conflict with the locals for the sharing of resources and adoption of new management rules.*

[17] See bibliography : 23
[18] See bibliography : 10
[19] See bibliography : 19
[20] See bibliography : 11

This migratory phenomenon has been observed many times in other localities (South-western and North-western regions, Antongil Bay in the East). It is not as important here as in Ambaro Bay, but it still has the same consequences, in terms of conflicts with the natives.

- **'Pre' and 'Post' Fishing**

For the artisanal fisheries the landing sites are located in towns (Toamasina, Mahajanga, St. Marie), where the catches are received and weighed by the boat owners, purchased locally by fish traders or delivered to fishmongers in the local markets. The unsold catch is delivered to collecting and distribution companies that freeze the fish before shipping it to markets outside the province, generally in the capital. Exporting companies who own their own ships usually send off their fish, fresh or frozen, together with the other products of their catch.

Each traditional fishermen village has a landing site. If the landing site is of interest to a collecting company, the company will install a weighing area as well as a storage area of insulated boxes for the reception of the catch. Each town also has at least one landing site for traditional fishermen, without special installations, where the fishermen meet with the fishmongers.

According to Kasprzyk et al. [21](1990), in remote villages, the catch is salted and dried to be stored for several months or smoked to be stored for more or less two weeks, until the arrival of a collector or to be transported by the fishermen themselves, by sea, to a consumption centre.

The individual collectors and collecting companies play a vital role in boosting the traditional fisheries, by providing a remunerative market for fishermen and by often providing them with their material and equipment and sometimes even cash advances or advances in kind (products of first necessity). Therefore, one of the 12 programmes selected by the ministry in charge of fisheries in its 2004-2007 master plan concerns specifically "increasing the collection and marketing of catches from traditional fisheries". This includes the following actions: (1) assisting collectors to acquire proper means of collection and transportation by land and on sea (de-tax on equipment, facilitating access to credit), (2) professionalization of the collectors and (3) construction and rehabilitation of the cold chain linking the major production areas to the consumption centres. No data is available on the state of achievement of this programme.

Information concerning small businesses related to small coastal fisheries is very fragmented and disparate. The situation in the area of Toliara, reported by Consulting Plus (2009), is the same almost everywhere in Madagascar. The dugout canoes are built by the fishermen themselves or by a craftsman of the village or its surroundings, often a fisherman himself. Similarly, when unable to buy netting, they will make the nets themselves out of string purchased from local merchants. Small shipyards and craftsmen skilled as carpenters in the construction of dhows also build traditional fishing boats (wood, fibreglass or steel) and are cited in various documents, but we do not have an exhaustive list or information on their current situation.

- **The Voice of the Fishing Community**

The government as well as various NGOs and projects have encouraged traditional fishermen to come together in associations or cooperatives to, essentially, facilitate the provision of grants

[21] See bibliography : 14

(often socio-political actions) or financing, mentoring and outreach programmes for managing the resources and / or the preservation of the environment. Most have no legal existence, because the fishermen are wary of any commitments towards the administration. Thus, there was a proliferation of fishermen associations, up to 6 in a village of 114 fishermen according to Randriambololona (2008), more than 100 in Ambaro Bay, including twenty villages, according to Andrianaivojaona al [22](2007).

Formal registration of some of the associations was initiated by development agencies that wanted to work with associations or cooperatives that were set up officially. But these associations, like most others, only recorded failures, for various reasons, including the lack of long term common interests.

Some are noteworthy because they are actually involved in the management of resources and / or the organization of marketing their catch.

The Federation of the Fishermen of Ambaro Bay, created in 2007, composed of five unions regrouping the 122 fishermen's associations in the area (whereof 29 are active), is engaged in dialogue with the industrial shrimp fishery operating in the bay, the collecting companies, the local authorities and environmental NGOs to improve the management of shrimp exploitation in the area. This federation is also trying, but with difficulty, to negotiate with collectors and collection companies to improve their shrimp sales.

The Association of the Fishermen of Andavadaoka (Toliara), founded in 2006, was organized, made aware and trained to manage, with some success, the exploitation of octopus in the area.

The Consultation Platform for Sustainable Development in Antongil Bay, founded in 2005, regroups more or less 60 associations, including traditional fishermen associations as well as the industrial trawling company that operates in the Bay. The local government (Region) granted this platform responsibility for ensuring sustainable development management, including the management of fishing resources.

The TAZARA Association, founded in 1994, regroups the individual boat owners of artisanal fishing in Toamasina who have organized themselves in order to help each other in case of problems at Sea (rescue), to acquire a covered landing site with an ice factory and to commercialize/market part of their catch, fresh, to the markets of the capital.

4. Policy and Governance

The last Malagasy master plan for fisheries and aquaculture covers the period 2004-2007 and has not been renewed since. This plan indicates the overall objectives assigned by the Government to this sector, namely: increasing foreign exchange earnings of the state, participating in the satisfaction of the population's food needs, improving the income and living conditions of traditional fishermen and small fish farmers and creating jobs. In order to achieve these objectives, the plan has identified the following four strategic lines: (i) management for sustainable exploitation and preservation of the environment, (ii) development of production and services for export, (iii) increased production for the local markets and (iv) the availability of basic socio-cultural infrastructure for fishermen and fish farmers.

[22] See bibliography : 2

The decree of June the 15th, 1922, on river and coastal marine fisheries, the 1993 Ordinance, regulating fisheries and aquaculture, and the 1994 Decree on the general organization of marine fisheries, covers all fishing and aquaculture activities. The 1994 decree states that subsistence fishing and recreational fishing are allowed at any time and are free of the collection of fees. Traditional fishermen are also not required to obtain a license and pay a fee, unlike the provisions for artisanal and industrial fisheries.

Fisheries management is centralized in Madagascar: all decisions are made by the Minister in charge of fisheries, apart from those related to fixing the period of prohibition of the consumption of certain pelagic fish to avoid seasonal poisoning, for these decisions it has delegated its authority to the provincial officials. The texts provide for the establishment of two advisory bodies: an inter-ministerial committee (operational for some time) on a centralized level, and an Advisory Board of Fisheries (never created), with a representation of operators in each province. The only text that provides for co-management is the decree of 2007; it defines the conditions for coastal shrimp fishing and makes provision for a dialogue (the state) with the representative professional organizations, following the principle of a "Public – Private Partnership". A consultation involving traditional fishermen did exist, for a specific project[23].

No text recognizes the rights of small fishermen within their traditional fishing areas. The problems of coexistence with the fishing industry are quite acute in shrimp trawling areas, where of 85% are located within the 2 mile zone. A code of good cohabitation did somewhat improve the relations between the two groups in Morondava, according to Morlat et al.[24] (2009). The Malagasy Fisheries Policy does not confer any particular advantage to small coastal fisheries, except for non-payment of user fees and the non-restricted access to the resource, except for shrimp fishing, for which the administration imposed a general freeze.

The Fisheries Policy, while setting quantified targets for meeting the food needs of the general population, has failed to address the problem of poverty and gender equality. It timidly addresses conflict issues by providing for the harmonization of the allocation of fishing areas between traditional, artisanal and industrial fisheries, but without specifying how.

Even though the policy provides for the establishment of consultation mechanisms for fisheries management, the Ministry of Fisheries only completed the Concerted Development Areas Project and has shown no wish to continue the process, according to Morlat et al.[25] (2009). The legislation makes no provision for taking into account indigenous knowledge and local data in order to set up measures for fisheries management.

In order to ensure the sustainable exploitation of fishing resources and the preservation of the environment, the 2004-2007 master plan had planned a special programme for the adaptation of training courses to industry needs, including the training of artisanal fisheries' skippers, of fishery engineers and technicians, of fishery coaches / advisers as well as the fishermen.

Finally, the administration has taken no specific action for communication and information circulation towards the fishing communities, with the exception of the established, but rarely

[23] From March 2005 to December 2007 : "Concerted Development Areas" Project, financed by the French Development Agency
[24] See bibliography : 20
[25] See bibliography : 20

applied, formula: "... sufficient publication, including broadcasting or billposting, in addition to its inclusion in the official journal .... "

5. Management and Planning

Ordinance 93-022 provides that the Ministry of Fisheries, in collaboration with the relevant ministries, develops and maintains plans for fishery development and stock conservation. No plan has been developed, however, the administration did make, more or less detailed, arrangements to manage resources as well as some heavily exploited or overexploited areas such as coastal shrimps, rock lobster, sea cucumbers, cephalopods, crabs (very popular for exportation).

Thirty transfers of fishing resources management to village communities were done within a demarcated coastal area, through projects and the initiative of environmental NGOs as part of the "Marine and Coastal Environment" component of the National Environmental Action Programme (NEAP), since 1997; based on the law 96.025 of 30/09/1996 on local management of renewable natural resources, designed for forest resources. The contracts with the local communities have not been submitted to the Ministry of fisheries, which has not recognized them because it still has not decentralized the management of fishery resources. These contracts became binding agreements that the villagers, including traditional fishermen, more or less respected for some time, but they did not, legally, engage the artisanal and industrial fishing companies working in the area.

At the initiative of some environmental NGOs and with projects involving more the Ministry of environment than the Ministry of fisheries, integrated management plans of coastal areas (Antongil Bay[26]) or of certain ecosystems (corals and mangroves of Toliara and Nosy-Be[27]) have been developed.

For the small coastal fisheries these plans identify best practices to be applied as well as destructive methods and fishing gear that should be prohibited. No official organization and management method of these plans are defined.

Currently, the only access to resource that is frozen for traditional, artisanal and industrial fisheries is shrimps. No new licenses for artisanal and industrial trawling are issued. Traditional fishing gear have been inventoried, tagged and registered in the owner's name. No new gear may be used; identified owners can only replace their worn or lost gear, by using the same registration number.

For the other resources, artisanal fishing licenses are granted together with a protocol signed with the owner. For now, all the requests for licenses were accepted by the Ministry of fisheries.

Access to resources, other than coastal shrimps, is free for traditional fishermen who, in addition, did not receive exclusive or preferential working areas. The ministry is trying to manage the fishing effort by adjusting the product collection permits; for certain areas and certain products (e.g. fish) collection permits are not limited, all requests are met. For others (e.g. sea cucumbers), no new collection permits have been issued. This management mode is not very effective because the size of the collection means is not limited.

[26] See bibliography : 25
[27] See bibliography : 21

The Ministry of Environment and its technical and financial partners have set up four marine parks. New marine and coastal protected areas are currently subject to preparatory work for their creation or for trail management, but there is no institutional structure specifically in charge of the coordination and management of these protected marine areas.

The Ministry of fisheries has field services (inter-regional services to cover the 22 regions of Madagascar, sectors) in charge of technical supervision and monitoring of the fishermen's activities. These services are under the responsibility of the Regional Rural Development Management. Their services are available to the regional managers while they are financially dependent of the central ministry and must also follow the guidelines of the latter. For fishing control and monitoring, the Ministry has a Surveillance Centre (1999) linked to its General Secretariat, which has two regional units and field agents that only act on instructions from the central management. This centre provides satellite tracking of all industrial vessels (foreign and Malagasy) operating in the waters of Madagascar. It has[28] 133 agents, 3 control vessels, can charter, if necessary, a plane equipped with a camera, can involve, for land based monitoring, a mobile squad equipped with 11 motorbikes, 7 ATVs of which 4 are equipped with SSB (single side band) radio, and a zodiac for travel to remote villages or for operations at sea. Sometimes, the surveillance centre is assisted in its tasks by the national police force. These means are insufficient to cover the 5 000 km of Malagasy coastline. Note that this surveillance centre cooperates with member countries of the Indian Ocean Commission for the development of a regional surveillance plan.

The scale of illegal and unauthorized fishing is not known. For activities carried out from the Malagasy coast, we can assure that, for industrial fishing, apart from a few exceptions, already suppressed, all are legitimate. However, concerning artisanal fishing, 18 vessels had no licenses in 2009, according to Andrianaivojaona et al.[29] Concerning traditional fishing, many fishermen engage in illegal activities such as working with prohibited fishing gear or non-standard gear. We do not know the magnitude, except for shrimp fishing in some areas.

[28] Documents of the Fishing Surveillance Centre
[29] See bibliography : 4

6. Development, Trade and Projects

A list of the major programmes / projects on the livelihoods of small coastal fisheries is given in the table below. Currently, apart from these, there is no other development programme underway

Name	Areas Covered	Financial Backer	Duration
Regional Programme for Sustainable Management of Coastal Resources of Indian Ocean countries	Toliara (seaweed culture, sea cucumbers)	EU : 9th European Development Fund	2006-2011
Support Project to the Fishing Communities of Toliara	Toliara	African Development Fund	2006-
The GEF/PNUD Support Project to the Environmental III Programme : Sustainable Management of the Natural Resources of the Mangroves and Coral reefs	Toliara, Nosy-be	GEF-PNUD*	2007-2010

** GEF-PNUD: GEF-UNDP Global Environment Facility - United Nations Development Programme*

The industrial shrimp production (fishing and aquaculture) has always dominated the fishery export production. In 2003, according to the statistics produced by the Ministry of fisheries, small coastal fisheries have contributed nearly 26% of the total tonnage of fishery and aquaculture export production (27 726 tons) and nearly 9% of the total value of exports (142 million U.S. $). This share of small coastal fisheries will increase (even in absolute terms), given the crisis in the Malagasy shrimp industry (lower production and exportation), reported by Caillat et al.[30](2008). Indeed, the crisis is far more severely felt by the shrimp trawling sector (increased fuel prices) and the aquaculture industries (higher food prices and vannamei "Pacific White Shrimp/Whiteleg shrimp" competition).

While the general decline of the population's purchasing power reduces the demand for fishery produce, new local markets are opening up for small coastal fisheries. These are new consumption centres created by mining projects, including nickel and cobalt on the East coast (1 500 direct jobs), and Ilmenite (Iron Titanium Oxide) in the South (600 direct jobs).

The rehabilitation of some major roads, including the road from the capital towards the North (Antsiranana) and to the Southwest (Toliara) will facilitate the evacuation of the fishing production towards the large consumption centres of the interior.

Rock lobster and crab exportations should remain at their current level, resources used only by traditional fishermen, because the accessible and known areas are already extensively exploited. Concerning cephalopods (octopus and squid), exportations have grown rapidly, to reach nearly 1 500 tonnes in 2004 (3rd place volume wise, after tuna and shrimp). Even though the export

[30] See bibliography : 8

market's demand remains, the production seems to be unstable from one year to the next due to the variation in abundance of the resource, according to Bemiasa J.[31] (2009).

7. SWOT Analysis

Strengths	**Opportunities**
• Traditional fishing operating mode not involving huge marine expenditures (no fuel or food needed) • Lucrative activities for those targeting sought after export or local market resources as well as for those situated close to the major consumption centres.	• Relatively easily accessible resources exist that do not interest the industrial fisheries, but that are quite lucrative (rock lobster, crabs, cephalopods) • High demand from local and export markets • SME development for exportation / marketing of "PTA" (Traditional and Artisanal Fisheries) produce • ASCLME approach could : 1. Inform and make Madagascar aware of best practices for the management and development of small coastal fisheries in the other countries concerned by the project; 2. Propose rules / principles for the defence of small coastal fisheries' interests; 3. Help countries to define and implement a policy and blueprint for the development of small coastal fisheries
Weaknesses	**Threats**
• Lack of information / statistics, current and complete, on small coastal fisheries and related activities • Complete and to date socio-economic data for small fisheries is non-existent • Disparate and incomplete data on the fishing areas of small fishermen, except for shrimp fishing • Fishing associations and cooperatives created solely to receive grants, little or no operational activity • Fisheries Master Plan not updated • No policy concerning small coastal fisheries • Lack of specific socio-economic goals for small fisheries within the fishing policy • No special protection of the small fisheries from the competition of industrial fishing boats • Improper storage of products in remote villages (lots of post-harvest losses) • Fishing activities at sea is risky and unsafe • Non-involvement of small fishermen in the	• Over-exploitation of certain areas (trawling zones, lagoons, reefs) and of some resources (sea cucumbers, shellfish) • Lack of trust from banks and micro-finance towards PTA • Inflation, leading to increased cost of equipment and fishing material, coupled with a lower demand from local and export markets • Competition from industrial fishing in the trawling areas for the exploitation of demersal fish • Increased fuel prices for motorized small coastal fisheries • Lack of coordination between government departments involved in coastal activities, especially between the Ministries of Fisheries and the Ministry of Environment • Inadequate training of human resources in the sector

[31] See bibliography : 7

global fishing management scheme • No arrangements to ensure that the information reaches the fishing communities • Lack of specific mechanisms / arrangements to manage small fisheries • Means for fishing surveillance insufficient compared to the length of the country's coastline • Weak institutional capacity incapable of managing the fishery industry as a whole	

8. Bibliography

1. Andrianaivojaona C., Kasprzyk Z., Dasylva D. (1992) Malagasy Fisheries and Aquaculture, a diagnostic assessment
2. Andrianaivojaona C., Le Marec R. (2007) Report on the execution of the Concerted Development Areas Project
3. Andrianaivojaona C., Le Marec R., (2009) Analysis of the Exploitation of Malagasy Fishing Resources as part of the Fishing Agreement
4. Andrianaivojaona C., Le Marec Ronan (2009) Study to set up legal arrangements and management tools for all fishing activities
5. Bellemans M., Silvestrini G. (1990) Results of the socio-economic survey of traditional Malagasy fisheries
6. Bellemans M.S., (1989) Results of the survey of traditional coastal fisheries in Madagascar in 1987/1988. Diagnostic assessment of the structural characteristics.
7. Bemiasa J. (2009) Dynamics of Traditional Fisheries of anchovy, squid and octopus of Southwest Madagascar; use of oceanographical tools for resource management
8. Caillat A., de Riviers X., Wilson J. R. (2008) Study in the context of a recovery plan for the sustainable management of the Malagasy shrimp industry.
9. Chaboud C. (2004) Social sciences PNRC (NSRP – National Shrimp Research Programme) research review. In : Ranaivoson E. et al. (éds) Proceedings of the workshop on the return of scientific research of the National Shrimp Research Programme, Mahajanga Madagascar, 19-21 October 2004 **8**: 162-169
10. Consulting Plus (2009) Feasibility study to set up micro credits in the PACP area
11. Courtois S., Chaboud C. (2000) Costs and Revenues of the traditional Malagasy shrimp fishery – Recent evolution. *In* Ranaivoson E., Kasprzyk Z. (éds) Proceedings of the workshop on the development of Malagasy Shrimp Fishing, Antananarivo Madagascar, 12-14 December 2000 : 198-212
12. Domalain G., Rasoanandrasana N., Tiandraza A. (2000) Traditional Malagasy Shrimp Fishing : characteristics and distribution of fishing vessels

13. Domalain G. et Rasoanandrasana N. (2000) Traditional Malagasy Shrimp Fishing: main exploitation characteristics. *In* : E. Ranaivoson, Z. Kasprzyk (ed) Proceedings of the workshop on the development of Shrimp Fishing, Antananarivo Madagascar, 12-14 December 2000

14. Kasprzyk Z., Randriamiarisoa N., Ravomanana D., (1990) Marketing and consumption of fishing products in Madagscar, Volume II, Socio-economic study of the marketing of fish.

15. Mara E. R. (1993) Bio-ecology and Southern Malagasy Palinuridae rock lobster population dynamics

16. Ministry of Agriculture (2001) Monograph of the inter-regional agricultural managements

17. Ministry of Agriculture, Livestock and Fisheries (2006) Register of traditional shrimp fishing vessels of Ambaro Bay

18. Ministry of Agriculture, Livestock and Fisheries (2007) Fishermen registers, registers of fishing vessels, traditional fisheries of Antongil Bay, Menabe region

19. Ministry of Agriculture, Livestock and Fisheries (2003) Final version of the 2004-2007 Master Plan In Andrianaivojaona C. et al. (éds) : Proceedings of the workshop on Malagasy Fisheries and Aquaculture, 2004-2007 Master Plan : 81-116

20. Morlat L., Andrianaivojaona C., Le Marec Ronan, Neu D., (2009) Can dialogue contribute to the sustainable management of the fishing resource? Shrimp fisheries and the experience of the CAZ (Coastal Activities Zone) project in Madagascar.

21. Océan Consultant (2000) Development of Plans and / or Integrated Management Systems of the Activities in the Coastal Areas (Reef fishing, mangrove exploitation and tourism activities) in the Toliara and Nosy Be regions. PNUD/GEF/MAG/97/03 and MAG/96/G31 Programme, «Marine and Coastal Environment » Component of PEII. 8 volumes.

22. Ralison A. (2000) Shrimp fishing and the 2 mile zone. *In* : Ranaivoson E., Kasprzyk Z. (éds) Proceedings of the workshop on shrimp fishing development, Antananarivo Madagascar, 12-14 December 2000 **6** : 352-357

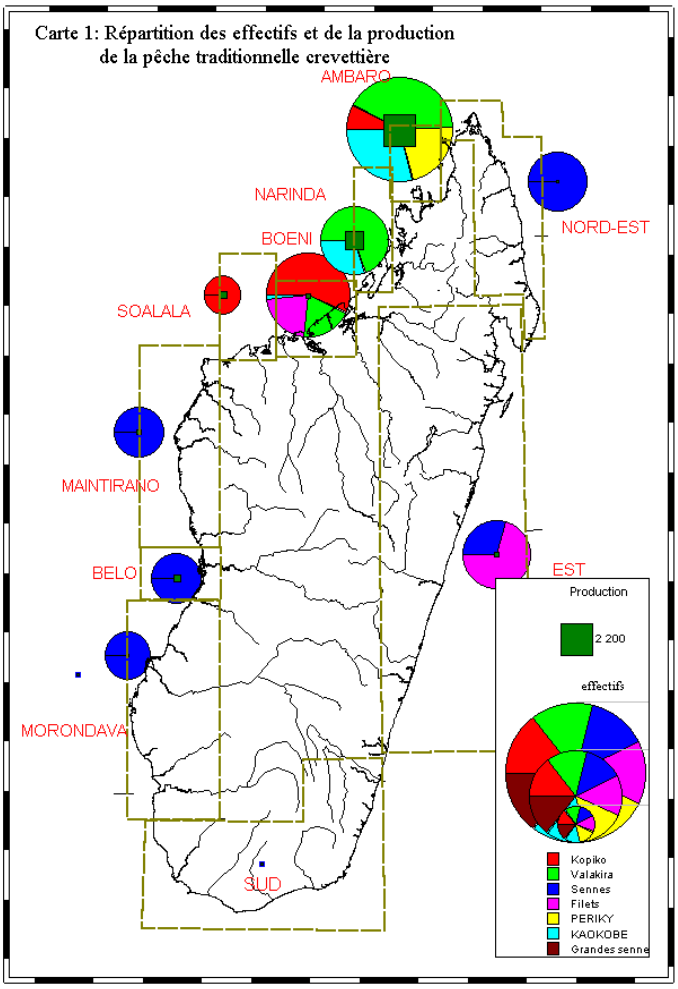
23. Randriambololona C. (2008) Result of the survey in the area of the support project of the fishing communities of Toliara

24. WCS, Mac Arthur (2008) Marine and Coastal Schematic of Antongil Bay

ANNEX

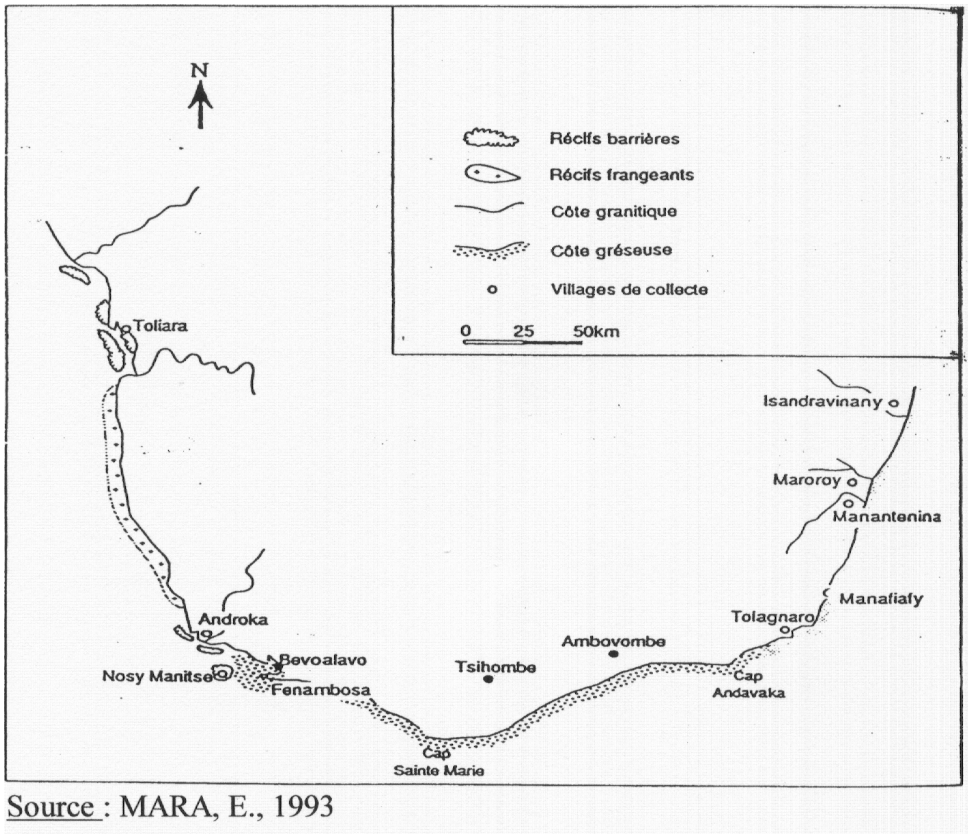
FISHING AREAS/GROUNDS

Map 1: Distribution of the staff and production of traditional shrimp fishing



Source:Domalain and N. Rasoanandrasana (2000) Traditional Malagasy Shrimp Fishing : main exploitation characteristics. *In* : E. Ranaivoson, Z. Kasprzyk (ed) Proceedings of the workshop on the development of Shrimp Fishing, Antananarivo Madagascar, 12-14 December 2000

Map 2 : Rock lobster exploitation areas



Source : MARA, E., 1993

Mara E. R. (1993) Bio-ecology and Southern Malagasy Palinuridae rock lobster population dynamics

Map details:

- Récifs barrières : Barrier reefs

- Récifs frangeants : Fringing reefs

- Côte granitique : Granite coast

- Côte gréseuse : Sandstone coast

- Villages de collecte : Collection villages

II. Tourism – Prepared by Ms. Patricia Rajeriarison and Dr David Picard,

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Madagascar overview

Madagascar is an island-state in the Western Indian Ocean located on the eastern limit of the Mozambique Channel, at 400 km off the East-African coasts. The country's surface is 587.000 km2, with a North-South length of 1.587 km and a width of 580 km. The shoreline has a total length of 4,828 km. Formerly an independent kingdom, later a French colony (from 1896), the country gained independence in 1960. The country has a population of 19.5 million inhabitants, over three-quarters of whom live in rural areas. With a gross domestic product of approximately $275 per head, a life expectancy of 57 years and a demographic growth rate of 3%, Madagascar is considered one of the least developed and poorest countries in the world (placed 145 of 182 countries in the human development indicator ranking in 2009). 1,7% of the population are HIV positive. Almost 70% of the population lives below the poverty line (unable to provide food providing 2,100 calories per day). There are important regional disparities in terms of poverty levels. The poorest regions are found in the south, marked by a very dry climate and limited access to fresh water and other basic infrastructures. Madagascar is internationally renowned for its biological and geological diversity, widely untouched natural environments and rare species, which are the source base for a significant, though hitherto inadequately developed international tourism sector. The natural environment is being threatened by serious ecological problems including deforestation and soil erosion. Moreover, long- and medium-term prospects for sustainable development are currently threatened by the political crisis that began in 2009 and the creation of the – internationally non-recognised – High Transitional Authority (HAT). At the time of writing this report, the crisis had not yet been resolved; new legislative and presidential elections are planned to take place in March and May 2011, respectively[i], and a referendum for a new Constitution is to be organized in November 2010.

1. Coastal Tourism Overview

With 375,000 arrivals in 2008, Madagascar is one of the major tourist destinations in the Western Indian Ocean. Tourism is, however, relatively marginal when compared to the country's surface (about half the size of South-Africa, but 230 times larger than La Reunion that receives about the same number of tourists every year). In 2008, the tourism and hotel sector generated 3.7% of Madagascar's gross domestic product GDP (up from 2.8% in 2003)[ii] and was the second largest provider of foreign currency ($116 million in 2009, down from $210 million in 2007 and $303 million in 2008)[iii] [iv]. Agriculture, fishing, trade, textile processing and services remain the core economic sectors. The country is a relatively expensive destination. The country's main challengers in different product niches – discovery circuits (Vietnam, China, India), scuba-diving (Egypt, Maldives), beach (Antilles, Mauritius), fauna and flora (South-Africa, Kenya) and adventure (Nepal, Réunion) – are consistently cheaper and offer better value-for-money[v]. Only Seychelles and Australia offered more expensive, though better value-for-money tourism packages. This situation is partly due to poor and expensive air transport facilities. Despite adopting an open skies policy in 2005, only a limited number of international airlines operate in Madagascar (mainly connecting to the capital, Antananarivo, and one of the major beach clusters, Nosy Be). The national airline, Air Madagascar keeps a monopole on domestic flights. Connections within the Western Indian Ocean region remain limited and expensive and opportunities for growing regional tourism can therefore not fully be tapped into. Road and train transport networks within Madagascar are also limited and are in very poor condition, making journeys within the country difficult and time-consuming.

Madagascar's main source market is France which provides approximately 70% of all arrivals (among whom about 12% from the French overseas department, La Reunion). Secondary source markets are Italy, the United States, Germany and Switzerland. The vast majority of hotels are situated in the medium quality price range (one to three stars)[vi] and can be found in the capital and various beach side locations. Four and five star hotels are exceptional – there were only six in the entire country in 2002 – and can only be found in the capital city and the seaside cluster of Nosy Be. A certain number of ecolodge-style developments have emerged during the past years, yet the standard of most of these hitherto seemed insufficient to qualify for any of the internationally used ecotourism labels. There is no luxury or even up-market hotel sector in the more isolated coastal areas of the country or close to the country's well-known national parks (several of whom are listed as UNESCO World Heritage Sites). Besides the international star-rating system, a domestic hotel rating system based on *Ravinala* (one to three) is used to classify the cheaper pensions that are mainly frequented by domestic travelers. Additionally, a very large number of so called "*hotely*", cheap and minimum standard accommodations are found along the principal main roads traversing the country. Sometimes frequented by backpackers, these are usually only used by locals. The total bed capacity (all categories considered) has passed from 10,879 in 2005 to 16,055 in 2009[vii]. The annual growth rate of around 5% remained below the annual growth rate of tourist arrivals (at about 14%). The (official) room occupation rates remained relatively low at around 60%. The existence of data based on star-ratings would create a better picture about the tourism-relevant dynamic in the mid-range and luxury hotel categories. The current lack and quality of international standard accommodation and its disparate spatial distribution makes it difficult to make most parts of the country accessible to the international tourist markets.

Number of Hotels and Room Capacity in Terms of Ratings (2002 - 2009)

Hotel rating	2002			2009		
	Number of hotels	Room capacity	*%*	Number of hotels	Room capacity	*%*
4 - 5 Stars	6	530	*6%*	10	517	*3%*
3 Stars	22	686	*8%*	47	2 116	*13%*
1 - 2 Stars	83	1 824	*22%*	147	2 642	*16%*
1 - 3 Ravinala	109	1 079	*13%*	470	4 974	*31%*
Unrated	497	4 318	*51%*	722	5 806	*36%*
	717	8 437		1 396	16 055	

Source: GATO Report (2004) and Ministry of Tourism & Handicraft (2010)

Tourism market reports from 2005[viii] and 2008[ix] indicate that only one third of all international tourists take part in an organised trip; two thirds are independent travellers, typically over forty and part of the high income classes. Tourist arrivals know a relatively low seasonality, with a significant low peak in February[x], due to the rainy season. Two out of three tourists stay on

average for 21 days[xi], which is almost double the length of the time tourists spent in other destinations of the Indian Ocean. Daily tourist expenditures vary between $40 and $100[xii], according to the mode of travel (independent travelers tend to spend less). The figures provided by different studies are not coherent, which may be related to different methodologies. A value chain analysis by Global Development Solutions[xiii] claims a significantly higher daily expenditure of $138 per tourist (based on a study in the southern city of Tolagnaro. Air and terrestrial transport represent around 80% of this daily expenditure. Direct employment in the tourism and hotel sector increased from 21,167 in 2005 to 27,299 in 2009, which corresponds to an annual growth rate above 6%[xiv]. Most jobs are found in hotels; three star hotels employ about 1.5 staff per room, four and five star hotels at least two or more per room. Most training is done on the job. Average wages in the sector are considerably higher than in other sectors, while the country continues to experience a lack of qualified hotel staff. No figures are available for indirect employment[xv] created by tourism activities, in particular in agriculture and fishing, the agro-industries, manufacturing including the handicrafts sector, and transport and other tourism-related services. In the main sites of activity, tourism had a considerable impact on the livelihood of local populations. However, it was observed that food, service and handicraft producers are often badly integrated into the supply chains of the tourism sectors[xvi], especially where hotels offer all-inclusive products. Many raw and intermediate materials and daily consumables that could be sourced locally or nationally are imported, which generates an important revenue leakage at the national and micro level[xvii].

2. Biophysical Environment

The geology of Madagascar results from the diverging movement of tectonic plates in the Indian Ocean. Initially part of the Indian subcontinent, which had split from the African continent about 160 million years ago, it became a separate landmass between 80 to 100 million years ago. Due to the large diversity of geographical formations, climates and natural habitats (high plains of tropical climate inland, mountain ranges and plains of subtropical climate in the north and east, and arid landscapes of sub desert climate in the south), the island enabled a remarkable differentiation of animal and vegetal species and today counts among the top ten biodiversity hotspots in the world. Due to its early geological separation, it had become a natural refuge for many archaic species that have now disappeared in the African and Indian continents and mutated into a very large number of endemic species. Madagascar's outstanding natural heritage has been the object of a large number of multilateral conservation initiatives. Among others, three natural sites are included on the UNESCO World Heritage list. Despite the abundant presence of white-sand beaches, Madagascar's tourism sector is currently only partly oriented toward classical beach holidays. Natural landscapes, managed through national parks represent one of the principal resource bases for tourism. According to a market survey based on interviews with tourists who travelled to the country[xviii], only around 50% had spent a significant amount of time in beach locations, whereas 95% observed the island's wildlife and 82% discovered cultural and historical sites. The most frequented sites in the country are Antananarivo (with the main international airport; visited by 86% of all international visitors), followed by the coastal town of Toliara and the national park of Isalo (visited, respectively, by 33% and 29%). The geographical distribution of tourism in Madagascar is largely unequal, which is essentially due to different modes of tourist mobility. A large part of the tourists remain in tourism and hotel clusters that have developed in the capital city of Antananarivo and various seaside clusters, undertaking day excursions in the local environments or staying at the beach. The most important seaside clusters are Nosy Be in the north-west, Ste Marie in the north-east, Diégo Suarez, Mahajanga, Tuléar and its coastal periphery in the south-west (Ifaty to the north, St Augustin and Anakao to the south), Tolagnaro (Fort-Dauphin), and Toamasina.

Another type of tourists moves from site to site, using 4-wheel drive vehicles, public transport or air planes[xix], thus generating a tourism geography defined by three spatial axes or "circuits". The "southern circuit" (950 km) connects Antananarivo with the city of Toliara, in the south-west of the country, the "northern circuit" connects the city of Antsiranana to the seaside cluster of Nosy Be, and the "eastern circuit" (400 km) connects Antananarivo to Toamasina and the island of Ste Marie. A direct charter plane connection exists between the beach resort cluster of Nosy Be and Italy or South-Africa. At the time of writing this report, no data on arrival numbers at Nosy Be were available. In the absence of more specific data regarding tourist flows in and between the different development clusters, regional figures about hotel numbers and their bed capacity give an indication about the spatial distribution of tourism in the country.

Geographical Distribution of Room Capacity (2008)

Area	**Main City**	**Region**	**% of Total Room Capacity**
Eastern circuit (535 km)	Toamasina (Toamasina)	Atsinanana	8.94%
	Sainte-Marie	Analanjirofo	5.75%
Northern Circuit (320 km)	Nosy Be	Diana	10.64%
	Antsiranana (Diégo)	Diana	5.69%
West	Mahajanga (Majunga)	Boeny	10.45%
Southern Circuit (950 km)	Antsirabe	Vakinankaratra	9.26%
	Toliara (Tuléar)	Atsimo Andrefana	7.73%
	Fianarantsoa	Haute Matsiatra	4.83%
Capital city	Antananarivo	Analamanga	33.46%
South-East	Tolagnaro (Fort-Dauphin)	Anosy	1.27%
Other	[unspecified]	[unspecified]	1.98%

Adapted from ONTM & Alter Ego (2008)[xx]

Due to its relatively low level, tourism currently has a globally very limited impact upon the natural environment in Madagascar. This impact becomes however important where locales see a very high concentration of tourist activities. This concerns both coastal resort clusters and natural parks. Impacts are linked both directly to leisure activities such as diving, swimming, biking, or climbing and to the management of accommodation and transport infrastructures. Coastal leisure activities were pointed out for being partially responsible for the degradation of coastal environments, due to the trampling of coral reefs, and mangroves, damage caused by boat anchoring and the collection of ornamental sea shells. In Nosy Be, many hotels and restaurants within the beach resort clusters occupy zones bordering or entering the beach area. This was made possible after a 80-meter large beach strip along the entire coast of the country, classified as government owned land, was made available to regularize illegal land occupations by coastal communities. This measure allowed many investors to buy or long-term lease this land. The erection by hotels and restaurants of walls and terraces on the beach disturbs the natural balance of sand accumulation and significantly contributes to coastal erosion. In other cases, entire mangroves had been destroyed in order to make space for hotel projects (case of Madirokely). Another direct problem is the management of waste generated by tourism activities, especially the hotel sector. The tourism development plan[xxi] of Nosy Be, for instance, stresses the general absence of waste water treatment plants. Liquid waste, night soil and other liquid organic waste are usually treated through septic tanks or sumps. The report observes that these sewage facilities are usually not sufficient and various organic matters and nutrients do eventually reach the sea. In an area with a low demography, this a priori poses no major problem. However, in a highly urbanized coastal zone, it can affect the environmental health of the immediate surroundings; contaminate the groundwater and impact the public health of populations sourcing water from nearby fountains. Similarly, solid waste poses a major concern in highly dense tourism clusters. Not only does it disturb the tourism related aesthetic of the natural environment (which is a main asset for tourism activities), but also threatens the environmental health of the coastal zone. Various sea animals mistake plastic bags for food and accidentally swallow them – leading some of them to an agonizing death. Hotels in Nosy Be use different techniques to treat their solid waste including the use of public garbage dumps, organized collection of rubbish and incineration.

Moreover, in a context of widespread austerity among rural populations, the promise to earn money frequently provokes or reinforces migrations towards sites of tourist attraction, putting additional pressure on natural and cultural assets which represent the resource base for the tourism sector. There is little information available with regard to migration induced by tourism activities (while there are very good studies out there on migration motivated by other economic opportunities both in rural and urban environments)[xxii].

3. Human Environment

In the absence of comprehensive studies on livelihood impacts of tourism at the scale of the country, data available for specific cases can be used to understand various livelihood issues arising in the context of tourism development. In particular, a 2005 World Bank financed project on integrated growth poles (*Pôles Intégrés de Croissance* PIC)[xxiii] in the cities of Nosy Be and Fort-Dauphin offers here a more detailed analysis of the main issues and challenges. The project report stresses that these relate in particular to an effective integration of tourism activities into the local economic and social fabric, in particular through giving access to the touristic supply chain and the hotel sector job market. The report further notes the great diffculty for local people living next to old and newly developed tourist sites to find employment – essentially due to a lack of basic literacy and numeracy[xxiv], but also to the absence of basic tourism training institutions in the coastal zones (most of these are concentrated in the capital city, Antananarivo). On the job training already provided by many larger hotels is here one opportunity to gain sustainable direct employment in the sector. A fundamental question that remains here often unasked is if these populations are actually willing to work in the tourism sector. A study on integrated value chains of strategic industries in Madagascar, by Global Development Solutions (2007)[xxv] notes a relatively low motivation, by many local populations in Nosy Be and Fort-Dauphin, to work in the highly industrialised framework of tourism and hospitality production (which requires regular working hours, the integration to a hierarchy, a tedious attention to details and customer service formalities incomprehensive from a local cultural perspective. Furthermore, the report affirms, many employees once they are well-trained and efficient leave for better opportunities. As a result of the scarcity of motivated and well-trained staff sourced among local populations, most hoteliers in Nosy Be and Fort-Dauphin contract-in staff from outside (the nearby cities, people with formal hotel training or confirmed work experience, etc.).

Beyond opportunities of direct employment in the hotel sector or as tourist guides or handicraft providers, rural and coastal populations living in vicinity of the main coastal zone tourism clusters may take advantage of the tourism sector by doing what they know to do best: providing agricultural goods, fishing and sailing. In both Nosy Be and Fort-Dauphin, a previously existing local handicraft tradition of high quality has adapted to the tourism sector (main products are wooden carvings, model boats, textiles). Organized in professional associations, the activities are governed by a code of good conduct and include a social solidarity fund in case members of the association were to become unapt to work. However, incomes generated via these various alternative activities are reported not to be sufficient; like most people in the rural zone, the handicraft producers usually have additional other jobs. The tourism sector also represents a formidable market to sell local agricultural produce and thus can, potentially, contribute to the reduction of rural poverty[xxvi]. Most coastal hotels are supplied in fish and meat directly from local suppliers. In some cases, local farmers do also supply vegetables, potatoes, riz and fruits. The latter usually requires more sophisticated and industrialised agricultural technologies in order to ensure quality and quantity, which most farmers are technically unable to deliver. The promotion of integrated hotel supply chain management systems articulating the needs and abilities of hoteliers and farmers represents here a strategic objective. There is an economic downside

attached to a more integrated food supply chain at the local level: it has been observed increased local supply of food stuff has led to price inflation and increased costs of living in some of the centres of tourist activity[xxvii].

A number of studies show that smaller, higher priced hotel units with an ecotourism philosophy sometimes work better with local producers, as they have a larger budget to buy their provisions and a much smaller need. The use of local produce is often part here of the ecotourism product where the idea of local "authenticity" is part of the provision consumed by tourists. The framework of commercial ecotourism often also provides other leisureous "community" products – including village tours, language courses, teaching in local schools, working in riz rice fields, "helping" the community, etc. Everyday life of the rural and generally "poor" populations thus become part of the tourism product; the modalities of bringing this "product" to the market, and remunerating it, remains however in most cases unclear.

In a climate of generalised austerity, the difficulties to integrate the formal sector lead to the emergence of important informal sectors around major tourism sites[xxviii]. This sector creates new, or transforms old jobs into the tourism sector with informal guides offering tours or information; small shops and ambulant vendors selling cigarettes, drinks, drugs, postcards, etc.; boys and girls offering massages, sexual services or to get married; children begging for money or pens; people asking to be photographed for money, etc. Sex work represents here in particular a means for many poor people to relatively quickly earn money, also to open opportunities to get married with a foreigner. Interviews with local representatives of the population of Nosy Be appear to show a publicly held positive attitude towards sexual relations with foreigners among consenting adults, considered as an additional source of income and means for the betterment of livelihoods. International development institutions probably need to self-critically assess here their own moral stance towards prostitution and more critically informed research shall be carried out on the contact zones of sex and romance. Sex worker associations exist in most tourism clusters, promoting the use of condoms and running information campaigns about AIDS. These associations also defend sex workers against police violence and harassment, and fight against child prostitution. With the help of NGOs, international governments, the national government and the private sector, child prostitution has been criminalized, though law enforcement remains limited. Many hotels ask the "visitors" that guests take to their rooms to leave an identity card attesting their adult age at the reception (for example in Ambatoloaka).

Case Study: Community-tourism project in the village of Ampasipohy (Nosy Be)[xxix]

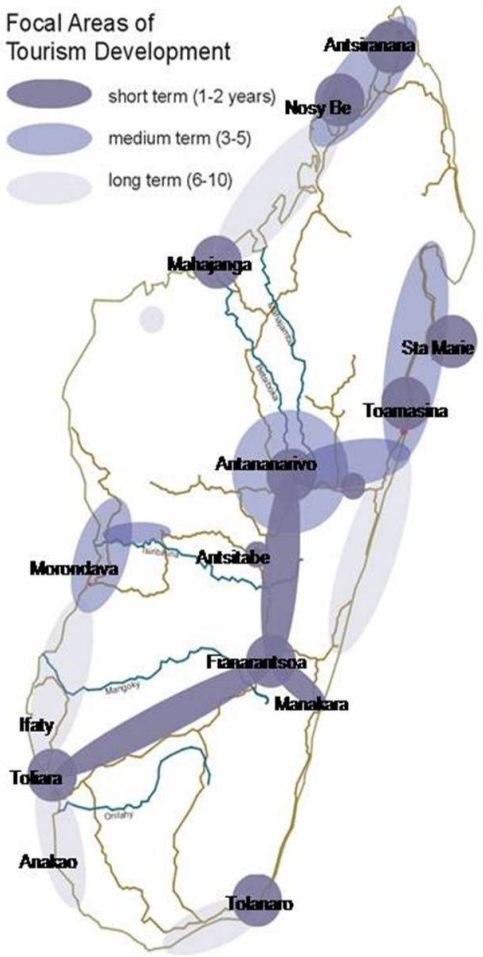
The village of Ampasipohy is situated on the island of Nosy Be, one of Madagascar's major coastal tourism development clusters. Members of the village have taken the initiative to organize guided tours through the environments of Lokobe Special Reserve, which covers around 740ha and includes the last remaining lowland rainforest found on the island. The reserve is known for the Black Lemur and the Nosy Be Panther Chameleon. Monthly visitor numbers are between 50 and 100, and see peaks of up to 100 per week during high season. To promote their product, the villagers collaborate with the resort hotels on the island. The entrance fee is 1,000 Ariary (approximately $0.50). Income is used to pay for an instructor in the local school and to buy food stuff for the local ceremonies. Tourists would typically arrive in the village by boat accompanied by their own guide. The latter would then pay a local guide who leads the groups through the forest. The local guides are not allowed to enter the actual Lokobe Reserve (managed by Madagascar National Parks) which remains closed to tourism visitors. To make the tours more appealing, some guides have trained the lemurs (that constitute a main attraction) to appear upon being called – and being gratified with bananas. This, in turns, appears to disturb the idea of untamed wilderness researched by many of the tourists (who – poor them – feel trapped in a tourist spectacle). The women of the village – or at least some of them – sell locally produced handicraft objects which procure additional income. However, here, as in other cases, due to a relatively inflexible demand (tourists are only prepared to spend a certain amount of money for souvenir objects), the growth potential is very limited and the standard of living this form of economy eventually could provide remains very low.

4. Policy and Governance

Tourism development and related activities are falling under the authority of the Ministry of Tourism and its regional representations. The regional representatives of the Ministry work with local government agencies at regional, communal and sub-communal (*fokontany***)** level. The international promotion of tourism in Madagascar is the responsibility of the National Tourism Office (ONTM), an executing agency for both private and public sectors. The ONTM is related to regional offices in the country's 6 provinces and 22 regions. In the past, federalising the various and spatially fragemented actors working within the country's tourism sector has often proven complicated.

The main policy framework for tourism development in Madagascar is the *Madagascar Tourism Plan*[xxx] developed in 2004. The latter is based on a consideration of the spatial patterns of current tourism behavior (see 2. Biophysical Environment). The plan suggests development objectives according to short, medium and long term priorities, mainly based upon already existing tourism infrastructures. The focus of short term priorities includes the amelioration of the quality, competitiveness and sustainability of the existing products. Areas identified here include the island's main cities (Antananarivo, Fianarantsoa, Toliara), the connecting roads between these cities, and the main beach resort clusters. Medium and long term development objectives concern, essentially, a wider spatial integration of these tourism hot spots within their regional contexts. This includes the development of, and connection to, excursion sites reachable within a day trip, in particular national parks in the vicinity of the main hotel clusters. It also includes the creation of wider integrated tourism zones, especially along the north-western coast between Mahajanga and Antisiranana, the north-eastern coast between Ste. Marie and Toamasina, and the south-western coast between Anakao and Morondava. The *Madagascar Tourism Plan* was not accompanied by an operational action plan. It has, subsequently, been up to each region to establish their own regional development plan (*Plan de Développement Régional*)[xxxi] as part of the

regional and communal implementation of the Madagascar Action Plan (MAP), the country's main strategic development tool (see next section).



Map adapted from Madagascar's 2004 *Tourism Master Plan*

In order to mainstream environmental issues in the tourism sector, a "green charter" (*Charte Verte*)[xxxii] was signed by the ministries of the environment and of tourism in 2006. Moreover, a 2008 tourism law project revising the earlier *Code du Tourisme*[xxxiii] (1996) affirmed integrated and sustainable development as guiding principles for future tourism activities in the country. The law project also envisions the creation of a national Tourism Development Fund and a new institutional framework, federated by the national government. The 2006 green charter was accompanied by an application manual with guidelines for tourism and hotel operators on how to implement procedures that help to preserve natural and cultural resources. The initiative was followed, in 2007, by a labeling program suggesting a sustainable tourism classification system[xxxiv] put in place by the National Environmental Office and the ministry in charge of tourism. At the time of writing this report, 10 tourism enterprises have successfully been labeled. These initiatives and their underlying philosophy did not come single-handed. Already ten years earlier, the World Bank, in its 1996 *Appraisal Report for the Second Environment Program*[xxxv] had outlined the contribution of tourism activities to environmental preservation and the reduction of poverty. Stressing that a large part of the island's natural environment has been heavily degraded

(a large percentage of the forest cover has disappeared between 1950 and 1995) the report emphasizes the role of sustainable nature preservation and resource management for the maintenance of an exceptional biodiversity. It stressed that income and employment generated by tourism activities can help here to reverse the downward spiral of environmental degradation, and, if carefully managed, can thus mostly benefit the poor.

One means to generate income is through tourist taxes and entrance fees to nature parks. Madagascar National Parks are legally required to transfer 50% of park entrance fees to economic development projects benefiting the communities living in the vicinity or within the boundaries of the parks. However, the relatively low level of income currently generated by the parks risks making this model, of public sector-community collaboration, viable. Raising entrance fees to international standards would allow here a better economic viability of the running of the parks. While payment for tourism related environmental services are becoming mainstreamed in various development programmes, some critics, especially from the private sector, have claimed that environmental issues are, in some cases, used merely to legitimate higher or additional taxes to be paid to public or para-public administrations. One case frequently quoted here[xxxvi] is the 1999 Decree on the *Mise en Compatibilité des Investissements avec l'Environnement – MECIE* (making investments compatible with the environment), which required investors to pay between 0.1% and 0.5% (according to the size of the projects) of the total value of the investment to the National Environmental Office (ONE). While the purpose of the funds paid to ONE is to support environmental impact cross checking and monitoring, some investors claim that the money was used to little effect. Many subsequently limited the size of their projects in order to pay the lower tax (for tourism projects up to 120 rooms and 20Ha).

5. Planning and Management

Madagascar's 2007–2012 national development strategy (*Madagascar Action Plan MAP*[xxxvii]) identifies tourism development as one of its strategic objectives to contribute to economic growth and poverty reduction (along with mining and agri-business). Various tax incentives, but also environmental and institutional safeguards for foreign direct investment aim here to create conditions for a sustainable development. The promotion of foreign direct investment in the tourism sector is coordinated by the Economic Development Board of Madagascar (EDBM), an executing agency for various ministries. The EDBM is regulated by the 2008 *Investment Law*[xxxviii] (replacing the earlier *Code des Investissements*[xxxix]) which allows the agency to provide licences and authorisations to tourism enterprises. This law also confirms the possibility for companies domiciled in Madagascar, but owned by non-nationals, to acquire land for hotel investments (the article relating to foreign owned land has been suspended by the current administration). In the same year, a law regulating export[xl] classifies the tourism industry as an export sector, without however, offering any further tax exonerations (as for other exports).

The recent initiatives to facilitate foreign direct investment are based on earlier projects to give foreign investors in the tourism sector access to land. In the late 1990s, a consortium of the Ministry of Tourism, private sector companies and international donors (mainly France, Germany and USA) elaborated a tourism related land acquisition program called *Réserves foncières touristiques* (RFT) [xli]. The idea was to offer investors facilitated access to prime land, with as a counterpart the obligation to enable local communities to benefit from the investments. Following the identification of 32 RFT projects (concerning prime land in various areas of the country), a public tender was organized. The tender for the Isalo RFTs encountered a disappointingly low interest from the side of the investors. The few submissions that had been made were later cancelled. In the recent years, various attempts to re-vitalize the program were made. As part of

these attempts, the Government of Madagascar in partnership with German KfW and International Finance Corporation (IFC)[xliii] elaborated a program proposing land concessions in prime tourist locations, in particular within the boundaries of some of the national parks in order to facilitate the development of hotels. The terms of reference for these land concessions include strict environmental guidelines and regulations on how to integrate local communities to the hotels' activities (for example, through the financing of community projects, like in Ampasindava Sakatia[xliii]). Despite these renewed efforts by EDBM to attract foreign investors, in a context marked by the 2009 political crisis, the level of foreign direct investment in the tourism and hotel sectors remained very low.

6. Development, Trade and Projects

The tourism strategy herein included projects, as its strategic objectives, 500,000 international leisure tourist arrivals by 2012 (corresponding to 800,000 arrivals in total), to significantly increase direct employment generated by tourist activities, and the revenues generated by tourism activities. A mix of both budget and high quality ecotourism products developed nearby or within the boundaries of national parks and coastal seaside resorts seems here a key to achieve these ambitions. Attracting high capacity international investors such as international hotel groups represents here a particular means to provide direct income and employment, but also to generate professional capacity and create spaces for mid-range and community-based projects and enterprises to become economically viable.

The large number of projects which are currently run in the country (see list below) do generally focus on small-scale community and integrated development programs. These are important at the micro-scale in terms of connecting existing tourism infrastructures to livelihood opportunities. Yet they cannot replace a carefully planned tourism industry at the macro-level of the state and its regions. An often perceived underlying animosity to hotel investors and the idea of mass tourism is certainly not helpful here, especially where tourism development has been identified as a strategic development option. No change is done without change, and tourism development certainly means that buildings and roads and water treatment plants (but also schools, hospitals, computer networks, and yes: supermarkets) will appear in areas previously disconnected from the infrastructures of modern social life. It may be worthwhile for parts of the development expert community (and many tourists) to reflect about what the cultural historian, Steven Greenblatt (1991)[xliv], defines as "sentimental pessimism": the act of romanticising poor people in terms of noble savage images deemed to embody an "alternative" to modern life. In this sense, the "happy poverty" of Madagascar's rural populations is frequently being idealised as more "more real" or "authentic" than modern social life (which, in turns, becomes considered as "unreal" or "artificial"). Such a self-reflective process would certainly help some projects to free themselves from an overly romantic vision of development and envision local populations through a more cosmopolite, inclusive idea of humanity.

Major tourism related projects

Project and Agency	**Contact**
Economic Development Board of Madagascar (EDBM) Promotion of Foreign Direct Investment in the Hotel and Tourism Sector Since 2006 (funded by World Bank, IFC and	Eric Rakoto Andriantsilavo, National Coordinator (eric.ra@pic.mg) www.edbm.gov.mg

Project and Agency	Contact
UNIDO)	
Madagascar National Tourism Office (ONTM) International Tourism Promotion Since 2003 (funded by tourist tax, Agence Française de Développement AFD, Conservation International, Chambre de Commerce et d'Industrie France – Madagascar CCIFM)	Joël Randriamandranto, President of the Administration Board Vola Raveloson, Director (direction@ontm.mg) www.madagascar-tourisme.com
Pôles Intégrés de Croissance (PIC) Integrated Tourism Development Programmes in Nosy Be, Tolagnaro; and the Antananarivo–Antsirabe axis 2005 – 2010 (funded by World Bank)	Eric Rakoto Andriantsilavo, National Secretary (eric.ra@pic.mg) www.pic.mg
CAPDEV / French-Malagasy Chamber of Commerce (CCIFM) Support to Intermediary Organisations Since 2010 (funded by European Union)	Lova-Tiana Raharinosy (capdev@ccifm.mg) www.ccifm.mg
Madagascar National Parks Various tourism related projects in their 47 protected areas Since 1991 (funded by World Bank, USAID, WWF, FAPBM, CI, KfW)	Guy Ramangason, Directeur Général (dg@madagascar.national.parks.mg) Charles Rakotondrainibe, Directeur, Général Adjoint (dga@madagascar.national.parks.mg) www.parcs-madagascar.com
ONG Fanamby Community tourism projects in Andrafiamena, Andavakoera, Anjozorobe, Allée des Baobabs, etc. Since 1997 (funded by GTZ, UNDP, CI, Principauté de Monaco, etc.)	Serge Rajaobelina, Executive Secretary (s.rajaobelina@fanamby.org.mg) Mimie Ravaroson, Director for Tourism and Sustainable Development (m.ravaroson@fanamby.org.mg) www.fanamby.org.mg
Groupe Développement Madagascar National Campaign to Fight Against Child Sex Tourism Since 2005 (funded by AFD, UNICEF, Groupe Développement)	Michaëla Ranaivo (centre-ressource@gdmadagascar.com) www.gdmadagascar.org
Blue Ventures Madagascar (NGO) Velondriake Coastal Zone Conservation and Sustainable Development Projects in Andavadoaka and Belo-sur-Mer Since 2003	Alasdair Harris, Research Director (al@blueventures.org) www.blueaventures.org
Bel Avenir (NGO)	Madio Helène Volanjary, President

Project and Agency	Contact
Education and Solidarity Tourism Projects in the coastal zone between St Augustin and Mangily Since 2003 (funded by Agua de Coco Foundation, ONG Bel Avenir France, Océane Aventures)	(belavenir@moov.mg) www.ongbelavenir.org
CétaMada (NGO) Protection of Marine Mammifers and Tourism and Handicraft Development in Ste Marie Since 2009 (funded by the Fonds Français pour l'Environnement Mondial FFEM, private sector)	Henry Bellon, President (president@cetamada.org) François-Xavier Mayer, Administrator (fifou@cetamada.org) www.cetamada.com
L'Homme et l'Environnement (NGO) Community Based Conservation and Sustainable Development in Vohimana and Vohibola Since 1993 (funded by CI, KNCF, IUCN, FFEM, Yves Rocher Foundation)	Olivier Béhra (obdirect@mate.mg) Séverine Berthet, Director (direction@mate.mg; ecoutour@mate.mg) www.madagascar-environnement.com
AEECL (NGO)[xlv] Sahamalaza Community Based Tourism Programme for the Protection of the Black Lemur (*Eulemur Macaco*) in the forest of Ankarafa, Iles Sahamalaza – Radama National Park Since 2008 (funded by AEECL Association Européenne pour l'Etude et la Conservation des Lémuriens)	Christoph Schwitzer, Research Director (cschwitzer@bcsf.org.uk) Jolijn Geels, Coordinateur, Coordinator (jolgeels@yahoo.com) www.aeecl.org
Conservation International (CI) Community Based Ecotourism Development Project in the Corridor Ankeniheny Zahamena (CAZ) and the Menabe 2007 – 2010 (funded by USAID)	James MacKinnon (jmackinnon@conservation.org) Norotiana Mananjean, Ecotourism Officer (n.mananjean@conservation.org) www.conservation.org
GTZ German-Malgasy Environmental Programme (PGME) – Tourism Development in the Buffer Zones of Nature Reserved Areas in Salary, Andatabo Saint Augustin, Andrafiamena, Bombetoka-Belemoka, Mahavavy-Kinkony 2005 – 2013 (funded by German Development Cooperation)	Pascal Lopez (pascal.lopez@gtz.de) www.gtz.de

7. SWOT Analysis[xlvi]

Strengths	**Weaknesses**
• High potential as an exotic destination • Different climatic zones and • diversified landscapes (highlands, primary forest, desert zones, 5,000 km of pristine coastline, islands) • unique biodiversity in flora and fauna with many endemic species, • different ethnic cultures with their associated traditions, • no-jetlag for European and African source markets • Low side-expenses for food and beverages	• Poor international accessibility (few flight connections with renowned airlines) • Rainy season (with very hot and humid climate) during winter in the Northern Hemisphere, • Lack of appropriate hotel and restaurant facilities for international clientele • Insufficient service performance • Low-standard and comparatively high extra cost for domestic transport and infrastructures
Opportunities	**Threats**
• Establishment of a new destination in the competitive surrounding of the Indian Ocean • General improvement of infrastructure and facilities • Development of high service quality • Diversification of tourism products throughout the country • Revival of traditions and cultural heritage contributing to civil pride and feelings of belonging • Quality control management (labelling)	• Detrimental effect as a result of widespread destruction of rainforest • Negative impacts through environmental pollution in Antananarivo • Risk of cyclones on the East coast from December to March • Tropical diseases caused by climatic conditions • Internal migration adding pressure on often fragile natural resources

8. Bibliography

i Economist Intelligence Unit (2010) *Madagascar Country Report*. London, UK, EIU, p. 5.

ii The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 41-42

iii Ministère du Tourisme et de l'Artisanat (2010) *Statistiques du Tourisme 2009*. Antananarivo, Government of Madagascar.

iv Banque Centrale de Madagascar (2010). Antananarivo.

v Interface Tourism (2006) *Etude sur le prix des packages*. Paris. p. 7-13 & 25

vi République de Madagascar (2004) *Madagascar Tourism Master Plan*. Antananarivo, Government of Madagascar. p. 24-26

vii Ministère du Tourisme et de l'Artisanat (2010) *Statistiques du Tourisme 2009*. Antananarivo, Government of Madagascar.

viii ONTM (2006) *Synthèse des études préalables au plan de communication de l'ONTM*. p. 60-65. Antananarivo, ONTM.

ix ATW Consultants (2009) *Enquête visiteurs pour la filière tourisme à Madagascar*. Antananarivo, Projet PIC. p. 23-24

x Ministère du Tourisme et de l'Artisanat (2010) *Statistiques du Tourisme 2009*. Antananarivo, Government of Madagascar. p. 1

xi ATW Consultants (2009) *Enquête visiteurs sur la filière tourisme à Madagascar*. Antananarivo, Projet PIC. p. 50-52

xii ATW Consultants (2009) *Enquête visiteurs sur la filière tourisme à Madagascar*. Antananarivo, Projet PIC. p. 83-84

xiii Global Development Solutions (2007) *Integrated Value Chain Analysis of Strategic Industries in Madagascar*. Antananarivo, Projet PIC. p. 147

xiv Ministère du Tourisme et de l'Artisanat (2010) *Statistiques du Tourisme 2009*. Antananarivo, Government of Madagascar.

xv The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 42

xvi Rajeriarison P., Rajoharison N. (2005) *Tourisme et développement rural*. Antananarivo, Vice Prime Minister Office. p. 24

xvii The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 43-44

xviii Office National du Tourisme de Madagascar – ONTM (2006) *Synthèse des études préalables au plan de communication de l'ONTM*. Antananarivo, ONTM. p.11.

xix Rajeriarison P., Rajoharison N. (2005) *Tourisme et développement rural*. Antananarivo, Vice Prime Minister Office. p. 14

xx Alter Ego (2008). *Voyageurs du Monde : Opportunités d'investissement sur Madagascar*. Antananarivo, Alter Ego.

xxi EDSA, Détente Consultants, GLW, A. Spenceley. (2005*) Plan d'aménagement touristique de Nosy Be*. Projet Pôles Intégrés de Croissance (PIC), Antananarivo. p. 27-28

xxii Blanc-Pamard C and Fauroux E (no date) L'illusion participative. Exemples ouest-malgaches. *Autrepart* 31: 3-19

xxiii EDSA, Détente Consultants, GLW, A. Spenceley. (2005*) Plan d'aménagement touristique de Nosy Be*. Projet Pôles Intégrés de Croissance (PIC), Antananarivo. p. 64-67

xxiv The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 67

xxv Global Development Solutions (2007) *Integrated Value Chain Analysis of Strategic Industries in Madagascar*. Antananarivo, Projet PIC. p. 131

xxvi Rajeriarison P., Rajoharison N. (2005) *Tourisme et développement rural*. Antananarivo, Vice Prime Minister Office. p. 26

xxvii The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 43-44

xxviii The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 54

xxix EDSA, Détente Consultants, GLW Conseil, Spenceley A. (2005) *Plan d'Aménagement Touristique Durable de Nosy Be*. Republic of Madagascar, Vice Prime Minister Office, Antananarivo. p. 59-60

xxx Republic of Madagascar (2004) Madagascar Tourism Plan: tourism product development. p. 119-121. Antananarivo, Government of Madagascar

xxxi Projet Pôles Intégrés de Croissance – PIC (2008) *Plan de Développement Touristique de la Région DIANA*. Antsiranana.

xxxii Republic of Madagascar (2006) *Charte Verte de l'Investissement Touristique Durable à Madagascar, Déclaration*. Antananarivo, Government of Madagascar

xxxiii République de Madagascar (1995) *Loi 95-017 portant Code du Tourisme*. Antananarivo, Government of Madagascar

xxxiv Ministère des Transports et du Tourisme, Ministère de l'Environnement, des Eaux et Forêts, Office National pour l'Environnement (2007) *Classification pour un Tourisme Durable : Label Vert, Tourisme Durable* (questionnaire d'évaluation). Antananarivo, Government of Madagascar

xxxv The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 51-52

xxxvi The World Bank (2010) Améliorer l'environnement des affaires en rassurant les investisseurs privés. Antananarivo : The World Bank. p. 199

xxxvii Republic of Madagascar (2007) *Madagascar Action Plan (MAP) 2007 – 2012. A bold and exciting plan for rapid development*. Republic of Madagascar, President Office, Antananarivo. p. 93

xxxviii République de Madagascar (2008) *Loi 2007-036 sur les Investissements à Madagascar*. Antananarivo, Government of Madagascar

xxxix République de Madagascar (1989) *Loi 89-026 relative au Code des Investissements*. Antananarivo, Government of Madagascar

xl République de Madagascar (2008) *Loi 027-2008 sur les Exportations*. Antananarivo, Government of Madagascar

xli The World Bank (2003) *Madagascar, Tourism Sector Study*. Washington DC, The World Bank. p. 67

xlii International Finance Corporation – IFC (2008). Madagascar Ecotourism Investment Programme. Washington DC, IFC.

xliii Economic Development Board of Madagascar – EDBM (2008) *Dossier d'Appel d'Offres: mise en concession de la Réserve Foncière d'Ampasindava Sakatia*. Antananarivo, EDBM. p. 4-7.

xliv Greenblatt, S (1991) *Marvelous possessions: The wonder of the New World*. Chicago, University of Chicago Press.

xlv Association Européenne pour l'Etude et la Conservation des Lémuriens – AEECL (2010). *Sahamalaza community based tourism programme: information for potential local partners*. Région Sofia, Antsohihy.

xlvi GATO AG (2004) *Tourism Master Plan, Madagascar*. Republic of Madagascar, President Office, Antananarivo.

III. Mariculture - Prepared by Dr. Thomas Ashley Shipton,

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1. Introduction

Much of the information appearing in the tables below is based on the comprehensive coastal mariculture assessment mission carried out by Shipton and Hecht (2007) on behalf of the Regional Programme for the Sustainable Management of the Coastal Zones of the Indian Ocean Countries (ReCoMaP) www.recomap-io.org

Farming Activity	Culture Species	Culture Technology	Production Scale[1]	Annual Production (2008)	Number of Farms	Market / Price		
						Export	Domestic	Household
Giant Tiger Prawn	Penaeus monodon	Pond culture	Commercial	8000[2]	6	X	X	
Seaweed	Euchema striatum & Euchema denticulatum	Stake / raft culture	Small-scale commercial	948	1	X		
Mud crab	Scylla serrata	Crab fattening / Ranching and enclosure technology for grow-out	Research	unknown	1	X	X	
Sea cucumber – Sand fish	Holothuria scabra	Tank-based hatchery / Sea pens for grow-out	Pilot Commercial	0	1	X[3]		
Blue-green algae	Spirulina	Pond culture	Research	0			X	
Oysters	Crassostrea cuculata Crassostrea margarita	Tank-based hatchery / rack or longline grow-out culture	Research	0			X	X

Eel	Anguilla mossambica	Tank culture	Research	0	1	X		

[1] commercial, single farmer small scale commercial, farmer groups, subsistence, pilot commercial, research

[2] In 2003, 7,000 tons of prawns were produced with an export value of US$62 million, the sector provided 4,325 permanent and 30,000 part time employment opportunities (Rabetokotany, 2005)

[3] While all product is destined for export, local price for cultured sandfish (Holothuria scabra) is 2.5 -3 US$/ kg (Robinson and Pascal, 2009)

2. Biophysical

Farming Activity	Geographical Extent	Environmental Issues
Prawn	West Coast (Ambilobe, Diana, to the Northwest, the Menabe region to the West Central region)[1]	Conditions are ideal for prawn farming due to the climate / soils and the large open areas of land available behind the primary mangrove forests[1]. In terms of environmental management the industry is well managed, and industry and government have developed appropriate guidelines / legislation to promote the sustainable development of the sector. However, concomitant with many prawn culture operations there remains potential for negative environmental impacts such as the physical alteration and destruction of the mangrove habitat through habitat conversion, and changes to habitat function through the discharge of suspended solids and high nutrient wastes in farm effluent streams. A high degree of technical ability and knowledge is required for sustainable production. Other environmental issues relate to small-scale community based culture systems - these systems often fail due to poor husbandry, pond mismanagement and water quality problems. There are also concerns that bio-security issues are not properly addressed by small scale producers, and should these producers expand, bio-security issues could become problematic to the industry at large.
Seaweed	Toliara (region Atsimo-Andrefana) & Diana, Sambava Vohemar and Antsiranana (northeast)[1]	The environmental impacts associated with seaweed farming are minimal. In some cases, impacts have been described as advantageous as the presence of the farms encourage the establishment of herbivorous fish populations that can also be harvested. Potential impacts include changes in sedimentation and water movement patterns associated with the placement of the farms, erosion, depletion of nutrients and the alteration of natural habitat prior to planting (notably sea grass beds), and changes to macrofaunal biomass through habitat alteration and destruction.
Mud crab	Toliara (South West Madagascar)	The seed stock required to operate the nascent crab fattening industry is derived from wild stocks. Despite the extensive mangrove habitat available for juvenile supply, there are concerns that in future, both the availability and sustainability of crablet supply could become problematical. To date, farms have been developed without undertaking initial stock assessments to quantify sustainable levels of

		juvenile harvesting. To ensure the long term sustainability of the sector, initial stock assessments and long term stock monitoring programmes need to be developed. Issues such as recruitment variability need to be addressed and incorporated into management planning. There is a need to identify those areas that are best suited to crab fattening. Feed supply, and the sustainability of feed sources needs to be established.
Sea cucumber	Toliara (South West Madagascar)	Natural populations of sea cucumbers are heavily exploited along the Malagasy coastline. Sea cucumber ranching is a new activity in the country and production models are still being developed. Nevertheless, it would appear that the activity is relatively benign, and while pens have to be set up in lagoonal areas, the environmental impacts accruing to the activity are believed to be slight. Indeed, there is some hope that the initiation of ranching operations will reduce local exploitation due to the income accumulated from mariculture; however, as an easily exploitable, high value resource, this remains to be seen.

3. Human Environment

Farming Activity	**Developmental Paradigm and Livelihood Issues**
Prawn	Prawn faming is primarily undertaken as a large scale capital intensive commercial activity. Benefits to communities accrue to the fact that the farms are often located in remote areas, and provide substantial employment opportunities in areas in which there are few existing opportunities. In some cases there have been problems associated with people moving to the farms in search of employment opportunities, substantially increasing the size of settlements, and competing with locals for jobs. In terms of small scale prawn producers, there have been considerable efforts to promote the small scale faming sector. Notably, JICA (2003-2006) funded the development of a hi-tech Penaeus mondon hatchery to produce juvenile prawns for small scale community grow-out programmes. Appropriate small scale production protocols were developed and tested. In terms of long term sustainability, the programme met with limited success, and while the reasons for the failure are complex, it was primarily a result of problems associated with the technology transfer to the growers, production technologies, profitability and lack of long term financial support. In terms of future developments, there is considerable concern that the uncontrolled and uncoordinated development of a small scale sector could compromise bio-security for the industry as a whole, and result in the introduction of diseases that could catastrophically affect production (as happened in S. America and the Far East in the

	1990s). As a result, there is a strong feeling from the industrial producers that small scale farming is not a suitable development model. This is a view that appears to be supported by government, and thus in the long term, the development of the small scale sector is unlikely to be supported. Notwithstanding this lack of support, there remain a number of small projects / research efforts to promote the sector.
Seaweed	The IHSM (Tulear University) has transferred seaweed culture technology to Madagascar, and successfully adapted it to local conditions. Globally, seaweed farming is a well established and simple technology that can be transferred to isolated impoverished communities. Despite the potential, the small farmer or village model that has proved so successful in Tanzania has not been adopted, and in many respects, the sector has yet to realise its potential in terms of employment opportunities and production.
Mud crab	Despite potential to develop the sector and create employment opportunities in rural areas, the sector remains at the research and development stage of development. There is a need for further financial feasibility and production trials to be undertaken to establish the economic viability of the various production models. There is scope to assist in the role out of crab fattening operations – particularly in the Majunga and Tulear regions that have extensive mangrove habitat that could supply juveniles for fattening.
Sea cucumber	Sea cucumber culture is being developed as a partnership between local communities, NGOs and private sector stakeholders. The production model uses hatchery reared juveniles that are grown-out out under ranching conditions (sea pens). The low stocking densities that are required for grow-out suggest that ranching is a viable alternative to tank based culture. It is anticipated that the development of ranching along the coast will provide alternative livelihood opportunities to coastal communities. A commercial company based in Toliara has been created (Holothurie SA) to commercialise the concept. The company comprises a private sector partner (Coprefito SA), technical partners (IHSM, Belgian Universities) and two NGOs (Blue Ventures and Trans'Mad Developpement). The NGOs have initiated programmes to support the development of 50 mariculture (ranching) units, and the economic and social viability of these operations are currently being established. While, it would appear that theft represents a major production issue, as a relatively low maintenance ranching activity, there is the potential to integrate the activity with existing livelihood opportunities (e.g fishing).

4. Policy and Governance

4.1 Policy

Legislation	Present	Comment
Fisheries Act	Yes	Fishing activities are covered within the Fisheries and Aquaculture Ordinance of 1993 (No93-022).
Aquaculture Act	Yes	The Fisheries and Aquaculture Ordinance of 1993 (Ordinance No93-022) articulates the regulatory framework for mariculture development. It outlines amongst others, the various permitting requirements, compliance, fines and sanitary requirements.
Aquaculture Policy	Yes	Policy has been developed for the prawn industry. The policy was developed as an industry led initiative that was designed to develop a framework for the promotion of sustainable prawn culture in the country. The framework was subsequently adopted by government.
Sub-sector development plans	No	Specific sub-sectors are discussed within the larger framework of the Aquaculture Master Plan.
Aquaculture Master plan	Yes	MAEP / FAO developed a masterplan for fishing and aquaculture development. To date, the plan has not been implemented (FAO, 2005).
Aquaculture zoning	No	
Environmental Management Acts	Yes	The EIA process falls under the remit of the Ministry of the Environment and Forestry (Decrees 99-954; 2004-167).
EIA Requirements	Yes	The Charter of the Environment of 1990 sets out the general principle that any project that might damage the environment must be the subject of an EIA. The Charter has been supplemented by further decrees requiring an EIA for projects located in particularly sensitive zones.

4.2 Governance

The Ministry of Agriculture, Livestock and Fisheries (MAEP) is the responsible authority for fisheries and aquaculture. Within the Ministry, aquaculture falls within the ambit of the General Department of Fisheries and Fisheries Resources (DPRH), and more specifically, the Directorate of Fisheries and Water Resources: Aquaculture Division. At the level of the aquaculture division there is an aquaculture service centre supported by a mariculture development manager. The DPRH along with its service centres are responsible for the development and promotion of the sector through:

- Creating an enabling environment for aquaculture development
- Regulation
- Providing a “one-stop-shop” for mariculture permitting
- Providing support to small-scale farmers
- Providing extension services through NGO and donor programmes
- Collecting and collating statistical data on production and sales
- Sector planning

5. Planning and Management

There is a need to improve aquaculture planning in the country and implement an industry wide masterplan to guide sectoral development. The most recent attempt to produce such a document was an FAO funded programme to develop a master plan for fishing and aquaculture development (2004 - 2007). The major themes that were addressed are those that would be anticipated in such plans, and thus broad themes such as improving technical capacity at MAEP, developing governance structures between institutions, and improving aquaculture legislation were addressed. In addition, sub-sectoral development strategies were developed to promote prawn, eel and tilapia, Damba, Saroy, Marekely (finfish), artemia, mussel culture. To date, the plan has not been implemented. Failure to implement the plan is unfortunate as it suggests that sectoral development is not being centrally planned, and as such the sector is likely to grow in an uncoordinated ad hoc manner. Sector development requires strong government leadership and support to provide a suitable enabling environment to attract investment into the sector, and in this regard, it would be advisable to revisit the sector planning process, revise and update the outdated sector plan, and implement the revised plan.

6. Development, Trade and Projects

Development Project	NGO / Donor / Private Sector	Project Details
Experimental breeding of Milkfish	Administration des pêches	Between 1978 and 1979 a project was set up involving the experimental hatchery breeding of milkfish (Chanos chanos) (Ranaivasa, 2009). The objective of the programme was to supply juvenile milkfish for grow-out in tidal fish farms, and thereby supply market sized fish for the local market. Currently, there is no substantive milkfish production in the country, and while this opportunity is currently being promoted in other countries in the region as a way in which to promote coastal livelihoods in impoverished rural communities, this does not appear to be happening in Madagascar.
Experimental breeding of oysters	Administration des pêches, revived by IHSM	Between 1986 and 1990 an experimental oyster breeding programme was undertaken in

		Toliara. The project has recently been revived with the objective of identifying suitable oyster species for culture and the development of hatchery technology. If successful, the grow-out technology would be suitable for small-scale mariculture development.
The development of coastal shrimp aquaculture	Gouvernement/PNUD/FAO/Les Pêcheries de Nosy Be (PNB)	The initiation of the development of prawn culture in Madagascar originated between 1987 and 1992 (Sadek et al, 2002; Ranaivasa, 2009). A pilot prawn aquaculture facility was set up to determine the feasibility of prawn farming in the country. As a result of the success of the project, other investments in the industry began to occur, and production now accounts for approximalty 8,000 tons per annum, representing the backbone of mariculture sector in the country
Seaweed culture (Project MPRH/FED/ARPL) S.W Madagascar (Tulear)	FED/UE-BIOMAD de Toliara Blue Ventures	Between 1992 and 1999 a technology transfer to develop seaweed culture in Madagascar was undertaken (Ranaivasa, 2009) Since November 2009, Blue Ventures has been working in partnership with a Tulear based NGO Trans'Mad Developpement and the fisheries export company Copefrito to develop seaweed farming in villages in south west Madagascar. The red seaweed (Kappaphycus alvarezii) is exported and processed to extract carraghenan. Blue Ventures has established a seaweed nursery and is working in one of the southern Velondriake villages to farm cottonii using the traditional off-bottom technique. http://blueventures.org
The Madagascar shrimp (CDCC) culture development centre	JICA	Between 2003 and 2006, JICA developed a hi-tech penaeus mondon hatchery that could be used to produce in the region of 6 million Post larvae (PL) per annum for small scale producers. The infrastructure has been donated to the government and it is now operated as a government hatchery, producing PLs for the industry. As of 2007, the facility was producing small numbers of PLs to small scale producers in the Mahajanga region.

Sea cucumber culture project	Belgian University Cooperation for Development / Government of Madagascar / IHSM / Blue Ventures	The project linked scientists from two Belgian Universities and the IHSM in Toliara (Eeckhaut et al, 2008; Robinson and Pascal, 2009; Ranaivasa, 2009). Between 1999 and 2007 the project successfully developed the technology and facilities to produce juvenile sand fish and grow them to commercial size. The facilities developed include hatchery nursery, site and sea pens. This technology is now being piloted at a commercial scale. Should the pilots prove successful, the model could provide significant employment opportunities to coastal communities in terms of the ranching component of the production process. Currently (2010) Blue Ventures (NGO) is collaborating with a Tulear-based company Madagascar Holothurie (MH), to pioneer sea cucumber farming for communities in Velondriake. The project has scaled-up from a feasibility study conducted in January 2007 to commercial scale operation involving up to 23 families in the annual grow-out of 21,000 juveniles. http://blueventures.org
Spirulina pond culture	IHSM	The initiation of spirulina culture was undertaken in 2001 to assist with malnutirition in the rural areas of Toliara (Ranaivasa, 2009). The production trials were successful; however the uptake of the technology by farmers has been limited, and production is currently insignificant.
Saline d'Ifaty	Saline d'Ifaty / IHSM	A project to commercialise artemia production in the Tulear region was developed (Crawford, 2002). Initially the project was financially self-sustaining and a private sector investor operated a successful production facility. However, a breakdown in relations with their technical partners (IHSM) resulted in the closure of the project in 1998. While there exists potential to undertake artemia production, and a local market in the form of the commercial prawn hatcheries, there are currently no commercial producers in operation.

Mahajanga	JICA / Government	A study was undertaken to evaluate mud crab stocks as well as a feasibility study of a pilot project for breeding crabs (Ranaivason E (2009))
Northern Madagascar	Ripple Fish / IMARES / DBSA funding	Under guidance from the Institute for Marine Resources and Ecosystem Studies (IMARES – Netherlands), Ripple Fish is developing a project to promote eel (A. mossambicus) culture. Initial studies have been undertaken to culture glass eels. Future work will focus on developing breeding technologies for the species. http://www.ripplefish.mu

7. SWOT Analysis

Strengths	**Weaknesses**
• High quality seawater • Research support capacity at IHSM / FOFIFA, and research support from European Universities • Historical presence of bilateral donor agreements to support mariculture development • Willingness of the MAEP to develop the sector • Strength of the private sector in the prawn industry – providing trained workers to the rest of the industry • Willingness and eagerness of coastal communities to adopt mariculture • High number of potential candidate species for small (and large) scale mariculture • Large areas of coastline suitable for mariculture • Private sector willing to invest in mariculture (e.g prawn culture, emergent sea cucumber culture)	• Sector plan – existing plan needs to be updated and funded • Extension capacity needs to be enhanced • Funding issues concerning the CDCC
Opportunities	**Threats**
• Dedicated government and / or bilateral support for mariculture development • Potentially, the CDCC could become a major fish hatchery / research centre for the development of new species • Development of sea cucumber ranching – a first in the Western Indian Ocean • Large number of potential culture species for which technologies have been developed or are in the process of being developed	• Unsustainable farming practices • Theft and vandalism • Resource conflicts • Potential biosecurity issues if small scale prawn farms are allowed to develop

8. Recommendations for Sectoral Development

The FAO sponsored Aquaculture Sector Development Plan (TCP/MAG/2901; FAO, 2005) was never implemented. In the absence of a coherent development plan, interventions tend to be ad hoc in nature, focusing on individual project outcomes with little coordination in terms of developing interventions that are required to promote border sectoral growth. The existing sector plan is now outdated, and in this regard it would be appropriate to update the plan, and have it sanctioned by government and industry stakeholders. In this regard, it would be important to determine why the original plan was not adopted and funded.

Developmental issues that need to be addressed include:

- Improve research and development capabilities. In this regard, the underutilised CDCC facility represents a major asset and could potentially, and among other things, become a major research centre / supplier of fingerlings to small scale farmers.
- Develop credible extension networks.
- Improve access to finance.
- Develop codes of practice for the various sub-sectors (e.g. sea-cucumbers, small scale prawn production, mud crabs) in a similar fashion to the industrialised prawn producers.
- Identify development priorities for the various sub-sectors, for example:

Mud crab - mapping and stock assessments and recruitment variability of mud crab populations. There is a need to establish those areas that are suitable for crab fattening. This could be undertaken as a GIS study. The seed stock required to operate the nascent crab fattening industry is derived from wild stocks. To ensure the long term sustainability of the activity it will be necessary to assess the current status of the stocks as well as recruitment variability. To date, no stock assessments have been undertaken.

Sea Cucumber - the grow-out techniques (lagoon based ranching) need to be optimized in terms of stocking densities and enclosure systems. There is a need to develop farmer / ranching production models. Feed requirements, particularly nursery feeds, need further research as does stocking density studies in the nursery system. Assuming that sea cucumber ranching is successful, there will be a need to map the areas that are suitable for farming. In addition to the bio-physical environment, overlays of human population density need to be added – the product is of high value and the best areas would be those that are both biologically suitable and are geographically far from settlements (theft issues are likely to be a major problem in this industry).

Eels - a critical assessment of the potential to develop eel aquaculture needs to be undertaken. Particular emphasis should be placed on the current status of the resource, and the sustainable exploitation of glass eels for aquaculture purposes.

Seaweeds - the potential for seaweed culture to provide rural livelihood options is significant. Past attempts to develop the sector have met with limited success. While the technology has been successfully transferred, a strategy to develop the sector needs to be developed. In this regard, the developmental model that has been applied in Tanzania and their associated Seaweed Development Strategy would be instructive.

9. Bibliography

Andrianaivojaona H, Rafidison R, Kasprzyk Z (2003) Bilan diagnostic 1996-2001 dusecteur halieutique et aquacole à Madagascar. Projet TCP/MAG/0170 (b). 47p + annexes.

Apdra F (2009) Diagnostic des activités piscicoles des 3 zones de Vakinankaratra.

Autrand M (2008) Etude des possibilités d'élevage de crabes de mangrove sur la côte Nord-Ouest de Madagascar. Identification des moyens et des étapes-Région DIANA-MADAGASCAR. GAPCM/Groupe UNIMA/AFD.36p.

Avalle O, Randriantomponiony R (1994) Rapport technique d'élevage (ferme piloted'aquaculture de crevettes, Nosy Be). PSP/PNUD/FAO-MAG/92/004. 21p.

Avalle O (1994) Dépliant sur l'aquaculture de crevettes. PSP/PNUD/FAO-MAG/92/004. 4p.

Collart A (1977) Le développement des pêches maritimes et continentales et de la pisciculture, FAO. 16p.

Consortium OSIPD-FTM-PHD 2001 Etude du Schéma d'Aménagement de l'Aquaculture de Crevettes de mer à Madagascar et Rapport final document de synthèse des phases un et deux (1999-2001). MPRH/FDAA/UE. 50p.

Crawford BR (2002) Seaweed farming: An alternative livelihood for small-scale fishers? Working Paper. University of Rhode Island, Coastal Resources Center, Narragansett, Rhode Island, USA. 22pp

CSP 2008 Recueil des textes législatifs relatifs à la gestion de la pêche et de l'aquaculture : 2 volumes.

Damien (2003) Le problématique du mono sexage chez le Tilapia : approche théorique et technique. ARDA.

Eeckhaut I, Lavitra T, Rasoforinina R, Rabenevanana MW, Gildas P, Jangoux M (2008) Madagascar Holothurie SA: The first trade company based on sea cucumber aquaculture in Madagascar. SPC Beche de Mer Information Bulletin #28

FAO (2005) Formulation d'une strategie pour la valorisation des acquis du sous-secteur de l'aquaculture. Programme de cooperation technique. TCP/MAG/2901 (A)

GAPCM/SEPRH (2003) Crevetticulture responsable. Actes de la conférence intervention du 3-5 Décembre 2002 à Antananarivo, Madagascar. Couteaux, B., Kasprzyk, Z., Ranaivoson, E. (éds scientifiques). Edition CITE et Océan Consultant. 345p.

Harilala R, Hishamunda N, Moehl J (2005) Stratégie pour le développement durable de l'aquaculture à Madagascar : Formulation d'une stratégie pour la valorisation des acquis du soussecteur de l'aquaculture. 16p.

VESAT Option : Agronomie et Innovation en Milieu Rural. Institut des Régions Chaudes-Montpellier. SupAgro.

MAEP/FAO 2004 Plan directeur 2004-2007 des pêches et aquaculture à Madagascar-Actes de l'atelier du 11 et 12 Novembre 2003 à Antananarivo, Andrianaivojaona Ch., Rafidison, R., Kasprzyk, Z., Andiantsoa ,M., Ranaivoson, E. (éds scientifiques).161p.

Nguyen Van Thong (2008) Rapport de bilan des résultats d'activité de deux années de groupe d'experts et techniciens vietnamiens à Ambohimahasoa, Madagascar. Projet MAEP/FAO/PSSA.

Ocean consultant (2007) Assistance pour la mise en oeuvre d'un projet pilote d'élevage du crabe de mangrove Scylla serrata à Madagascar : Etude de faisabilité et dimensionnement pour la côte Nord-Ouest de la province de Mahajanga, Madagascar. Projet MAEP/DPRH/JICA, Razafindrainibe H, Rakotoson L, Kasprzyk Z (éds scientifiques) 72p +annexes.

Rabelahatra A (1996) Aquaculture en Afrique. Organisation de l'Unité Africaine-Commission Scientifique, Technique et de la Recherche.

Rabetokotany RJ (2005) Apecu general du secteur national de l'aquaculture et analyse previsionelle de son developpement a Madagascar. Ingenieur agonome – halieute. European Master in Aquatic Production Management. pp26.

Rajaonarivelo MN (2006) Recensement des acquis de la recherche effectuée à Madagascar et élaboration d'une base de données fonctionnelle. Cas de la filière « Pisciculture et aquaculture non industrielle ». Projet PSDR/MAEP/BM. 11p.

Rakotoambinina S (2004) La pisciculture à Madagascar : Réalités et perspectives. Projet FOFIFA/APAM/ARDA/FSP-FORMA.

Ranaivason E (2009) Evaluation des réglementations et des programmes aquacoles en Madagascar. A report for SARNISSA, EC FP7 Project.

Ravelo V (2001) Bioécologie, valorisation du gisement naturel de spiruline de Belalanda (Toliara, Sud-Ouest de Madagascar) et technologie de la culture. Thèse de Doctorat de 3ème cycle en Océanologie Appliquée, Institut Halieutique et des Sciences Marines/Université de Toliara, Madagascar. 160p.

Razafitsalama LH (2003) Projet de création d'une unité de provenderie dans la region d'Ankadinondry-Sakay. Mémoire de fin d'études. Option : Finances et comptabilité. ESDEGS, Université d'Antananarivo.

Robinson G, Pascal B (2009) From hatchery to community – Madagascar's first village based holothurian mariculture programme. SPC Beche-de-mer Information Bulletin #29. 6 pp.

Sadek S, Rafael R, Shakouri M, Rafomanana G, Loforte Libeiro F, Clay J (2002) Shrimp aquaculture in Africa and the Middle East: The current reality and trends for the future. Report prepared under the World Bank, NACA, WWF and FAO Consortium Program on Shrimp Farming and the Environment. Work in Progress for Public Discussion. Published by the Consortium. 42 pages.

Shipton TA, Hecht T (2007) Coastal Mariculture assessment mission. Regional Programme for the Sustainable Management of the Coastal Zones of the Indian Ocean Countries (ReCoMaP) www.recomap-io.org

Van Den Betg F, Janssen J (1994) Manuel pour le développement de la pisciculture à Madagascar. Volume 2 : Marketing et gestion financière d'une micro-entrentreprise de production d'alevins en milieu rural. PSP/PNUD/FAO-MAG/92/004-DT/2/94. 68p.

WioLab (2008) Transboundry Diagnostic Analysis of Land-based Sources and Activities in the Western Indian Ocean Region, Draft. UNEP-GEF Wio-Lab Project

Legislation

Fisheries and Aquaculture Ordinance of 1993 (No 022 of 1993)

http://www.agriculture.gov.mg/index.php

Ordonnance nº 93-022 portant réglementation de la pêche et de l'aquaculture. Journal officiel de la République malagasy, 9 août 1993, p. 1870 à 1877

http://faolex.fao.org/docs/pdf/mad1392.pdf

Relatif à la mise en comptabilité des investissements avec l'environnement (Decree No 167 of 2004 amending certain provisions of Decree 954 or 1999)

http://www.agriculture.gov.mg/index.php

Policy

Policy for the development of a sustainable prawn culture sector in Madagascar (Law No 020 of 2001)

http://www.agriculture.gov.mg/index.php

Loi nº 2001-020 portant développement d'une aquaculture de crevettes responsable et durable. Journal officiel de la République de Madagascar nº 2752, 17 décembre 2001, p. 3620 à 3622

http://faolex.fao.org/docs/pdf/mad29212.pdf

IV. Agriculture and Forestry - Prepared by Dr. Elizabeth Ann Daley,

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1. Introduction

Much of the island of Madagascar (larger in area than Kenya) is sparsely populated, with an average density of approximately 30 inhabitants per km^2. About 34 percent of the population of 18.1 million lives within 100km from the coast. About 3 million ha of land is under cultivation, of which less than 2 million ha are permanently cultivated and only 484,000 ha of agricultural land is irrigated. Some 300,000km^2 of the total landmass is pastoral grazing land given over for cattle-keeping, while other forms of land use in Madagascar are forests, shrub land and urban areas (Wio-Lab 2008).

The Central Highlands of the island are favourable for the production of a large range of food crops, including rice, which is Madagascar's most important staple food. The eastern coastal areas benefit from a humid tropical climate and grow cash crops, but are regularly hit by cyclones. The western plains are covered with savannah and dry forests and are more suitable for extensive livestock breeding and, in some areas, irrigated rice production. The south, with a semi-arid climate, low rainfall and recurrent drought, has specialized agriculturally more in peas and cassava (IFAD 2006).

The agricultural and animal husbandry sector in Madagascar provides employment, livelihoods and subsistence resources for more than 75 percent of the population, including a significant proportion of poor and near-poor households, and the sector contributes to over 35 percent of the national GDP. Low intensity, rain-fed rice production is the main agricultural activity in Madagascar, but other agricultural products, notably vanilla, are important sources of foreign earnings for the national economy. The practice of slash and burn agriculture – locally known as "tavy" – is the most common form of land exploitation, despite the resulting loss of soil fertility, deforestation and erosion, and its responsibility for the propagation of fires, and traditional agriculture contributes 30 to 60 percent of the total agricultural production on the island (Wio-Lab 2008; WWF 2010b). However, industrial agricultural practices are present in Madagascar as well as the traditional ones. Common food crops include rice, sweet potato, coffee, vanilla, pepper and maize, while the main cash crops include sugar-cane, peas, cotton, tobacco, groundnut and cocoa. Most of the rural poor practice subsistence agriculture, with rice being cultivated by 86 percent of households and covering over 40 percent of the total cultivated area, accounting for 37 percent of agricultural cash income (IFAD 2006).

Madagascar has lost all but 15 percent of its forests to tavy agriculture and illicit logging of precious hardwoods. Deforestation poses a serious threat to the survival of local plant and animal species; without trees, the land's shallow soils and steep slopes quickly become eroded and exhausted, incapable of supporting life. Mining and the trapping and hunting of numerous forest mammal species, including lemurs and bats, as well as birds also threaten this unique island habitat (WCS 2010a, 2010b). There is also an important link to be highlighted here, between the inland forests and deforestation processes and the coast. For example, soil erosion from deforestation impacts on the coast though excessive sedimentation, and deforestation also impacts on water quality and supply.

2. Biophysical

Madagascar is endowed with abundant but fragile natural resources (80 percent endemic), fertile soils and ample rainfall. The moist forest in eastern Madagascar is characterised by tropical humid and sub-humid forests. The moist forests represent an important centre of endemism and contain many species of lemurs as well as over 20 species of small mammals. As this habitat becomes degraded or disappears, all of these species, found nowhere else on Earth, are at risk of disappearing forever (WWF 2010b).

The Makira-Masoala Landscape is the largest tract of intact rainforest remaining in Madagascar, an area of over 6,475km^2 within which over half the county's floral diversity is found, including 60 different species of palms (WCS 2010b). As well as the rainforests being a vital source of water for over 150,000 local residents, there are high densities of rare and valuable hardwoods growing in the forests, including 25 species of ebony and Malagasy rosewood.

Mangroves are an important source of income both for the local population and the national economy and, as Table 1, below shows, they cover a vast area of the country with a high value attached to them. The mangrove trees are harvested for building poles and firewood, while traditional and industrial shrimp fishing take place in mangrove areas (Wio-Lab 2008).

Table 1: Valuation of Ecosystem Goods and Services in Madagascar

Coral Reefs		**Mangroves**		**Total**
Area (km2)	Value (Million US$)	Area (km2)	Value (Million US$)	Value (Million US$)
2,230	1,355	3,000	2,997	4,352

Source: Wio-Lab 2008

Unfortunately, poverty, high population growth and a lack of agricultural alternatives have resulted in extensive deforestation in Madagascar. The island loses almost 1000km^2 of its forest each year due to burning for agricultural land and if this trend were to continue the island's spectacular natural heritage could disappear within the next century; illicit logging of precious hardwoods, mining and hunting are all serious threats (WCS 2010a, 2010b).

Madagascar's forests are also threatened by weak environmental governance which undermines the natural resource base by encouraging deforestation, unsustainable management and environmentally destructive agriculture. Commercial timber exploitation is poorly regulated with central policies and weak institutions exacerbating deforestation, while stakeholders, particularly those at the local and regional level, are not effectively engaged in trying to stop it.

3. Human Environment

Madagascar's human population grows by about 3 percent annually which puts enormous pressure on the island's natural resources. The non-farm sector is a possible alternative source of income that could absorb the growing rural population but the generally low level of development in some regions has limited the emergence of small and microenterprises, which account for less than 10 per cent of rural income and have remained largely undeveloped (WCS 2010a, 2010b).

As noted, poverty, high population growth and the lack of current alternatives to agriculture – which is mainly traditional tavy – contribute substantially to deforestation in Madagascar. Further research and investigations into alternative livelihoods for coastal populations on the island would therefore be of merit.

4. Policy and Governance

Launched operationally in 1991, the Government of Madagascar elaborated Africa's first National Environmental Action Plan (NEAP), which had the following objectives:

- To manage the national heritage of biodiversity in protected areas, in conjunction with sustainable development of surrounding areas;
- To improve human living conditions through protection and better management of natural resources, emphasizing watershed protection, reforestation, agro-forestry and improved water supply and sanitation;
- To promote environmental education, training and communication;
- To improve policy management; and
- To establish mechanisms for research, data management and environmental monitoring.

A participatory process introduced key principles from NEAP into other major initiatives, including Madagascar's Poverty Reduction Strategy Paper (2000) and the Rural Development Action Plan (2001). As demonstrated in these documents, the government clearly recognizes the linkage between the environment and sustainable development

(Razafindralambo and Gaylord, no date). Table 2 below presents the three phases of the implementation of NEAP between 1991 and 2008.

Table 2: Design and Implementation of the NEAP

First Phase 1991-1997	Aimed at creating a proper policy, regulatory and institutional framework. It sought to generate conditions for ownership of the environmental agenda by the country rather than the donors.
Second Phase 1997-2003	Consolidated the first phase programmes and put national institutions more firmly in the driver's seat. It aimed at expanding conservation and development beyond national parks and reserves, adopting a regionalized landscape approach.
Third Phase 2003-2008	Aimed at mainstreaming environmental thinking more broadly into macroeconomic management and sector programs, including mechanisms for sustainable environmental financing. It was to ensure that the importance and quality of natural resources were conserved and developed in support of sustainable economic growth and a better quality of life.

Source: Razafindralambo and Gaylord no date

5. Planning and Management

In Madagascar, civil society and, in particular, international NGOs, play a key role in the planning and management of the island's natural resources.[32]For example, in the Makira-Masoala Landscape, WCS (World Conservation Society) has created a community-managed forest zone of nearly 700,000 acres in collaboration with local residents. This green belt buffers the protected forest area and serves as a model for sustainable resource use and conservation. Local residents learn about intensified rice production and other 'Earth-Friendly' farming practices, like the cultivation of vanilla, cloves and silk. They also participate in projects to create tree nurseries, manage watersheds and develop ecotourism. This gives local communities viable economic alternatives to destructive practices such as mining and burning down forests for rice cultivation. WCS is also training park guards to effectively enforce the laws and successfully protect the Makira-Masoala forest complex to ensure the landscape continues to support its wildlife and their habitats (WCS 2010b).

The goals of the WCS programme are (WCS 2010b):

- to collect data for the design and future management of the new conservation site, including wildlife surveys and socio-economic research in local communities;
- to contribute to sustainable regional development in the areas surrounding the park and train local community members in ecologically sound agriculture, forest management and resource conservation techniques;
- to transfer management of the peripheral forests to local communities at several sites in order to reduce deforestation;

[32] It is not clear whether this is because of a lack of government planning and management activities (NGOs are filling a void) or whether this is historical and has caused government activities to have become crowded out. However, given the very limited information found on the government side during the research undertaken for this scoping study, it seems likely that the NGOs are meeting a need posited by lack of government activity and/or capacity. This is perhaps something that could be researched further and addressed within the project.

- to implement an effective environmental education program.

Conservation International and the World Wildlife Fund are two other international NGOs that have made management and conservation recommendations with respect to Madagascar to reduce the vulnerability of biodiversity and enhance the resiliency of species and ecosystems in the coastal and marine areas in the face of climate change (MEEFT 2008). These are to:

- Create a marine reserves system based on factors likely to increase resistance and resilience to climate change, such as creating a network of reserves along latitudinal gradients, protecting source populations for larvae, protecting naturally resilient areas, establishing multiple reserves for each habitat type including deeper and offshore areas, and creating reserves to address a variety of needs (fisheries, biodiversity, etc.).
- Significantly increase the total area of MPAs; 1 million ha will not be enough.
- Promote Integrated Coastal Zone Management (ICZM), and consider the effects of upland watershed activities on coastal marine ecosystems such as mangroves, coral reefs, and sea turtle nesting beaches.
- Incorporate climate change into outreach efforts focused on marine resource use.
- Reduce non-climate stressors, including pollution, and unsustainable harvest, and excessive sedimentation, while providing alternative, sustainable, culturally appropriate sources of food and income.
- Use national legislation and enforcement to better govern the behavior of large companies and international interests.
- Support community engagement with reserve design, management, and enforcement.
- Support a coordinated, centralized database such as the one ReBioMa has created for terrestrial ecosystems that cover marine ecosystems as well.

6. Development, Trade and Projects

This section highlights two WCS and WWF projects and reviews IFAD's work in Madagascar, as well as providing information on other projects related to livelihoods and funding for the Protected Areas and Biodiversity Foundation of Madagascar. There are other environmental-based projects ongoing that have not been included in this section.

WCS's Makira Carbon Company

In collaboration with the government of Madagascar, WCS's Makira Carbon Company will help to sell over nine million tons of carbon offsets to the global market. Proceeds will protect the forest form further destruction and help to enhance the economic wellbeing of neighbouring communities. Makira Forest spans over 3885km^2, making it one of the largest remaining intact blocks of rainforest in Madagascar. It contains 22 species of lemurs, hundreds of bird species and thousands of plant varieties, many of which are found no where else on earth. It also provides a critical forest 'corridor' allowing wildlife to travel between adjoining protected areas and outlying forest blocks. As a result of the carbon sales, WCS and the Ministry of Environment, Water, Forests and Tourism, in close collaboration with local nonprofit and community orgnisations will establish a new Makira Forest protected area. The sale of Makira carbon offsets will provide the long-term financing needed to ensure the management of its pristine forests and unique species (WCS 2010b).

Fandriana-Marolambo Forest Landscape Restoration

This WWF project has as its goal to restore the ecological services and socio-economic values of the Fandriana-Marolambo Landscape within the Madagascar Moist Forest Ecoregion. The project will undertake analyses of the main causes of forest degradation and identify and implement appropriate restoration strategies in partnership with local authorities and communities. The biodiversity vision for the Moist Forest Ecoregion has identified the critical need for restoration if biodiversity and ecological services are to be maintained in the future. In 2003, a process to identify priority areas for restoration was initiated and resulted in the identification of 3 priority areas. Fandriana-Marolambo is one of them and has been deemed particularly suitable for beginning a Forest Landscape Restoration initiative.

Restoring this forest landscape will ensure the continuity of the Malagasy Eastern forest corridor. The objective of the project is in line with the Malagasy Government priority to increase the forest cover and contribute to poverty reduction in environmentally sensitive areas. The project will establish a framework and action plan for a long-term restoration programme of the Fandriana-Marolambo landscape, field test restoration strategies that can be upscaled and develop lessons learned and extend forest landscape restoration (FLR) initiatives to other identified priorities in the Madagascar Moist Forest Ecoregion (WWF 2010a).

IFAD's Operations in Madagascar

Under IFAD's performance-based allocation system, the annual allocation for Madagascar in 2006 was around US$10.7 million per year, or US$64.2 million over the period covered by the Country Strategic Opportunities Programme (COSOP) 2007-2012 (IFAD 2006). Table 3 below shows the main elements of IFAD's operations on the island.

Table 3 – Key Elements of IFAD's Operations in Madagascar, 2006

IFAD Assistance	What IFAD Promotes
Improved risk management and reduced vulnerability through enhanced access of the rural poor to services and assets.	IFAD will promote mechanisms for risk management and help to reduce production risks by facilitating access by small-scale producers to sustainable and appropriate support services so they can build up resistance to natural shocks
Higher incomes for the rural poor through diversification of farming activities and promotion of rural entrepreneurship	IFAD will promote the development of rural small and microenterprises along value chains that reflect regional comparative advantages and market opportunities, and that integrate on and off farm activities. It will improve market access for small-scale producers by supporting the development and cohesion of regional value chains.
Increased engagement of small-scale producers and their organizations in economic and policy development through professionalization	IFAD will encourage the organization of small-scale producers. It will promote farmers organizations and facilitate dialogue between small-scale producers' organizations and the Governments.

Source: IFAD 2006

Projects relating to Diversification of Livelihoods in the Coastal Zone

Table 4 – Sample Projects in Madagascar

Organisation	Length	Objective	Activities
Association Sante et Developpment	24 months	Development of ecotourism, sustainable management of fisheries and reduction of solid waste and waste water.	• Sensitizing and awareness raising of all partners • Training of a local management group for resource and MPA management • Development of sources of revenue • Development and application of a coastal resource management plan
Blue Ventures Conservation	24 months	To build on the success of the pilot mariculture project initiated in 2007 and expand sea cucumber mariculture to other coastal villages within the Velondriake conservation management area as a sustainable alternative livelihood	• Construct grow-out pens for raising sea-cucumbers in all villages in the area • Assist communities in managing the pens and engaging effectively with commercial markets • Assist communities in financial planning to enable them to sustainably generate and manage revenues to purchase juveniles and grow-out pens • Communicate results and lessons learned to assist other communities in replicating the projects
TRANS-MAD Development	24 months	Integrated micro-enterprises for the production of sea-cucumbers	• Select 8 to 10 families in each of 4 pilot villages, each of which will have 4 sea-cucumber raising pens • Train families and follow up the growth process • Support for the fair trade of the produce

Source: Recomap no date

Protected Areas and Biodiversity Foundation of Madagascar (PABFM)

Funds mobilized for PABFM reached USD 33,162,586 and were sourced as follows:

- Malagasy State : USD 2,555,801
- WWF : USD 1,000,000
- CI : USD 1,000,000
- KFW : USD 6,664,071
- AFD : USD 2,961,809
- FFEM : USD 1,480,905

- IDA : USD 7,500,000
- GEF : USD 10,000,000

Environmental forest receipts amounted to 200 percent of the objectives set, that is, 3,029 billion Ariary including 2,367 billion Ariary of entry fees in protected areas and 662 million Ariary from the national forest fund. A process is also now underway to develop instruments for sustainable funding and to increase funding from the private sector (Republic of Madagascar 2009).

7. SWOT Analysis

Strengths	**Weaknesses**
• Vibrant coastal and forest resources including many unique endemic species offer great potential for natural resource management and economic development • Livestock production well established and suited to part of the island's terrain; crop production also well developed, including export crops, with scope for expansion through change from traditional to more industrial methods of farming • Strong civil society and NGO activities and interest in preserving Madagascar's unique environmental landscapes means resources are likely to be forthcoming for development efforts	• Heavy local dependence on subsistence agriculture, and particularly traditional tavy agriculture has cause massive deforestation and threatens to continue to do so in the face of poverty, rising population growth and limited non-agricultural income-generating opportunities • Limited information on alternative livelihoods and non-forestry or mariculture related projects found in this scoping study, suggesting substantial development needed to identify and promote alternatives to tavy agriculture • Limited information on capacity of local communities to manage their own resources sustainable, particularly if NGO projects end or pull out due to political problems (see under 'threats' below) • Lack of information on government planning and management activities in the natural resources sector raises questions about long term domestic capacity to lead sustainable natural resource management without donor and NGO support
Opportunities	**Threats**
• Tourism, and especially eco-tourism, offer one line of potential development, as does carbon trading as other countries respond to climate change concerns by offsetting their own emissions against the world's existing forests • Madagascar's romantic image due to its high level of endemic species and unusual flora and fauna creates likelihood of interest from donors and international NGOs continuing into the future	• Difficult political and governmental situation in Madagascar at present hinders efficient implementation of government policies and future political violence and instability cannot be ruled out – this has already led to the withdrawal of the Millennium Challenge Corporation from supporting the island's development, and could lead to similar withdrawals by other donors and NGOs

8. Bibliography

IFAD (2006) *Republic of Madagascar Country Strategic Opportunities Programme*

Ministry of Environment, Water, Forest and Tourism (MEEFT) (2008) *Assessing the Impact of Climate Change on Madagascar's Biodiversity and Livelihoods*

Razafindralambo and Gaylord (no date) *Madagascar: National Environmental Action Plan*

Recomap (no date) *Projects Relating to Livelihoods Diversification in the Madagascar Coastal Zone*

Republic of Madagascar (2009) *Poverty Reduction Strategy Paper*

WCS (2010a) *Antongil Bay Seascape, Madagascar*, World Conservation Society.

WCS (2010b) *Madagascar: Makira-Masoala Landscape*, World Conservation Society.

Wio-Lab (2008) *Transboundary Diagnostic Analysis of Land-based Sources and Activities in the Western Indian Ocean Region*.

WWF (2010a) *Fandriana-Marolambo Forest Landscape Restoration*

WWF (2010b) *Adaptation in the Agriculture and Husbandry Sector*

List of Datasets

None found.

List of Sector-Related Projects

Makira-Masoala Landscape Project, World Conservation Society (see Section 6 above)

http://www.wcs.org/saving-wild-places/africa/madagascar-makira-masoala.aspx

Fandriana-Marolambo Forest Landscape Restoration, WWF (see section 6 above)

http://wwf.panda.org/who_we_are/wwf_offices/madagascar/index.cfm?uProjectID=MG0894

Antongil Bay Seascape Project, World Conservation Society

http://www.wcs.org/saving-wild-places/ocean/antongil-bay-seascape.aspx

Annex 1 – All References and Web-Links Identified and Reviewed in Report Preparation

1	CARE Website (2010) **CARE in Madagascar**. Available at: http://www.careinternational.org.uk/11041/madagascar/care-in-madagascar.html
2	GCRMN (2008) **Socioeconomic conditions along the world's tropical coasts: 2008**. Available at: http://www.socmon.org/pdf/socmon_global_report.pdf
3	Ireland C (2004) **IUCN: Alternative Sustainable Livelihoods for Coastal Communities – A Review of Experience and Guide to Best Practice.** Available at: http://www.theidlgroup.com/documents/SustainableCoastalLivelihoods-IUCNOct2004.pdf
4	IFAD (2006) **Republic of Madagascar Country Strategic Opportunities Programme**. Available at: http://www.ifad.org/gbdocs/eb/89/e/EB-2006-89-R-13.pdf
5	Brugere et al (2008) **FAO: Livelihood Diversification in Coastal and Inland Fishing Communities: Misconceptions, Evidence and Implications for Fisheries Management (working paper)**. Available at: ftp://ftp.fao.org/fi/document/sflp/wp/diversification_june200
6	MCC Website (2010) **Madagascar, Millenium Challenge Corporation**. Available at: http://www.mcc.gov/mcc/countries/madagascar/index.shtml
7	WCS Website (2010a) **Antongil Bay Seascape, Madagascar, World Conservation Society**. Available at: http://www.wcs.org/saving-wild-places/ocean/antongil-bay-seascape.aspx
8	WCS Website (2010b) **Madagascar: Makira-Masoala Landscape, World Conservation Society**. Available at: http://www.wcs.org/saving-wild-places/africa/madagascar-makira-masoala.aspx
9	UNEP (2009) **A New Strategic Programme to Strengthen Coastal and Marine Protection in the Western Indian Ocean under Discussion in Mombasa, United Nations Environment Programme**. Available at: http://www.unep.org/NairobiConvention/docs/Press_Release_A_New_Strategic_Programme_to_Strengthen_Coastal_and_Marine_Protection_in_the_Western_Indian_Ocean.pdf
10	Razafindralambo and Gaylord (no date) **Madagascar: National Environmental Action Plan** Available at: http://www.mfdr.org/sourcebook/1stEdition/6-2Madagascar-National.pdf
11	Republic of Madagascar (2009) **Poverty Reduction Strategy Paper** Available at: http://www.imf.org/external/pubs/ft/scr/2009/cr0910.pdf
12	WWF Website (2010a) **Fandriana-Marolambo Forest Landscape Restoration** Available at: http://wwf.panda.org/who_we_are/wwf_offices/madagascar/index.cfm?uProjectID=MG0894
13	WWF Website (2010b) **Adaptation in the Agriculture and Husbandry Sector** Available at: http://madagascar.panda.org/ourwork/climatechange/howwework/adaptation_in_the_agriculture_and_husbandry_sector/
14	Recomap Website (no date) **Projects Relating to Livelihoods Diversification in the Madagascar Coastal Zone** Available at: http://www.recomap-io.org/fileadmin/template/main_en/RA1/R1.7/CFP1_projects_related_to_R1.7-Madagascar.pdf

15	MCC (2009) **Report on the Termination of Activities in Madagascar** Available at: http://www.mcc.gov/mcc/bm.doc/cn-080609-madagascar.pdf
16	IFAD Website (2010) **IFAD in Madagascar** Available at: http://operations.ifad.org/web/ifad/operations/country/home/tags/madagascar
17	Ministry of Environment, Water, Forest and Tourism (MEEFT) (2008) **Assessing the Impact of Climate Change on Madagascar's Biodiversity and Livelihoods** Available at: http://marineclimatechange.com/Marine_Climate_Change_Workshops/Madagascar_files/CI-WWF%20Madagascar%20Workshop%20Report%20FINAL.pdf

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1. Introduction

The Republic of Madagascar is an island nation in the Indian Ocean off the South East coast of Africa, separated from the continent by the Mozambique Channel. Madagascar, the world's 4th largest island, has a surface area of 587,540 km2 and is 1600 km long from North to South and 500 km wide from East to West. The country has had several abrupt changes in government, with the most recent political crisis coming in March 2009. Since March 2009 Madagascar has been isolated by the international community and suspended from the AU and SADC. Major international donors have suspended all assistance, with the exception of humanitarian aid.

Madagascar is a Least Developed Country (LDC) where more than 63% of the population lives on less than 1 US$/day. The country is constrained by the following disadvantages:

- Recurrent natural disasters, such as cyclones and floods that hit the island during the rainy season, with underdeveloped and poorly distributed disaster preparedness
- A wide expansive landscape, with a population that is concentrated in towns where they have access to public amenities and are not landlocked, especially during the rainy season
- A weak centralized public service, with a low absorption capacity and Government responsiveness, which is unable to address the education and health demands of remote areas
- A dull private sector which is incompliant with international standards

1.1 Oil and Gas Sector overview

Oil & Gas sector is a capital-intensive sector usually divided in two sub-sectors:

- Upstream activities with exploration and production. The Prospecting phase, which includes the drilling and operating of the well, are capital-intensive, specialized activities, executed by specialized corporations. The decision to exploit a field depends on a number of factors, including the calculated exploitation costs, the price of oil, the political stability of the concerned country, and vulnerability to natural hazards. There can be delays between the Exploring and Operating phases, as the owner of the exploitation rights may want to wait for more favourable conditions.

- Downstream activities include all the steps from refining to distribution and marketing. A refinery or a processing plant, is also built by specialized corporations, however, it can use some labour from the local workforce. In accordance to a country's legislation, distribution is implemented and managed by the State or private firms, but relies more widely on local workforce

In Madagascar, upstream activities have been developed since 1976 with blocks transfers, however, they are still in the exploration phase. Proven oil reserves are located inland, in the Bemolanga (estimated 9.8 billion barrels of recoverable reserves) and Tsimiroro (estimated 2 billion barrels reserves) sites (North-West of Madagascar). Both are "unconventional oil" reserves and their exploitation could have huge environmental impacts (especially the tar sands of Bemolanga). Light oil has also recently been found inland, East of Tulear.

Serious prospects for offshore oil fields on the western and northern coasts also exist close to the richest marine ecosystem of the island. It is also an area with potential for tourism development.

Oil activities have long been performed by state owned companies, but they have been privatized since the early 2000's (seen with Solima, the State-owned gas distribution company in 2000). Activities are now carried out by very large companies such as Total, Exxon and Madagascar Oil.

Downstream activities include fuel and LPG importation, processing, storage and sales. The Toamasina refinery stopped its activities in 2004. All of the refined oil is delivered on the eastern coast at Toamasina Port, while nine companies are licensed to distribute, including Jovenna, Galana, Moco, LP sa, MEGS, MPIGS, Shell, Total and GRT. The retail sales of fuel and LPG are operated by Jovenna, Galana, Shell and Total. About 250 franchised gas stations are operative throughout the 22 regions. (see Annex 1 for more details about the "key players" in the sector)

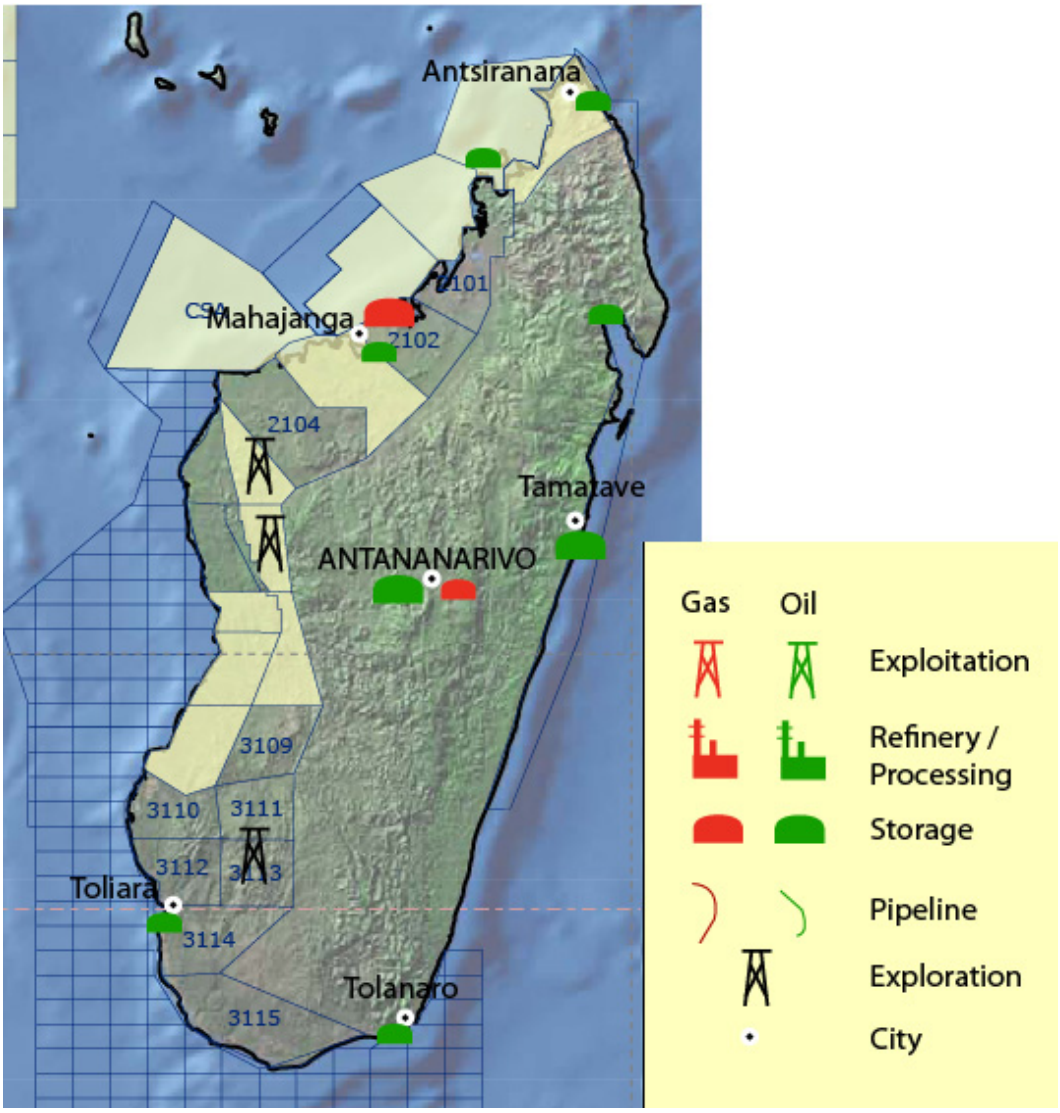


Figure 1: Map of the Oil & Gas activities in Madagascar (adapted from Deloite 2009)

Oil and Gas activities are currently limited in Madagascar, hence, they are not covered in the GDP breakdown. Fuel and LPG activities have been diluted by the different categories in the GDP breakdown.

1.2 Biofuels sub sector

Starting in 2006, many investors have become interested in developing biofuel projects in Madagascar. Both land availability (see Table 1), as well as the government's willingness to support private investment and agribusiness development, were regarded as a positives for the sub-sector.

Table 1. Potential availability of land (all areas in 1,000 Ha) From World Bank, 2010, "Rising Global Interest in Farmland : can it be sustainable and provide equitable benefits?"

Total area	Forest area	Cultivated area	Suitable non cropped, non protected			
			Forest	Non-forest with pop. Density of		
			< 25/km²	< 25/km²	< 10/km²	< 5/km²
58,749	12,657	3,511	2,380	16,244	11,256	6,572

Several projects for bioethanol (from sugarcane) and biodiesel (mainly from Jatropha, see Annex 2) have been planned, while pilot implementations have also begun. However, an inability to secure land rights, agro-technical problems (mainly for Jatropha), the global economic crisis and the national political crisis all led to the suspension of most of the projects (1).

Table 2. Officially recorded biofuel projects in 2009 (2) (see map Annex 3)

DIESEL		ETHANOL	
Company	**Region**	**Company**	**Region**
NEO	Bongolava	SITEC Brickaville	Atsinanana (Brickaville)
J-Oil	Diana	JWE	Boeny (Katsepy)
ER Company	Atsimo Andrefana	SAIM	Diana (Ambilobe)
Magnard	Atsimo Andrefana	SOPREMAD	Boeny
Delta Petroli	Sofia	E-Kolo	Atsinana (Vatomandry)
MCD	Boeny	X	Analamanga
Avana Group	Bongolava	SITEC Farafangana	Atsimo Atsinanana
TRE		X	Mahanoro
JatroGreen	Haute Matsiatra	TF sarl	Diana (Diégo 2)
JSL	Boeny	Tora Green Industry	Atsinanana (Toamasina)
Bionergy	Boeny	Madagascar Industries	Boeny (Majunga 2)
X (palm oil)	Atsimo Atsinanana		

At the local level, the "Tany Meva" foundation is also developing ethanol stoves (Vatomandry and Ambositra) and Jatropha products (candles, oil lamps).

A national platform for sustainable agrofuels has also been set up at the national level, supported by both the WWF and UNDP. Its aim is to promote exchanges among the sector's stakeholders (government bodies, private sector, technicians, NGOs), develop sound legislation and policies and encourage the sustainable development of agrofuels in the country. A workshop was also held in December 2009 to present the status of this approach (with the need to complete the legal framework for upstream activities, and to prepare specific EIA framework) and draft an action plan for the following years.

1.3 Trends and prospects

Since the majority of the country's international financing has been discontinued and the political situation remains unclear, most investment projects have been suspended. The recommencement of economic activity is, thus, contingent on establishing stability in the country.

Oil and gas exploration operations appear to be slowing down, however, inland pilot exploitation operations are still ongoing at the Tsimiroro oil field.

This break in activity could give the government an opportunity to fill the gaps in the extractive sector's legislation and framework. For fuel and LPG distribution, the licenses are at their renewal stage. There are no prospects for change in the composition of the sector's key players. As for biofuels, the situation is very much the same, in that, no serious development is expected as long as the present political situation prevails.

Several projects of offshore oil exploitation, as well as biofuels growing in the coastal zone, do exist, but at their early stages. Thus, the specific impacts on coastal livelihoods cannot be assessed at this point.

2. Biophysical

Madagascar is known as a biodiversity hotspot with 90% of its species endemic. The country has a large international environmental NGO community and these NGOs and international donors have assisted the government of Madagascar in creating well written and strong environmental regulations (see 4.Policy and Governance).

With a mainly rural population and underdeveloped infrastructure, Malagasy energy consumption relies mostly on biomass, with low CO2 emissions per capita.

Table 3: National data on energy consumption and impacts of climate change

Energy use (kt of oil equivalent)	Combustible renewables and waste (% of total energy)	Fossil fuel energy consumption (% of total)	CO2 emissions (kt)	CO2 emissions (metric tons per capita)
			2,249.69	**0.12**

Source: World Bank, year 2007

Onshore petroleum activities are located in Bemolanga and Tsimiroro, Melaky region. But full scale exploitation of these fields will require upgrades in infrastructure, including processing plants, pipelines and ports. Due to the technical process used for tar sands exploitation ("washing" of crushed oilstones), polluted water and oil spills could in the future accidentally drain into the neighboring rivers and then to sea.. Offshore activities take place in StAndré Cape in the Boina region and Ambilobe in the Diana region, all of which are at risk of possible oil spills.

Table 4: Environmental and social issues of oil, gas and biofuel activities in the coastal zone

Coastal Oil & Gas Activity	Environmental issues	Social issues
Onshore exploitation	• Oil spills, accidents • Water and soil contamination • Water table wasting and major landscape changes (tar sands)	• Opportunities for employment • Opportunities for new services • Population displacement and major livelihood changes (tar sands)
Offshore exploration	• Oil spills, accidents	• Restriction of fishing zones • Fauna disturbance (a) • Opportunities for employment
Oil & Gas transport	• Oil spills, accidents • Water and soil contamination • Invasive species in ballast waters	• Risks of accidents (fire, collisions, etc) • Improvement of transportation network
Gas station and retail	• Oil spills, accidents • Water and soil contamination	• Opportunities for employment • Opportunities for new services • Fuel availability
Biofuels development	• Monoculture and biodiversity loss • Pollution	• Opportunities for employment • Opportunities for new services • Competition for arable land

(a): during Exxon's exploration campaign in June 2008, more than 100 dolphins beached in Antsohihy Bay. Though investigation of this unexpected incident did not find any links with Exxon activities, offshore explorations are regarded as potentially disturbing to marine mammals in particular

No major oil spills have been recorded in Madagascar in recent years. The most noticeable pollution incident involved 500 tonnes of HFO spill from the Turkish bulk carrier Gulser Ana in 2009, off Cap St Marie (3).

From its location in the Indian Ocean, Madagascar is regularly hit by cyclones and tropical storms. According to climate change findings, cyclones could occur more often and be stronger in the future. During the last three decades, Madagascar had been hit by several strong cyclones. Thus far, no oil and gas exploration, or fuel and LPG related incidents have been recorded. Nevertheless, close appraisal and monitoring of existing or planned infrastructure should be conducted with a knowledge of these types of risks.

3. Human Environment

3.1 Socio-economic indicators

Table 5: National economic indicators

GDP (million current US$)	GDP growth (annual %)	GDP per capita (current US$)	GDP per capita growth (annual %)	GINI Index (2007)
9,463	**7.3**	**495.14**	**4.49**	**47.2**

Source: World Bank, year 2008, and HDI

Table 6: National social indicators

Population, total (million)	Population growth (annual %)	Poverty headcount ratio at $1.25 a day (PPP) (% of population)	Human poverty index (HPI-1)	Human development index
19.11	**2.68**	**67.83** (2005)	**36.1**	**0.543**

Source: World Bank, year 2008, and HDI, year 2005

Table 7: National gender indicators

Life expectancy at birth, female (years)	Life expectancy at birth, male (years)	Literacy rate, adult female (% of females ages 15 and above)	Literacy rate, adult male (% of males ages 15 and above)	Gender-related development index (GDI)
62.0	**58.8**	**65.26**	**76.53**	**O.541**

Source : World Bank, year 2008, and HDI, year 2005

Though Madagascar is ranked among the mid-level countries according to the HDI, the poverty rate is still very high at 67%. The high adult literacy figure hides the quite low level of education, which is more acute in landlocked areas where public services are poor.

The main occupation of the population living in inland exploration areas is agriculture and husbandry. Given the low level of development in those areas, as well as weak entrepreneurship, the local population will not be able to benefit from the petroleum projects without adequate support.

The main occupation of coastal populations is agriculture and fishery. The depletion of marine resources has been recognized for two decades. Coastal populations will not likely benefit from petroleum projects for the same reasons noted above.

As noted above, upstream activities of the oil and gas sector are highly specialized. Experts and builders are not locally hired, and very few non-specialized jobs are available for the local population.
Downstream activities are more likely to bring job opportunities locally. Refineries, processing plants, and transports use skilled and "semi skilled" workers and proper training can be given with more permanent activities. Trading and retail gas stations create opportunities for SMEs but create very few jobs.
However, like other big mining or industrial projects, oil and gas activities may generate local immigration flows with negative consequences, including the spreading of HIV and STDs, inflation from increases in demand, and competition with local populations for job opportunities.
Revenue leakages are generally very high since local complementary sectors are not developed, and governments are often unable to help the private sector benefit from this demand.
The main threat pertaining to Medium and Large Foreign Direct Investment that can be addressed by the government is the eviction effect and the Dutch disease

Exploration activities create few jobs in the field, nor in the coastal zones, as the major companies hire international petroleum experts, while most of the low level jobs (driver, guards etc) are hired in Antananarivo, the capital. The level of education in rural zones is so low that it is difficult for companies to find enough candidates suitable for the hygiene, safety and environmental minimum. Oil and gas companies generally live in autarchy, as goods are imported from other regions, usually the Capital, where more dynamic SMEs are located. Services are also contracted with SMEs located in Antananarivo.

Downstream activities create more jobs. Besides the headquarter jobs, gas stations create between four and twenty low-level jobs in towns, all according to the size of the station.

For the local population, some expected benefits are:

- The rehabilitation of roads, thus, no longer leaving the population landlocked during the rainy season
- Social interventions such as education support and the building of health and youth centres.

Those benefits rely on the willingness of business to allocate resources to Corporate Social Responsibility (CSR). A national framework on CSR does not exist at present.

Revenue leakages are very high, as high-skilled staff are not nationally available. Likewise, very few Malagasy SMEs are able to comply with international standards, and even when labour-intensive jobs are required for the construction of infrastructure, companies and subcontractors prefer to hire experienced workers.

3.2 Details of corporate and social responsibility programmes of the oil and gas companies

At present, major CSR interventions in social areas are well above government expectations. Major companies are complying with international standards and utilizing their experiences gained in other countries.

Coastal Oil & Gas Activity	Corporate and social responsibility (CSR) – or Social benefits
Madagascar Oil	Madagascar Oil works with local communities, as well as international NGOs, to foster environmental awareness and environmentally-friendly practices. This ensures that it understands the current environmental issues.
Total / Exploration and Production	Local development activities in the Bemolanga region (rehabilitation of roads, of community buildings, and support to agriculture extension)
Exxon	Claims to be compliant with international standards (environmental performance / workplace / corporate governance / transparency and human rights / community development), but no specific actions have been identified in Madagascar
Total / distribution	CSR is not clearly detailled on the Total website for Madagascar, only quoting general headlines : - Sustainable development of the energy offer - Secure all operations and limit their environmental impact - Participate in the struggle against climate change - Respect and promote human rights - Respect communities living nearby the installations and contribute to the development of host countries
Galana	Galana has developed activities related to health, education, and HIV prevention. It also contributed to the rehabilitation of the “Rova” palace and provided support to cyclone-affected populations.
Jovenna	No social or corporate activities reported on the website
Shell	Madagascar a fait hier un don de 5.200.000 Ar. à l’Association Fonds de solidarité avec les Personnes vivant avec le VIH (AFS-PVVIH) et Sida à Madagascar (2008). Shell Madagascar s’est engagée pour permettre un accès total aux soins et traitement au VIH et Sida de son personnel (Requires translation)

3.3 Trust Funds and EITI

According to the present legislation, the local revenues accrued from extractive industries should be channelled to communes located in the concerned areas. If applied, this would mean that small communes made up of a few hundred inhabitants may have to share and manage large quantities of funds each year. Since there are currently no revenues from oil and gas exploitation, communities in extractive areas are not yet receiving any of these benefits. The existing legislation pertaining to this sharing of benefits may not be the most effective and it would be of interest to work on the following issues:

- To which administrative division should the extractive revenues be given?
- How should such revenue be shared?

In 2008, Madagascar was in the process of creating custom-made trust funds for the communities in extractive areas, compliant with the EITI approach. The Government was studying the best method for sharing revenues among the relevant administrative divisions (communes, region, district), and assessing capacity building requirements at the local level, especially with regards to community development, budgeting and management. This process has been on hold since the beginning of the political crisis in March 2009.

4. Policy and Governance

4.1 Policy and Legislation

Strategies / Regulations	Description – Comments
Upstream activities	Loi 96-018 portant Code Pétrolier Sept. 23th 1995
Downstream activities	Loi 99-010 régissant les activités du secteur pétrolier aval Apr. 17th 1999
Agriculture and land planning	Loi n° 2005-019 fixant les principes régissant le statut des terres Loi n °2006 - 031 fixant le régime juridique de la propriété foncière privée non titrée Lettre de Politique Foncière (2005)
Environmental regulations	• Environmental charter (Law no 90-033 of 21 December 1990 relating to the Environmental Charter, changed and supplemented by Laws no 97-012 of 6 June 1997 and no 2004-015 of 19 August 2004) • MECIE (Decree no 99-954 of 15 December 1999 amended by Decree no 2004-167 of 3 February 2004 relating to the compatibility of investments with environment) • Arrêté no 12032/2000 of 6 November 2000 related to the regulation of mining areas and environmental protection • Law no 96-025 of 30 September 1996 relating to the local management of renewable natural resources; • General guidelines for carrying out an environmental impact study; Guidelines for conducting an environmental impact study on a mining project;
Temporary protection of sites of high biological and ecological value	Inter-Ministerial orders n° 19560/2004 n° 17914/2006 n°18633/ 2008

In order to control the development of the mining and oil sectors and preserve the biodiversity of Madagascar, maps of protected areas, as well as sites of biological and environmental value, have been drawn. All mining permits within these zones have been suspended (and no new permits granted) according to the inter-Ministerial orders of 2004, 2006, and 2008.

Environmental Impact Assessment Implementation

Before implementation, all petroleum activities must obtain an environmental permit issued by the Ministry of Environment. The legal framework for this is given by the "MECIE Decree" (" Mise en Compatiblité des Investissements avec l'Environnement"), which relates to national environmental policy and the promotion of ecological and social equilibrium.(4)

In the case of large size projects (PGA: Projets de Grande Envergure), the technical opinion should be synthesized with the public investigation report. It is recommended that the

formulation of the conclusions of technical advice is based on the same model as the conclusion of the investigation commission report.

The following steps must also be performed:

- Establish the Environmental Impact Assessment (EIA), attached with an environmental commitment schedule (PEE) with two alternatives, or establish an environmental management schedule (specifications) prior to any operation.
- Submit the quoted EIA report to the Environmental National Office (O.N.E.), which must be assessed by a multi-disciplinary panel.
  The licensee and/or the petroleum contractor are permitted to relinquish a portion of or the entire permit only after receipt of the final Record of Decision.

In practice, companies comply with the Environment Charter and have the EIA carried out. However, a few weaknesses should be highlighted:

- The ONE's capacity to monitor the EIA is insufficient. Companies are free to hire a pool of experts in order to follow-up, making their independence questionable.
- Experience also shows that such pools do not cover all environmental areas, thus, biasing the conclusions of the EIA report.
- Although EIA's are routine in Madagascar, when setting up the team, some key sub-areas are neglected (e.g.: the pool of experts mandated to study the correlation between dolphin beaching and Exxon's exploration did not include a marine ecosystems expert).

The challenge in the coming years will be to both assess the capacity of EIA experts at the sub-regional level, and to update government capacity and knowledge.

4.2 Governance

Entity	Responsibility/ Description
Ministry of Mine and Hydrocarbons	Responsible for the conception, management and implementation of the government's policy for the sustainable development of the country through mining and hydrocarbons. This is to ensure that conditions for economic growth and the general welfare of the population are met.
OMNIS (Office National des Mines et des Industries Stratégiques)	State-owned agency, created in 1976, tasked to manage, develop and promote petroleum and mineral resources in Madagascar. Responsible for upstream sub-sector (exploration and exploitation)
OMH	Responsible for downstream sub-sector (distribution)
Ministry of Decentralization and Land Planning	In charge of national land planning. Also responsible for the appraisal and agreement of large scale agribusiness investments
Ministry of Environment and Forests	In charge of environmental management, including forests, protected areas and issues pertaining to climate change
National Office of Environment (ONE)	The ONE is responsible for the prevention of environmental risks and pollution in public and private investments. It also manages the environmental information system, monitoring and evaluating the state of the country's environment. ONE is a one stop centre for the issuance of environmental permits.

National Commission of ICZM	The National Commission of ICZM ensures the implementation of ICZM policy in Madagascar.
APMF (Maritime and Fluvial Port Authority)	Responsible for the regulation of ports and national policies related to ports.
BNGRC (National Bureau for the hazards and risks management)	The BNGRC is responsible for information diffusion pertaining to cyclones, as well as the management of the needs assessment and assistance management.
OLEP (Organe de lutte contre l'événement de pollution marine par les hydrocarbures)	Attached to the Ministry of Environment, in charge of the prevention of, and training for, oil spills

The current political situation in Madagascar is complicating the improvement of the ICZM Framework Structures, ICZM Processes and the development of a National ICZM Plan. The National ICZM Committee (Comité National GIZC - CNGIZC) was formally established by a Prime Minister's Decree in December 2008. In February 2010, with support from ReCoMaP and WIO-LaB, the ICZM Strategy of Madagascar was approved by the National Cabinet.

The oil and gas sector benefits from the support of several entities and agencies. However, since development in the sector is recent, the central issues are still governance and management. Livelihood concerns are presented as a sub-component of the mission of organisations responsible for governance and management. While a participatory process is utilized in Madagascar, local and coastal populations are still not involved in the decision-making process.

The Economic Development Board of Madagascar (EDBM) is a one stop centre in charge of promoting and facilitating domestic and foreign direct investments. The EDBM aims to make the country's investment climate attractive to private companies and conducive to success.

5. Planning and Management

Though more capacity building in government managers would be profitable, coordination remains the central problem. High-level officers are focused on completing their own tasks, which makes coordination very difficult. Again, this is the result of weak capacity. The short-term solution would be to create specific task forces.

The former government's central goal was to develop, even at the expense of responsible management. The attribution of oil and gas blocks in Bemaraha region and Sainte Marie island, both protected areas with coral and whale sanctuaries, were put on hold due to pressure from NGOs and environmental activists. The present Government, in search of funds since the suspension of budgetary aid, is eager to find new investors.

Thus, NGOs play the double role of watchdog and implementing agencies for CSR activities.

Concerning land access and agribusiness development (including biofuel projects), the formal responsibility of the Ministry of land planning and decentralization is often "by passed" by private operators, whereby, they normally deal directly with local or provincial authorities. The national effort toward land planning (National land planning schemes, regional land planning schemes) has also been stopped, as it also relies mainly on international finance.

Policy Planning Initiative	Objective
Poverty Reduction Strategy Paper, 2005 (PSRP)	The PRSP contains a set of strategic priorities and goals. There are 15 implementation programs and 31 indicators for Madagascar. It is a proposed outline for reducing poverty in Madagascar.
Integrated Coastal Zone Management (ICZM) Strategy of Menabe, Madagascar	The ICZM Strategy of Menabe describes the environmental protection program in the coastal areas of the region. It focuses on two pilot areas Morondava and Andranopasy.
Madagascar "Vision 2030"	The M / vision for 2030 has the following objectives: i) Improving governance; ii) Building a strong economy; iii) Rebuild and enhance the environment; iv) Rebuild a successful education system; v) Build on Malagasy cultural values to stimulate knowledge and human development.
Vision "Madagascar Naturally" (VINA)	This vision places humans as the main actors in all proceedings. It takes into account the paramount importance of promoting rural development to ensure a significant reduction of poverty and, thus, the satisfaction of basic human needs and the elimination of distortions that facilitate corruption
National Strategy and Sector Programmes	About 60 strategies and programmes were drafted. An Oil & Gas and Fuel & LPG strategy hasn't been drafted yet.
Madagascar Action Plan (MAP)	The MAP is an action plan that outlines the roadmap and the priorities of the country from 2007 to 2011. The MAP outlines the commitments, strategies and actions that lead to rapid economic growth, contribute to poverty reduction, and allow the country to benefit from globalization. This is in accordance with the national vision "Madagascar Naturally "and the Millennium Development Goals.
National Policy for Land Planning (PNAT)	PNAT aims at producing a comprehensive framework for the country's territory development, integrating rational economic development, social welfare and environment sustainable management (formally includes ICZM consideration). Elaboration of SNAT (National Scheme for Land Planning), and SRATs (Regional Scheme for Land Planning) started in 2008, but completion, approval and implementation were suspended because of the political situation

6. Development, Trade and Projects

NORAD's project, Oil for Development, supported the oil and gas sub-sector, however, it was closed due to political instability. Its goal was to improve Madagascar's capacity to deal with potential discoveries of oil on the Malagasy continental shelf. The programme consists of a number of components – legislation, policy development, environment, financial management and anti-corruption measures. Environmental considerations are an important element of the programme, and the Norwegian Pollution Control Authority (SFT, now the Climate and Pollution Agency) is also involved in the process.

Development project	NGO / Donor / Private Sector	Project details
Extractive Industries Transparency Initiative (EITI)	African Development Bank / World Bank / other international partners	Transparency Initiative (EITI) aims to strengthen governance by improving transparency and accountability in the extractives sector. Madagascar is a candidate country, and due to the political situation, applied to extend the deadline for completing EITI validation. This has been agreed until 9 March 2011
Oil for Development (OfD)	NORAD	• Petroleum policy and strategy • Legal and regulatory framework • Updating office computer systems • Data management • Resource assessment • Promotion • Revenue management • Integrity building to control corruption in the petroleum sector • Protection of the environment • Supervision • Application for an extended continental shelf • Other training Due to the political situation, the programme was frozen in March 2009 and has not yet been resumed
Madagascar Third Environment Program Support Project	World Bank	Third phase of the big National Environment Action Plan (PNAE), started in the late 80's. Due to the political situation, this project (close to its end) is now only dealing with social issues (as safeguard policies for the protected areas)
Regional Coastal Management (ReCoMap)	European Union	ReCoMap is a regional program for the sustainable management of the coastal zones of the countries of the Indian Ocean. It is an initiative of the Indian Ocean Commission which deals with seven countries of the region, namely Mauritius, the Seychelles, Madagascar, the Comoros Islands, Kenya, Tanzania and Somalia. The program started in August 2006 and will end in 2011. The Program aims to improve valorization and sustainable management of coastal resources of the seven countries of the region.
Western Indian Ocean Marine Highway Development and Coastal and Marine Contamination Prevention Project	GEF	Concerned countries : South Africa, Mozambique, Tanzania, Comoros, Madagascar, Mauritius, Seychelles and the Reunion Island. All countries are required to have a NOSRCP to provide a national framework for responding to oil spills and protecting coastal resources

Projects relating to Diversification of Livelihoods in the Coastal Zone

Table 4: Sample Projects in Madagascar

Organisation	Length	Objective	Activities
Association Sante et Developpment	24 months	Development of ecotourism, sustainable management of fisheries and reduction of solid waste and waste water.	• Sensitizing and awareness raising of all partners • Training of a local management group for resource and MPA management • Development of sources of revenue • Development and application of a coastal resource management plan
Blue Ventures Conservation	24 months	To build on the success of the pilot mariculture project initiated in 2007 and expand sea cucumber mariculture to other coastal villages within the Velondriake conservation management area as a sustainable alternative livelihood	• Construct grow-out pens for raising sea-cucumbers in all villages in the area • Assist communities in managing the pens and engaging effectively with commercial markets • Assist communities in financial planning to enable them to sustainably generate and manage revenues to purchase juveniles and grow-out pens • Communicate results and lessons learned to assist other communities in replicating the projects
TRANS-MAD Development	24 months	Integrated micro-enterprises for the production of sea-cucumbers	• Select 8 to 10 families in each of 4 pilot villages, each of which will have 4 sea-cucumber raising pens • Train families and follow up the growth process • Support for the fair trade of the produce

Source: Recomap no date

7. SWOT Analysis

Strengths	Weaknesses
• The legal framework is nearly comprehensive • Strong environmental regulations • Oil fields are sparsely inhabited • Dutch disease strictly monitored by the Government • Land availability	• The absence of a legal government in Madagascar constrains the implementation and application of development policies of the country. Furthermore, most of international donors have suspended their support and private companies are not willing to invests in an insecure environment • Weak centralized Public Service, with insufficient capacity to apply the legal framework • National framework giving CSR guidelines and minimum does not exist • Insufficient capacity to monitor EIA and environmental experts not available in the sub-regions • The status of the ICZM Program of Madagascar is still on stand by due to the political situation in the country. • SMEs weak compliance to international standards • Poor education of the local population impeding them from getting jobs and offering services to the Oil companies • Land access remains difficult to foreign investors for agribusiness or biofuels projects (but this could be an asset for better monitoring at the national level and assure proper benefits to local populations)

Opportunities	Threats
• Experience of oil and gas companies in other regions • Sector development is the early stages, therefore, giving the government the opportunity to fill in the sector management gaps • Commitment to EITI process • Signatory of the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (The "Nairobi Convention", 1985).	• In-migration of workforce • Unidentified impacts of offshore explorations on Marine ecosystems • Creates very few jobs at local level • Vulnerability of fuel and LPG infrastructure to Climate Change • Application of all the development strategy papers have been placed on hold • Population in the coastal zone is very poor.

8. Bibliography

(1) Ullenberg A. / GTZ, 2009, « Jatropha à Madagascar : Rapport sur l'état actuel du secteur », 46 p.

(2) ONE, 2009, "GUIDE POUR L'ELABORATION D'UNE ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL (EIES) DU SECTEUR AGROCARBURANT », presentation to the « atelier plateforme agrocarburant durable »

(3) ITOPF 2010 country profile : Madagascar 2 p.

(4) GOM/ Décret MECIE, Décret n°99-954 du 15 décembre 1999 modifié par le décret n°2004-167 du 03 février 2004 relatif à la mise en compatibilité des investissements avec l'environnement (MECIE)

9. List of datasets / 10. List of sector related projects

Madagascar Action Plan 2007-2011 - http://siteresources.worldbank.org/INTMADAGASCARINFRENCH/Resources/MAPFrench.pdf

Oil for Development Annual report 2009 - http://www.norad.no/en/Thematic+areas/Energy/Oil+for+Development/Oil+for+Development.127154.cms?show=all

ITOPF country profile: Madagascar - http://www.itopf.com/information-services/country-profiles/individual.html#klist

Exxon Corporate citizenship report - http://www.exxonmobil.com/Corporate/files/Corporate/community_ccr_2007.pdf

Fiche de Synthèse : l'exploration pétrolière - http://www.fimfrance.com/_repository/files/2007-01_FS_exploration_petroliere.PDF

Madagascar EITI Reports - http://www.mines.gov.mg/eiti/

Downstream Act Law - http://www.omh.mg/index.php?idm=2&CL=txtvig

Licensees Listing - http://www.omh.mg/index.php?idm=3&CL=titlic

Distribution Routes Map - http://www.omh.mg/index.php?idm=2&CL=guid#4

Total - http://www.total.mg/os/osmadagasikara.nsf/VS_OPM/E3ED1DD7C7F1B98CC12574F3004F80C7?OpenDocument

Galana - http://www.galana.com/index.html

Jovenna - http://www.jovenna.mg/

Shell - http://www.shell.com/home/content/footer/about_this_site/contact/contact_madagascar.html

Strategie nationale gestion des pollutions - http://www.meeft.gov.mg/index.php?option=com_docman&task=cat_view&gid=78&Itemid=74

Etat des lieux au niveau National, dans le domaine biologique, écologique, socio-économique, politique, légal et institutionnel à Madagascar - http://www.amp-coi.org/fileadmin/files/documents/Madagascar/Rapport_final2.pdf

Loi n° 2005-019 fixant les principes régissant le statut des terres - http://www.sif-mada.com/pdf/LOI%20CADRE%202005-019.pdf

LOI n °2006 - 031 fixant le régime juridique de la propriété foncière privée non titre - http://www.droit-afrique.com/images/textes/Madagascar/Mada%20-%20Propriete%20fonciere%20privee%20non%20titree.pdf

MECIE/ONE - http://www.pnae.mg/ee/ref/txt_nat/txt_nat_sect.htm

Ministry of Mines and Energy - http://www.mem.gov.mg/

National Mine and Strategical Industries Office - http://www.omnis-madagascar.mg/

Malagasy Office of Hydrocarbons - http://www.omh.mg/index.php?idm=6&CL=annsect

Ministry of Environment and Forests - http://www.meeft.gov.mg/

National Office of Environment - http://www.pnae.mg/

Ministry of Decentralization and Land Planning - http://www.mprdat.gov.mg/

EITI - http://eiti.org/fr/madagascar

Total - http://www.total.mg/os/osmadagasikara.nsf/VS_OPM/E3ED1DD7C7F1B98CC12574F3004F80C7?OpenDocument

WWF/Oil for development - http://madagascar.panda.org/ourwork/footprint/footprintprojects/oil_for_development/

Madagascar Oil - http://www.madagascaroil.com/index.php

Regional Coastal Management Programme of the Indian Ocean Countries - http://recomap-io.org/integrated_coastal_zone_management/iczm-country-updates/

Western Indian Ocean Marine Highway Development and Coastal and Marine Contamination Prevention Project - http://gefonline.org/projectDetailsSQL.cfm?projID=2098

Programme for the Agulhas and Somali Current Large Marine Ecosystems: Agulhas and Somali Current Large Marine Ecosystems Project (ASCLMEs) - http://gefonline.org/projectDetailsSQL.cfm?projID=1462

Addressing Land-based Activities in the Western Indian Ocean (WIO-LaB) - http://gefonline.org/projectDetailsSQL.cfm?projID=1247

Development and Protection of the Coastal and Marine Environment in Sub-Saharan Africa - http://gefonline.org/projectDetailsSQL.cfm?projID=849

Strategic Partnership for a Sustainable Fisheries Investment Fund in the Large Marine Ecosystems of Sub-Saharan Africa (Tranche 1, Installment 1) - http://gefonline.org/projectDetailsSQL.cfm?projID=2093

Regional Activities of the Strategic Partnership for a Sustainable Fisheries Investment Fund in the Large Marine Ecosystems of Sub Saharan Africa, Tranche 1 - http://gefonline.org/projectDetailsSQL.cfm?projID=3271

NORAD / Oil for Development - http://www.norad.no/en/Thematic+areas/Energy/Oil+for+Development/Oil+for+Development.127154.cms

Madagascar Third Environment Program Support Project - http://web.worldbank.org/external/projects/main?pagePK=64283627&piPK=73230&theSitePK=356352&menuPK=356384&Projectid=P074236

Western Indian Ocean Islands Oil Spill Contingency Planning - http://gefonline.org/projectDetailsSQL.cfm?projID=533

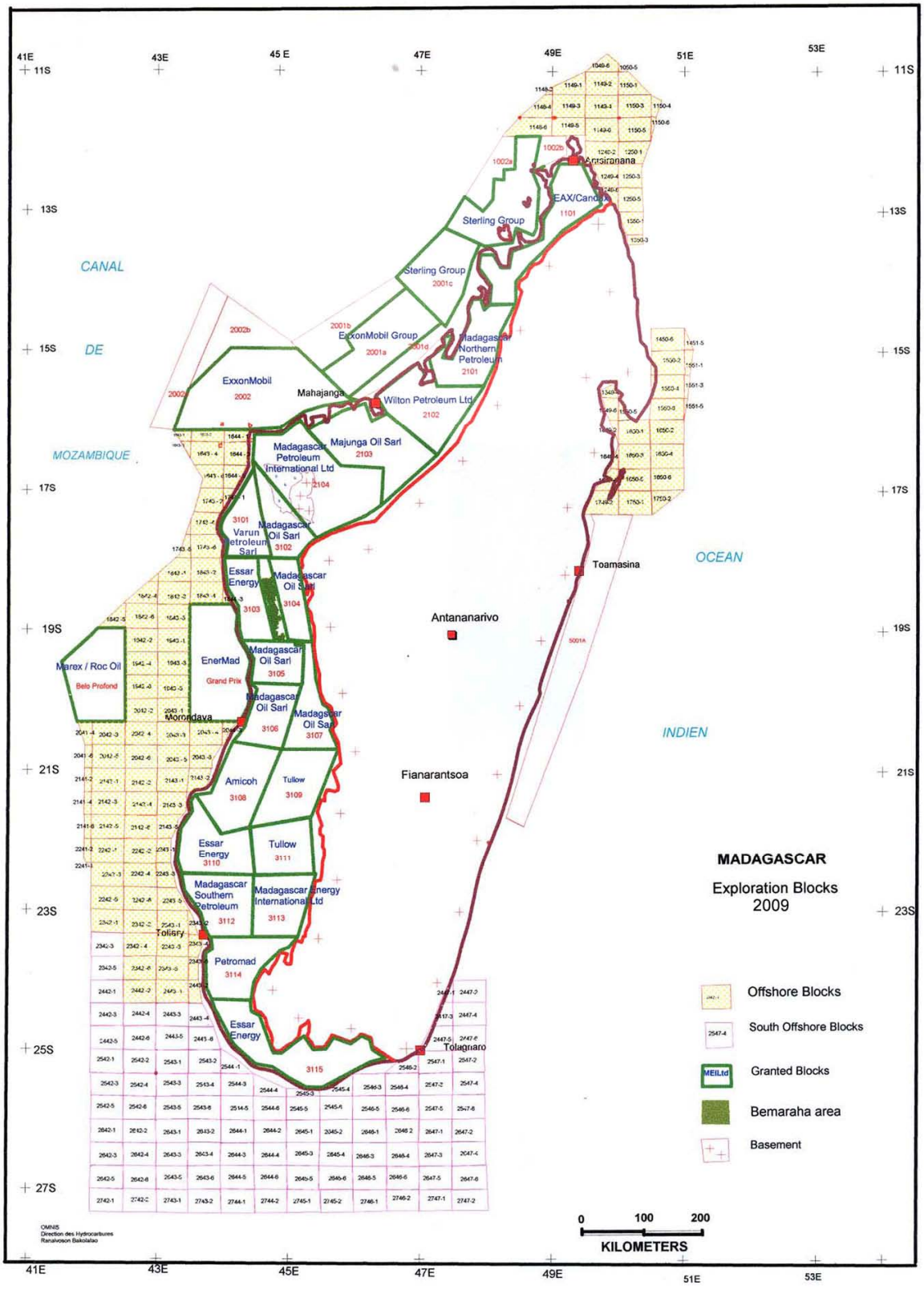
Demonstrating and Capturing Best Practices and Technologies for the Reduction of Land-sourced Impacts Resulting from Coastal Tourism - http://gefonline.org/projectDetailsSQL.cfm?projID=2129

Annex 1
Activities and "key players" in the Malagasy Oil and Gas sector

Activity / infrastructure	Company name	Company structure	Location	Production (per year) / storage capacity	Status / programmed development	Comments
Storage (and former refinery)	Galana Raffinerie Terminal (GRT)	80% private, 20% State owned	Tomoasina port	260,000 m3		
Storage	Total	Private		1 gas center, 14 storages for planes		
Storage	LOGISTIQUE PETROLIERE S.A,	Private (Socamad, Total, Shell) & State		Licensed for oil and gas storage, oil and gas transportation (land and maritime)		Licences delivered in 2000 for 10 to 15 years
Storage Gas	Vitogaz	Private	Majunga Antananarivo	Total capacity 2.850 Tonnes		
Retail	Total	Private (French)	61 gas stations (17 on the coast)			
	Galana Distribution Pétrolière (GDP)	70% private, 30% State owned	63 gas stations (15 on the coast)			
	Jovenna	Private	67 gas stations (18 on the coast)			
	Société Malgache des Pétroles Shell (SMPS)	Private (Shell)				
Exploration	***See Map***					

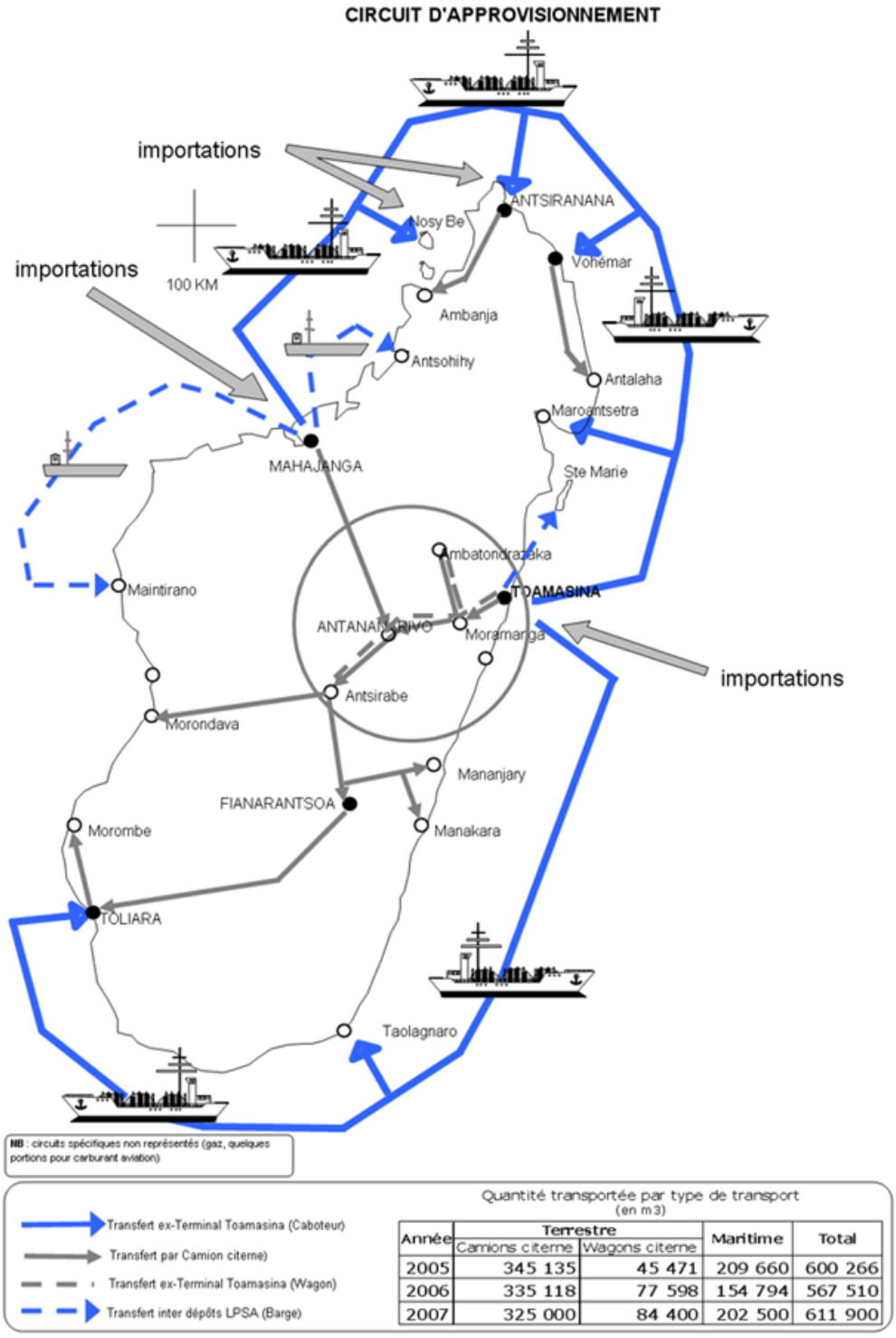
Map of Exploration blocks

(OMNIS website : http://www.omnis-madagascar.mg/exploration_block.html)



Map of Distribution routes

(OMH website http://www.omh.mg/index.php?idm=2&CL=guid#4)



Quantité transportée par type de transport (en m3)

Année	Terrestre		Maritime	Total
	Camions citerne	Wagons citerne		
2005	345 135	45 471	209 660	600 266
2006	335 118	77 598	154 794	567 510
2007	325 000	84 400	202 500	611 900

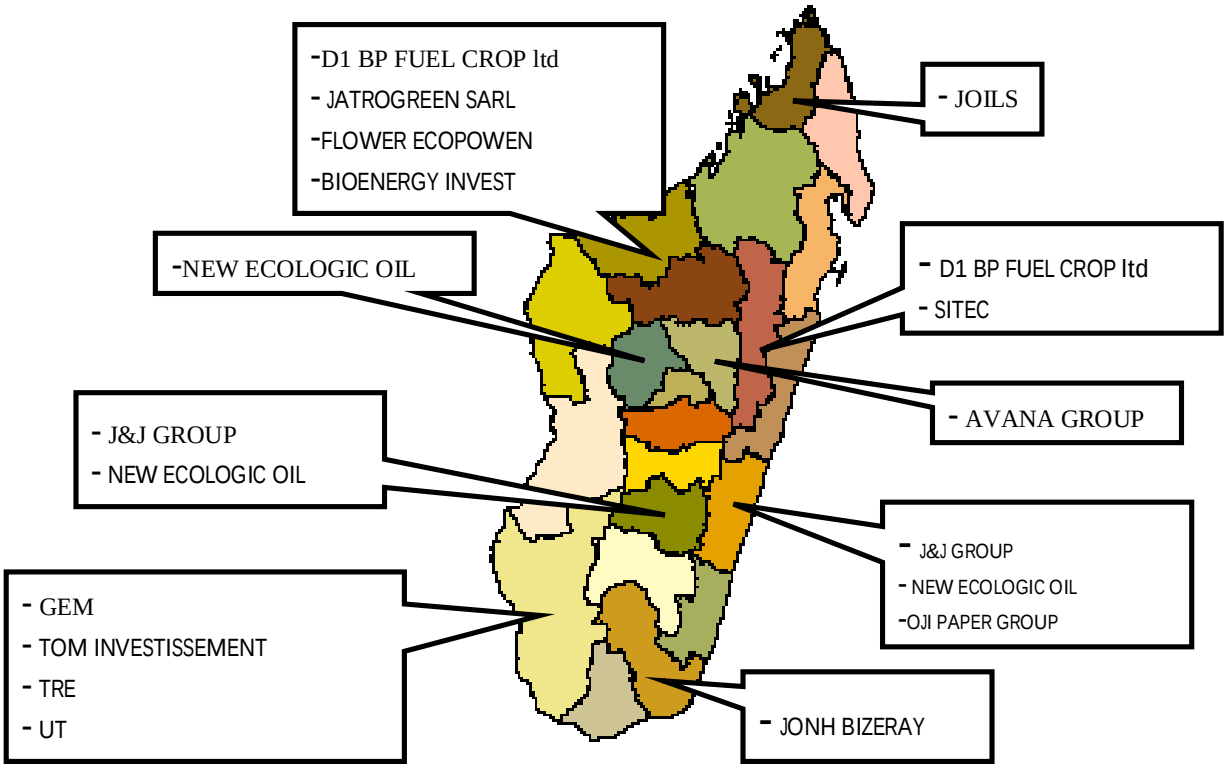
Annex 2
Jatropha projects in Madagascar
(From Ullenberg A. 2009 "Jatropha à Madagascar : Rapport sur l'état actuel du secteur")

Investor / project	Location	Surface	Comments
Green Energy Madagascar (GEM) British company	Southern Madagascar (Tolagnaro, Tuléar) Mainly along RN7, areas previously used for cotton, corn and millet	Claim to have rented 425,000 Ha About 55,000 Ha planted in 2009	Plantation started in 2005, cultivation of both Jatropha Mahafalensis (local endemic) and Jatropha Curcas
JatoGreen SARL Joint venture Jatrosolutions (German) and GreenIslandMadagascar (Malagasy)	Hte Matsiatra, West Ambalavao	3,000 Ha forecasted, 1,000 Ha planted in 2009	
JSL Biofuels Joint venture German / Malagasy, promoted by British NGO GEXSI	Analavory (Bongolava region) Boeny region, nortern Ankarafantsika National Park	Support to 300 Ha plantation Claim to have rented large scale areas 20 Ha planted in 2008	Uncertain validity of large scale area rented (for more than 500 Ha, should be a decision at the "Ministers council" level) Project suspended in 2009 due to lack of financing
Projet Delta Jatropha Madagascar (PDJM) Italian company Delta Petroli with Catholic church (ECAR)	Sofia Region	Target of 30,000 Ha About 100 Ha planted in 2009, in 4 pilot projects	Planned investment of Eur. 50 millions with 50 millions of Jatropha plants Carbon credits through MDP forecasted
Eco Regional Initiative (ERI) USAID support at farm level	Andringitra-Ranomafana corridor (Fianarantsoa) Andasibe-Zahamena corridor (Tomoasina)	ERI Fianarantsoa : 600 Ha ERI Tomoasina : 80 Ha	Aims at improving socio-economic situation and cultivation system
Programme de Lutte anti-érosive (PLAE) Support by KFW and Ministry of agriculture	Marovoy (Boeny region) Soavina (Amoron'I Mania region) Bezaha (Tuléar) Andapa (Sava), and Ambanja (Diana) started in 2008	15,000 plants cultivated About 30,000 plants cultivated	Aims at developing Jatropha for anti erosion purposes and additional income at the farm level
Bio Energy Limited (BEL) Backed by Austalian company	Analalava (Sofia)	Large scale plantation, 2,000 Ha planned in 2009 (but not realised)	Suspended because of political crisis
New Ecological Oil (NEO) French company involved in bio energies	North Tsironomandidy (Bongolava)	5 farms, for 30,000 Ha 4 Ha planted in 2008	Suspended because of political crisis
NOTS renewable energy B.V. Dutch company	North-west Maevatanana (Betsiboka)	Pilot plantation on 80 Ha	Suspended because of political crisis
J-oils French company	Diana region	Large scale plantation planned 20 Ha to be planted in 2008 / 2009	Suspended because of political crisis
Avana group Malagasy company involved	Bongolava region	Planned 5- 10,000 Ha from the 27,000 Ha	Actual implementation unknown

in mining activities, collaboration with PROJER project		contracted by PROJER	
Bio Energy Invest	Boeny region	2,000 Ha rented, Pilot plantation on 130 Ha unsuccessful (survival rate less than 1%)	Seeking investors for the large scale plantation
Global biofuels Lebanese company	Boeny and Sofia regions	Large scale plantations planned	No precise available data
Tezzo renewable Energy (TRE) Italian company	Atsimo Andrefana region	Still seeking for land	Suspended because of political crisis
D1 BP Fuel crop limited		20,000 Ha planned through "contract farming" with 1,500 local farmers	Canceled
Flora Ecopower German Holding	Boeny		Canceled in 2009 due to economic crisis
Oji Paper Group Japanese company		30,000 ha planned	Canceled, Project shifted to tree plantation (Acacia and Eucalyptus) and wood ships production
TOM Investment Subsidiary of Israeli mining group MMF	Atsimo Andrefana	500 Ha planted in 2006	Canceled in 2008

Annex 3
Map of the officially registered biofuels projects in Madagascar

(From the presentation "GUIDE POUR L'ELABORATION D'UNE ETUDE D'IMPACT ENVIRONNEMENTAL ET SOCIAL (EIES) DU SECTEUR AGROCARBURANT » ONE 2009, atelier plateforme agrocarburant durable)



VI. Ports and Coastal Transport - Prepared by Professor Gavin Maasdorp,

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1. Overview

Madagascar is an island state in the Indian Ocean, being separated from the mainland by the Mozambique Channel which is approximately 400 km wide at its narrowest point. The island is a maximum of about 1,700 km from north to south and 600 km from east to west, with a total area of 587,041 square km.

The interior of the island is very mountainous and the transport infrastructure is poorly developed, creating difficulties for economic development. In addition, the location of the country makes it prone to periodic intense monsoon and hurricane damage that has wreaked havoc with railways, ports and buildings over the years. There are 883 km of 1,000 mm-gauge railway lines (in two separate systems) and about 50,000 km of roads of which about 5,800 are paved. There are four large airports (Antananarivo, Mahajanga, Taomasina and Nossi-Be) and 200 small airfields (57 open to public) used for domestic movements due to difficulties of the terrain.

The population of approximately 15 million are poor and mainly dependent on small-scale agriculture for subsistence. There are mineral deposits in several areas but, due to the abovementioned factors, there has been minimal exploitation to date.

The coastal populations are dependent on the ports for communications, supplies and the export of agricultural produce, handicrafts and fisheries. Tourism is a major source of income, and the island has benefited from the extensive flora and unique animal species as eco-tourism attractions.

2. Extent of Ports and Transport Activities

The ports of Madagascar are described in this section, clockwise in succession from the south-western end of the island**.**

Toliara

The port of Toliara is located at the south-western corner of Madagascar on the Saint-Augustin Bay facing the Mozambique Channel. The surrounding area is drained by the Tsiribihina, Mangoky, and Onilahy rivers, as well as by many smaller streams that flow directly to the coast. The port serves as the outlet for the agricultural products of the hinterland, and also ships fish and marine products.

The town has facilities for processing sisal, soap production, and processing food products. There is a livestock-breeding station and an agricultural experiment station. Cattle are raised, and rice and other crops are grown. There are deposits of coal, mica, copper, heavy mineral sands, and gold; and there is some lumbering in the south-east. The area is a tourist destination with beaches and resort centres lining the northern and south-eastern parts of the coast.

Mahajanga

Mahajanga (population 136,000 in 2005) is a seaport located on the Betsiboka River, which empties into Bombetoka Bay. The port is the most important in Madagascar after Toamasina. The marine terminal accommodates container ships and small (150 gross tons) general cargo freighters. Because of limited water depth at the wharf, only small ships can call at the terminal. Deeper-draft ships anchor offshore, and transfer cargoes to and from barges which move to and from the terminal.

In December 2006, a cyclone caused significant damage to the port facilities and to some buildings located near the coast. The storms damaged the pavement of the piers, allowing water to flow in and wash backfill out from under the terminal's concrete deck. The resulting collapse of pavement blocks has made operations at the terminal less efficient and reduced the storage space available.

The port serves mainly as a transhipment port; the major export is containerised frozen shrimp, which is the product of the local fishing industry. Industries in Mahajanga include the processing of agricultural products, meat canning, and the manufacture of soap, sugar, and cement. In the surrounding areas coffee, rice, sugarcane, cashew nuts, cassava, cotton, and raffia palms are cultivated, and cattle raising and hardwood lumbering are important economic activities.

Mahajanga is a popular tourist destination for both Malagasy and international tourists, with beautiful beaches, a boardwalk and eight months of hot yet virtually rain-free weather. Mahajanga is linked by road with Antsiranana and with the national capital, Antananarivo, about 550 km to the south-southeast. Roads are reportedly bad and not suitable for commercial trucking. The town has an international airport with regional flights to the Comoros and Mayotte.

Antsiranana

The port of Antsiranana is situated in a large bay on the north-east coast, and is sometimes described as one of the best natural harbours in the world. Antsiranana was at one time primarily a naval base but has now become a busy commercial port.

Ship construction and repair is a major activity. The Secren which is one of the best -developed shipyards of Indian Ocean is located in Antsiranana. Fishing is also an important industry in this part of Madagascar. Zebu horns and shells of sea turtle are used in making handicrafts. Other local industries are hardwood lumbering and salt production. The north-western part of the Antsiranana region has very fertile land on which vanilla, tropical fruits, vegetables, sugarcane and cotton are grown.

Toamasina

Taomasina, (formerly Toamasina) is the chief seaport of Madagascar, situated on the north-eastern coast at 18:10 South, 49:32 East. The town had a population of 179,000 in 2001. The port is protected by a coral reef forming a large harbour that can be entered by two separate channels. The town of Taomasina is built on the peninsula which projects at right angles to the general coastline.

Toamasina is connected by rail with Antananarivo, the capital. The railway company “Madarail” is a registered private company based in Antananarivo, with a 25-year concession from the

government to operate the northern railway network. Operations started in July 2003. The total network of 673 km is divided into three main sections: the TCE line (from the port to the capital); the TA line (from the capital south to Antsirabe); and the MLA line (Moramanga north to the Lake Alaotra area).

Madarail carries 94% of the rail freight and 86% of the passenger rail traffic of the country. The network is entirely single track, metre gauge with a maximum axle load of 16 tons. The network operated by Madarail connects the strategic points between Antananarivo and the industrialised region of Antsirabe. The TCE line has been upgraded, and five new locomotives were commissioned in 2007. The Moramanga-Lac Alaotra line connects the chrome mining and smelting plant and one of the major rice bowls of the island to the main rail network. In 2008, the transport by rail of commercial and consumer goods such as cement, foods and building materials and containers accounted for 45% of total tonnage; the transport of hydrocarbon fuels 23%, and chrome haulage for 32%.

Toamasina exports sugar, coffee, cloves, and rice. Food processing is the chief industry. The port system has essentially been undeveloped since independence in 1960, though in some areas the private sector has begun to manage port facilities. Imports include manufactured goods, vehicles, fuel and foodstuffs. The port is served by a range of shipping lines including Maersk and Japanese lines.

Solima (Solitany Malagasy) refinery is located at this port. Solima controls the import of crude and bulk fuels and also purchases from oil companies to supply the shipping industry. Imports of bitumen, bunkers, base oils and LPG are administered by the private sector. Solima carries out distribution and marketing of fuel products.

To the south of Taomasina there is a chain of sweetwater lakes and lagoons parallel to the coast, separated by a narrow stretch of land. The lake-canal system called “Canal des Pangalanes” consists of natural lakes connected by a man-made canal system that forms an inland waterway from just south of Toamasina through to Farafangana, making it the longest canal in the world, covering a distance of 600km. The canal was constructed during the early French colonial years of 1896-1904, and still dominates daily life in this region as it provides the main source of trade, transport and travel. Ferry services are also a major factor in promoting the tourism potential of the area.

Manakara

The small port of Manakara serves the well-developed town and, due to proximity and good road and rail connections, is important both to the city of Fianarantsoa, about 80 km inland and to the tourist industry and agricultural developments along the canal system. The railway line runs from Manakara to Fianarantsoa which is located on the central highway that runs the length of the island from Antsiranana to Toliara, with branches to Mahajanga and Taomasina.

Ehoala (Tolanaro, Port Dauphin)

Port Dauphin has recently been upgraded by construction of the new deepwater port of Ehoala which has a maximum draught of 15.75 metres protected by a 625 metre-long breakwater. The single quay comprises three berths – a 275 metre primary berth dredged to 15.75 metre; a 150 metre secondary berth dredged to 8 metre which can accommodate several types of ships; and a 75 metre long third berth.

The port has a secure yard for storing containers and break-bulk cargo, including power points for reefer containers, a large ilmenite storage shed, two warehouses for general cargo storage, and an adjacent 400 ha industrial zone with ample supplies of water and electricity. The port management company is a wholly-owned subsidiary of Rio Tinto.

There is reported interest in mining an estimated 100 million tons of bauxite located near Manantenina which is approximately 100 km north-east of Tolanaro, but the primary purpose of the port upgrade is to handle bulk ilmenite exports mined in the region by Rio Tinto. However, the port will also provide a public service to the community in southern Madagascar. Important, too, because of Madagascar's strategic position astride busy sea lanes linking the Far East with Africa and South America, Ehoala can play a role in serving the growing market for sea traffic in the Indian Ocean.

Ehoala port has been financed and developed jointly by the Rio Tinto mining group (USD 240 million) and the Malagasy State (USD 35 million) through a World Bank-funded project aimed at developing the Anosy region of southern Madagascar. The port complies fully with ISPS Code certification.

The port and mining development has changed the population and largely destroyed the tourist industry in the area by absorbing all the accommodation. The economy was formerly basic, relying on fishing and some limited mining of sapphires. The influx of foreigners has caused some social upheaval, brought increasing exposure to threats such as HIV and TB, and posed severe challenges for the local government administration.

3. Policy and Governance of Ports and Transport

Government involvement in the transport systems has been characterised by a strong nationalisation ethic that, because of capital constraints and pressures for performance, has reluctantly given way to private-sector involvement. Ports have been modernised, the road system has been upgraded and the rail system restored through international aid and the involvement of private contractors.

The political instability of the central government and the remoteness of some sections of the country have also tended to promote local organisation and management of the transport systems. In this regard all the ports have been essential links to the outside world and between centres within the country.

4. Planning and Management of Ports

The port of Taomasina is managed by the Ministry of Transport, but operations have been contracted to Madagascar International Container Terminal Services (MICTS), a subsidiary of a Philippine company. Mahajanga is managed by Majunga Port Authority, Antsiranana by the Port St Louis Port Authority, and the other ports by port-specific local authorities.

5. Development and Trade

Agriculture, fishing and forestry are the main occupations of the island and are the backbone of the economy. The main exports are vanilla, coffee, sugarcane, cloves, cocoa, rice, cassava (tapioca), beans, bananas, peanuts, timber and livestock products. Madagascar is now responsible

for 97% of the world's vanilla bean production. (Rasoanaivo P et al; in Wikipedia). The product has historically been based on its importance for the production of Coca-Cola. When Coca-cola switched to New Coke in 1985, which involved less vanilla, the economy declined dramatically and only partly recovered after the introduction of Coke Classic. Current prices for the product are so low that whole areas of small producers are suffering intense poverty despite the use of child labour and efforts to market the product elsewhere.

The main growth sectors are tourism, textile and light manufacturing industries in the EPZs located around Antananarivo and Antsirabe, mining and agriculture. The tourism industry is primarily based on the eco-tourism market, making the most of on Madagascar's unspoiled national parks and other natural areas, and unique animal species such as lemurs and pangolins. On the environmental side, the country has been criticised for logging indigenous rain forests on steep mountain sides, but economic deprivation is forcing the exploitation of the timber for export. A small but growing part of the economy is based on the mining of chrome and lately ilmenite. Several major projects are underway in the mining, oil and gas sectors that, if successful, will give a significant boost to the economy. These developments include coal mines at Sakoa and nickel mines near Toamasina. Madagascar Oil is developing the massive onshore heavy oilfield at Tsimiroro and ultra-heavy oilfield at Bemolanga.

6. Ports Impact and Benefits to Coastal Communities

The main ports are also the centres of population in the districts as the fishing industry, tourism and export processing are all port-related activities. Nearly all deepsea imports and exports are handled through the ports of Taomasina and Antsiranana, but the distribution of goods also takes place to the other ports by sea.

The ports each have a different character and focus, but are central to the life of the coastal areas due to the difficulty of inland movement, apart from the central major road network. On the west coast the ports provide the base for ferry activities between coastal villages and are used to move products to market. The Pangalanes canal provides an alternative to sea transport along the east coast on the sections that are still fully functional.

There appears to be limited opportunity for creating greater benefits for the population from use of the sea, as the limitations of capital and market size supports the artisanal fishery, but there are no indications of any scope for creating whole new industries from the ocean resources. The potential for industrial development in the coastal areas is to forge linkages with the mining of several minerals, coal and oil.

7. SWOT Analysis

Strengths	**Weaknesses**
• Unexploited mineral reserves. • Gradual increase in manufacturing activity. • Location on major shipping corridor. • Access to large expanse of ocean.	• Political instability. • Some ethnic tensions.
Opportunities	**Threats**
• Development of mining in several areas, with relevant port developments. • Increased general cargo traffic through Port Ehoala. • Potential for 100 million-ton bauxite mine within reach of Port Ehoala.	• Damage from cyclones and tsunamis.

8. Information Sources

Wikipedia - P. Rasoanaivo et al. “Essential oils of economic value in Madagascar: Present state of knowledge”. HerbalGram 43:31–39,58–59. (1998)

VII. Coastal Mining - Prepared by Mr. Thomas Cushman,

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1. Introduction

Madagascar or the Republic of Madagascar is an impoverished island nation in the Indian Ocean off the south east coast of Africa and separated from Africa by the Mozambique Channel. Madagascar, the world's 4th largest island, has a surface of 587,540 km2 and is 1600 km long from North to South and 500 km wide from East to West. Formerly an independent kingdom, Madagascar became a French colony in 1896 and achieved independence from France in 1960. The capital of Madagascar is Antananarivo. The legal system is inherited from the French and based on the Napoleonic system. The official languages of Madagascar are Malagasy and French.

Madagascar has had several abrupt changes in government, the most recent coming in March 2009. Since March 2009 Madagascar has been isolated by the international community and suspended from the AU and SADC. The major international donors have suspended all forms of assistance other than humanitarian aid .

Map: Coastal Mining activities in Madagascar

2. Mining Sector Overview

Madagascar had a mining industry during the French colonial period but during the Malagasy socialist era (1974- 1991) it had been nationalized and poorly managed with most mines closing. Madagascar had been well known as a source of precious stones during the colonial period. By 1991 the Kroma ferrochrome mine and several artisanal gem mines were all that remained of the industry.

A new mining code in 1998 and assistance in sector development by the World Bank's Mining Sector Reform Project (MSRP) led to renewed mining interest in Madagascar with many junior mining companies arriving to prospect. Two large mining projects had been prospected during the 1990s and completion of feasibility and financing studies led to decision to develop the QMM ilmenite and Ambatovy nickel-cobalt mines. These two projects with an investment of over $5.5 billion were the most significant investment ever in Madagascar. Artisanal gem and gold mining had been an important source of income for rural populations since the 1970s. Important discoveries of sapphire and ruby in the 1990s led to rushes in several remote previously nearly uninhabited areas of Madagascar. By 2000 up to 500,000, often part time, artisanal miners were searching for gold and precious stones.

Since the 2009, investment in mining declined precipitously while at the same time the government suspended the issuance of new mining permits. A few junior companies are still prospecting in Madagascar but most mining companies are waiting until a new internationally recognized government is installed.

Mineral production in Madagascar contributes less than 1% to the GDP but the expenditures for the QMM and Ambatovy mine construction have been the country's largest source of hard currency.

2.1 Coastal Mining Characteristics

QMM, a partnership between Qit Minerals Madagascar (a whole owned subsidiary of Rio Tinto, the world's second largest mining company) and the Government of Madagascar, began construction in 2005 of an ilmenite (titanium oxide) mine near Ft. Dauphin, the southernmost city in Madagascar. The mine opened in 2009 and the first export of ilmenite from the QMM mines was made to the refinery in Quebec, Canada in December 2009. Two more exports have been made in the first half of 2010 and full production (750,000 tons/yr) is expected to begin in 2011. QMM built substantial infrastructure to be able to exploit the resource (a new port, roads, water distribution and electricity generation plant) and spent several years working with the local community to mitigate negative impacts of the mine.

Ambatovy, a partnership between Sherritt International Corp, Sumitomo Corp, Korea Resources Corp and Snc-Lavalin Group Inc, began construction of what will be the world's largest laterite nickel-cobalt mine in 2008. The mine site is 100 km inland at an elevation over 700 meters. The nickel-cobalt ore will be mixed with water and the slurry transported by pipeline to the refinery on the coast near the port city of Toamasina. Construction is expected to be completed by 2011 and mining to commence in 2011. Ambatovy improved the port of Toamasina to be able to ship the refined nickel abroad. Ambatovy also built roads and electric generation in the Toamasina region.

Toliara Sands in the Southwest and the Soalala Iron in the Northwest are also coastal mining projects. Both are in the study phase and no dates for construction or production have been announced. The Toliara Sands project is an investment by a South African-Australian group and Soalala Iron is an investment by Wuhan Iron and Steel Co a state owned Chinese company.

A limestone mine near the port city of Toliara is planned but no permits have been awarded or dates for construction announced.

Coastal mining activity	Company name	Production	Mining method	Production capacity (per year)	Stage of the project/status	Market
QMM Project	QMM (Qit Madagascar Mineral Society) : QMM subsidiary of Rio Tinto (80%) and OMNIS (Office des Mines Nationales et des Industries Stratégiques) - Madagascar (20%)	Ilmenite and Zircon	Dredge	Expected production of 750,000 tons of ilmenite and 60,000 tons of Zircon	Production started in 2009	Export: Québec
Ambatovy Project	AMSA (Ambatovy Minerals SA): Sherritt International Corporation (40%), SNC Lavalin (5%), and Sumitono and Korea Resources own 27,5% each	Nickel, Cobalt	Open-pit mine	Production target of 60,000 tons of nickel, and 5,600 tons of cobalt per annum by 2012	Construction of infrastructures (Mine site, pipeline, refinery) The first production is expected to start in 2011	Export : Asia

2.2 Coastal Mining Project Benefits

Name of Mine	Location	Economic effect in %	Employment	Economic Benefits	
				National level	Micro-level
QMM Project	Tolagnaro	109 000 tons of total products (Ilmenite and Zircon) exported	***Construction phase*** 4460 direct jobs and 1500 indirect jobs ***Operation phase*** 600 direct jobs and 1500 indirect jobs	• Investment of $940 million with 40 years life span. • $11 million of duties and taxes paid to the government. • $ 100 million for local spending on contractors, wages, purchases and services	• Employment • Training for local employees: (476 Malagasy workforce trained) • Corporate and social responsibility undertaken by QMM
Ambatovy Project	Moramanga - Toamasina	Under Construction	***Construction phase***: A total of 11,000 direct and indirect jobs created. The production phase is expected to start in 2011	• Investment of $ 4.5 billion with 25 years life span. • Roads construction and rehabilitation • Market construction in Toamasina. • By-pass construction connecting the plant to the port. • Extension of the Mole B of the Toamasina Port • Royalties and taxes	• Employment • Training for laborers • Micro-projects undertaken by Ambatovy to support local communities.

3. Environmental Issues

Madagascar is known as a biodiversity hotspot with 90% of its species endemic. Madagascar has a large international environmental NGO community and these NGOs and international donors have assisted the government of Madagascar in creating well written and strong environmental regulations. Mining companies must submit environmental impact reduction plans to the Mines Ministry in order to obtain a prospecting license and a detailed EIA to the Office National de Environment (ONE) in order to receive an exploitation permit.

Name of Mine	Environmental issues
QMM Project	• Deforestation, water supply, and any other activities in the process of extraction of mineral sands have a negative impact on the environment especially on the existing flora and fauna. • The refinery is exposed to the risk of spread of dust and radioactivity. • The use of a quantity of groundwater (14 000 m3 a day) from Ambavarano Lake could cause a imbalance of the ecosystem in the lake.
Ambatovy Project	• The tailings disposal is the main environmental issue of the Ambatovy project. The deposit of toxic and chemical tailings may have dangerous effect on the environment in case of natural disasters such as a cyclone. • The treatment plant will emit gases SO2, NOx, particulates, NH3 and greenhouse gas emissions. • Noise disturbance caused by the plant • Degradation of the air quality at ground level in the processing plant and the refinery. • Risk of destruction of flora and fauna in the construction area.

4. Human Environment

4.1 Socioeconomic Indicators

Social indicator	Madagascar
Social indicators	
Total population	20, 653,556
Population growth rate	3%
Economical indicators	
GDP (2009)	$8.551 billion
GDP per capita	$414
GDP (growth rate in 2009)	-1%
Population below poverty line	50%

4.2 Corporate and Social Responsibility of the Coastal Mining Project Company

Coastal Mining Activity	Corporate and social responsibility (CSR) – or Social benefits from the coastal mining activity
QMM Project	***Enterprise development***: QMM is working in partnership with local and regional government and NGOs help small and medium sized enterprises. The project gives technical and managerial assistance in order to help them to win contracts with other companies – locally, regionally or nationally. *Integrated Development Plan (IDP):* QMM launched its own IDP after many negotiations with local communities who have to leave their habitat for the construction of the port. The IDP has been operational since 2002, and includes: • Eco-tourism and other income generating activities;

- Improved agriculture;
- Community based natural resource management activities;
- Plantations;
- Improved fishing practices;
- Restoration and conservation zone management;
- Improved education and community health services;
- Adult literacy programs;
- Sexually transmitted infections and HIV/AIDS prevention programs.

Micro finance initiatives:

QMM is stimulating the local economy (in partnership with local authorities, PIC and NGOs) through the creation of support structures such as the Anosy Business Centre (ABC), a micro-finance institution (IFRA) and a local training centre (CFPTA).

A fully fledged micro finance program under the leadership of International de Crédit Agricole Rural (ICAR) and the Anosy Region Financial Institution (IFRA) is accessible to 16,000 customers. Target customers include all the craftsmen, shopkeepers, farmers, small contractors and salaried employees who could not engage with the formal banking sector.

When ICAR sought to raise US$90,000 from the private sector, QMM bought 50 shares in IFRA, equivalent to around US$25,000 of this total, and then brought together its own suppliers and contractors to demonstrate to them the sustainable development value of participating in IFRA and the money was quickly raised. QMM has now donated its shares to local communities for future development.

Education programs:

QMM has established a vocational college, the Institut de Formation Professionnelle de L'Anosy, in the town of Fort-Dauphin. This college offers a number of courses in construction, mechanics, electronics, agriculture and geology. These all aim to train local people for jobs in the community and on the mine.

QMM has also built ten schools in a number of communities around Tolagnaro, investing $2.6m on education initiatives before the mine was even built. Much of the investment has been in rural primary schools, although company funding also enabled the establishment of a private high school of quality in the town of Fort-Dauphin. In addition, adult literacy programs are offered to local communities. It is QMM's aim to build local people's capacity so that everyone has the same opportunity to be involved**.**

Fagneva Program:

The Fagneva Program is a five-year community program initiated by Rio Tinto QMM. It is implemented in close cooperation with Government representatives at the local level, community representatives and other development actors in the region.

Rio Tinto QMM has worked out this program within the scope of its voluntary contribution to the sustainable development of Tolagnaro. The program is based on the regional stakes defined in the Regional Development Outline (SDR). It is also consistent with various partners planning documents: Urban Master Plan (PUDi), Regional Development Plan, Communal Development Plan.

Health:

Working with world-renowned authorities and with the support of the government agency

	(CNLS), QMM implemented a comprehensive workforce and community HIV/AIDS education and prevention program including: • Peer educator training; • Voluntary Counseling and Testing (VCT) campaigns; • Community education (through radio, Cinèmobile and industrial theatre); • Partnership with other NGOs active in the field (including USAID, UNICEF, International HIV/AIDS Alliance, GTZ, Population Services International, ASOS and the National HIV/AIDS Prevention Committee). A malaria prevention program also operates in collaboration with ISOS to biologically control the mosquito presence through spreading and distribution of impregnated bed nets.
Ambatovy Project	***Local Resource Development Initiative (LRDI)***: The project helps to improve the skills of the local labor pool; to support and strengthen local businesses; and to minimize the import of products. The LRDI has registered 25,000 job seekers and created a databank to assist subcontractors in recruiting locally. In 2009, 95% of construction-related labor has been provided by local personnel; 3,627 workers successfully completed the basic construction skills training program. More than 88% of those trained have been hired by the Project. A longer-term training program is also being developed in partnership with Madagascar's Ministry of Higher Education and national technical schools. ***CAM "Central d'Achat de Madagascar"*** : From May 2007 to 2008, the project established the CAM to purchase local produce and foodstuffs for the meal requirements of employees working onsite. ***HIV/AIDS and STDs campaign at the Plant Site***: The project organized an animation program to celebrate the International HIV/AIDS Day with an other Project subcontractor companies on December 1st, 2009. Many discussions related to the topic of HIV were developed during the animation with a participation of the employees. ***Agricultural Training Centre of Betainomby***: Valued at approximately U.S. $ 80 000, the centre aims to strengthen the capacity of demobilized employees and other persons affected by the project which have already acquired or have experience in agriculture or breeding.

5. Policy and Governance

5.1 Policy and Legislation

Coastal Mining Regulations	Description – comments
Mining activities laws and regulations	• Mining Code and its implementing decree (Law 99-022 dated 19 august 2009 amended by law 2005-021 dated 17 October 2005 and Decree 2006-910 dated 19 December 2006 fixing conditions of application of law 2005-021 of 17 October 2005). • The LGIM (Law 2001-031 dated 8 October 2002 and Decree 2003-784 dated 8 January 2003) • Decree n º 2000-170 of 15 March 2000 fixing the conditions of application of law nº 99-022 of 19 August 1999 including the mining code.
Environmental regulations	• Environmental charter (Law no 90-033 of 21 December 1990 relating to the Environmental Charter, changed and supplemented by Laws no 97-012 of 6 June 1997 and no 2004-015 of 19 August 2004) • MECIE (Decree no 99-954 of 15 December 1999 amended by Decree no 2004-167 of 3 February 2004 relating to the compatibility of investments with environment) • Arrêté no 12032/2000 of 6 November 2000 related to the regulation of mining areas to environmental protection • Law no 96-025 of 30 September 1996 relating to the local management of renewable natural resources; • General guidelines for carrying out an environmental impact study; • Guidelines for conducting an environmental impact study on a mining project;
Coastal mining specific regulation	No specific regulation related to coastal mining activity

5.2 Governance

Entity	Responsibility/ Description
Ministry of Mine and Hydrocarbons	The Ministry of Mine and Hydrocarbons is responsible for the conception, management and implementation of the Government's policy for a sustainable development of the country through mining and hydrocarbons, in order to ensure conditions for economic growth and welfare of the population.
Mining Cadastre Office of Madagascar (BCMM)	The BCMM is responsible to i) Manage (register, educate, issue) permits and mining permits. ii) Manage the licenses granted. iii) Update cadastral maps mining. iv) Initiate proceedings for cancellation of permits as provided by the Mining Code and its regulations. v) Recover the costs of mining administration and transfer of their shares in the General Budget and Autonomous Provinces. and vi) Undertake the demarcation of land on the site perimeters.
Directorate General of Mine (DGM)	The DGM provides the programming, coordination, implementation and monitoring of departmental guidelines related to mines.
Ministry of Environment and Forests	Ministry of Environment and Forests is responsible for preserving the environment to protect human health.
National Office of Environment (ONE)	The ONE is responsible of the prevention of environmental risks in public and private investment to prevent pollutions. It also manages the environmental information system, monitoring and evaluation of the state of the environment. ONE is a one stop centre for the issue of environmental permits.
National Commission of ICZM	The National Commission of ICZM ensures the implementation of ICZM policy in Madagascar.

6. Planning and Management

Investment facilitator

The *Economic Development Board of Madagascar (EDBM)* is a one stop centre in charge of promoting and facilitating domestic and foreign direct investments. The EDBM aims to make the investment climate attractive to private companies and favorable to their successes.

Land tenure Management

The land tenure regulations for mining activity are set out in:

- The Law No. 2003-028 amending and supplementing certain provisions of Law No. 62-006 of 6 June 1962 establishing the organization and control of immigration as amended by Law No. 95-020 of 27 November 1995.
- Decree No. 2003/897 amending certain provisions of Decree No. 94-652 of 11 October 1994 laying down detailed rules for the implementation of the Law No. 62-006 of 6 June 1962 on the organization and control of immigration.
- Amended Ordinance No. 60146 of October 3, 1960 related to land registration and its implementing Decree No. 60529 of September 28, 1960.

Environment Management

The adoption of the Law on the Malagasy Environment Charter and the promulgation of the Decree on the implementation and compatibility of Investments with the Environment (MECIE) imply an obligation for all public or private projects which may cause prejudice to the environment to be subjected to an environmental impact assessment (EIA) or a program of environmental commitment (PREE), depending on the technical nature, the scale of projects and the sensitivity of the environment in the place of implantation.

The deposit the dossier of EIA should be done at ONE. A Technical Evaluation Committee (CTE: Commission Technique d'Evaluation) is formed by ONE for the evaluation of each case. This Committee is composed includes members of the environmental sector of the ministries concerned, the ONE and the Ministry of Environment. ONE makes an administrative and technical evaluation of the EIA, and coordinates the action of the CTE. The conclusion of an evaluation should give a technical opinion of the project and its EIA. There is no specific mention of the form of the technical opinion in the MECIE Decree.

In the case of large size projects (PGA: Projets de Grande Envergure) such as QMM or Ambatovy, the technical opinion should be a synthesis with the public investigation report. It is recommended that the formulation of the conclusions of technical advice is based on the same model as the conclusion of the investigation commission report.

Integrated Coastal Zone Management (ICZM)

The current political situation in Madagascar is complicating the improvement of ICZM Framework Structures, ICZM Processes and the development of a National ICZM Plan. The National ICZM Committee (*Comité National GIZC - CNGIZC*) was formally established by a Prime Minister's Decree in December 2008. In February 2010, with support from ReCoMaP and WIO-LaB, the ICZM Strategy of Madagascar was approved by the National Cabinet

7. Development, Trade and Projects

Policy Planning Initiative	Objective
Poverty Reduction Strategy Paper, 2005 (PSRP)	The PRSP contains a set of strategic priorities, goals, 15 implementation programs and 31 indicators for Madagascar. It is a proposed outline for reducing poverty in Madagascar.
Integrated Coastal Zone Management (ICZM) Strategy of Menabe, Madagascar	The ICZM Strategy of Menabe describes the environmental protection program in the coastal areas of the region in two pilot areas Morondava and Andranopasy.
Madagascar “Vision 2030”	The M / vision for 2030 has the following objectives: i) Improving governance; ii) Building a strong economy; iii) Rebuild and enhance the environment; iv) Rebuilding a successful education system; v) Build on Malagasy cultural values to stimulate thinking for human development.
Madagascar Action Plan (MAP)	The MAP is an action plan that defines the roadmap and priorities of the country from 2007 to 2011. The MAP outlines the commitments, strategies and actions that lead to a rapid economic growth, contribute to poverty reduction, and allow the country to benefit from the challenges of globalization, according to the national vision "Madagascar Naturally "and the Millennium Development Goals.
Vision “Madagascar Naturally” (VINA)	This vision places human as the main actor in the center of all proceedings. It takes into account the paramount importance of promoting rural development to ensure a significant reduction of poverty and thus the satisfaction of basic human needs and the elimination of distortions causing the development of corruption

Development project	NGO / Donor / Private Sector	Project details
Regional Coastal Management (ReCoMap)	European Union	ReCoMap is a regional program for the sustainable management of the coastal zones of the countries of the Indian Ocean. It is an initiative of the Indian Ocean Commission which deals with seven countries of the region, namely Mauritius, the Seychelles, Madagascar, the Comoros Islands, Kenya, Tanzania and Somalia. The program started in August 2006 and will end in 2011. The Program aims at the improved valorization and sustainable management of coastal resources of the seven countries of the region.
Mineral Sector Reform Project (PGRM, MRSP)	World Bank	The PGRM aims to assist the Government on the implementation of a strategy to accelerate sustainable development and reducing poverty in Madagascar by strengthening transparency and governance in the management of mineral resources, with special support for small and artisanal mining.

8. SWOT Analysis

Strengths • Strong environmental regulation • Strong mining regulations • PGRM supports foreign investments in the mining sector. • Madagascar is rich in natural resources	**Weaknesses** • The absence of a legal government in Madagascar restrains the implementation and application of development policies of the country. • The status of the ICZM Program of Madagascar is still on stand by due to the political situation in the country. • There is no more funding from international donors.
Opportunities • Development of many mining projects such as WISCO in Soalala, and Toliara Sands. • Greater NGO involvement. • Employment for local workers and SMEs • Signatory of the Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region (The "Nairobi Convention", 1985).	**Threats** • Political instability in the country • Application of all the development strategy papers in stand by. • Population in the coastal zone very poor.

9. Bibliography

Ambatovy Project, *Ambatovy Project: Factsheet*

Ambatovy Project (August 2006), *Etude d'Impact Environnemental, Volume D : Usine de Traitement Addendum.*

Rocks for Crops, Madagascar. Available at: *ww.uoguelph.ca/.../rocks_for_crops/34madagascar.PDF*

Yves Henocque (2000), *Preparation of a master plan for coastal zone management / Menabe – Madagascar*.

Tecsult International Limitée, Projet Pôle Integrée de Croissance (2005), *Évaluation environnementale et sociale du pôle de Fort-Dauphin*.

Manon Vincelette, Lisa Dean and Jörg U. Ganzhorn, *The QMM/Rio Tinto Project History in Fort Dauphin and its Social and Environmental Concepts.*

David and Anthonny Bannister, Rio Tinto (March 2009), *A promise fulfilled*

Sarah-Jayne Clifton (October 2007), *Mining Madagascar – forests, communities and Rio Tinto's white wash.*

Websites:

http://www.pnae.mg/ee/ref/guides.htm

http://www.ambatovy.com/amb/web/html/index.html

http://www.riotintomadagascar.com/english/index.asp

http://elp.unitar.org/National-Workshop-for-Capacity,43.html?lang=fr

http://recomap-io.org/integrated_coastal_zone_management/iczm-country-updates/