

A Socioeconomic Baseline Assessment: Implementing the socioeconomic monitoring guidelines in southwest Madagascar

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CORDIO



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Front cover photos, clockwise from left:

1. Young fisherman in Andavadoaka
2. Vezo woman making *vondro* for house building in Ampasilava
3. SocMon team member Gildas Andriamalala conducting an interview
4. Pirogues pulled up on the beach at Ampasilava
5. Turtles for sale in Andavadoaka
6. Mangroves in Lamboara

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Summary

In recent years, there has been a global call to incorporate social science into coastal management. This has been supported by institutional and policy commitments to develop socioeconomic monitoring as a priority activity within marine conservation initiatives. In response to this, and with financial and technical support from Coral Reef Degradation in the Indian Ocean (CORDIO), a long-term socioeconomic monitoring programme was implemented around the village of Andavadoaka, southwest Madagascar. The programme has been developed using the Socioeconomic Monitoring Guidelines for Coastal Managers of the Western Indian Ocean (SocMon WIO), in conjunction with the development of a Marine Protected Area (MPA) that incorporates representative areas of all local marine habitats.

The creation of an 800km² MPA in the Andavadoaka region will directly affect 23 local villages. SocMon surveying of three of these villages, Andavadoaka, Lamboara and Ampasilava, took place between April and July 2006. This study presents results from a household survey on material style of life, focus group interviews on marine activities, information obtained by key informants from the local communities and direct observations by researchers.

These fishing communities are remote, with poor infrastructure and limited facilities and services. Andavadoaka was the largest village surveyed and had the most amenities available. Most of the present infrastructure is owed to the Catholic

Mission, which introduced educational and health services in the 1960s. Since then the Catholic Mission has become increasingly popular, and still has a strong influence on the villages.

Survey Results

(i) Fish and fisheries

Fish and fisheries related produce is the main source of income in all three villages, with over 80% of households engaging in fishing. Marine produce is consumed by the household, bartered for other food staples or sold locally. A variety of marine resources are targeted, but octopus accounts for 95% of sales, making it the villages' most precious trade commodity and highlighting village dependence on octopus collection by commercial export companies. Vezo fishers in Andavadoaka, Lamboara and Ampasilava have limited access to markets due to geographical isolation and lack of sufficient fishing market infrastructure. A lack of refrigeration facilities has traditionally necessitated the preservation of seafood products by drying or salting for sale within traditional local markets and trade routes. These preservation processes greatly decrease the market value of marine produce.

(ii) Community problems

The village of Andavadoaka identified the lack of a market place to buy and sell goods, and public provision of electricity as the main problems in the community. Other problems included insufficient number of wells and fishing materials, and the lack of a paved road for market access. The respondents also listed safety (*Malaso*) as an issue. Lamboara and Ampasilava had different

perceptions of community needs and problems, highlighting the lack of a hospital as the main problem (58% and 43% respectively). Other issues were the lack of a well with a pump, lack of a government primary school, and insufficient fishing material. Eight percent of the respondents in Lamboara listed the lack of a BLU radio as the community's main problem.

(iii) Dependence on marine resources

These fishing communities are heavily dependent on marine resources. The lack of diversified skills and competences, means of transport and communications combined with geographical isolation reduces the options for finding alternatives to fishing. However, a shift in occupational structure is likely to be seen over time as the area undergoes socioeconomic change and more alternatives become available. The rate of change will depend on national and regional demands and infrastructure development plans. Development accelerates the rate of exploitation of marine resources and may lead to the local extinction of certain species.

Factors for the future

(i) Tourism development

Tourism can be a major economic uplift in communities if development is carefully planned and effective mechanisms are put in place to reduce or mitigate associated negative environmental and social impacts on highly productive and vulnerable coastal ecosystems. Predicted effects of climate change will further increase the stresses on ecosystems and populations living in marginal areas.

(ii) MPA development

This study on the socioeconomic status of Andavadoaka, Lamboara and Ampasilava will provide baseline data to monitor the effectiveness and distribution of benefits from conservation interventions such as the Velondriake community-run MPA. The successful achievement of conservation goals thus ultimately rests with the local communities living in the protected area.

Socioeconomic change is inevitable, and we cannot prevent societies from evolving. We may however be able to influence the drivers of change to ensure sustainability for the long term. Mechanisms put in place such as strengthened regulations and economic incentive schemes may create environmentally sustainable solutions, but economic rewards are unlikely to be distributed equally in the community. This creates the potential for land-ownership disputes and conflicts in the immediate term between marginalized fishing communities and newly emerging opportunities.

One of the main objectives of SocMon is to provide feedback to the communities, both in recognition of their contribution and to allow them access to and use of the information. This iterative process also serves as a capacity building and awareness raising activity. Furthermore it will open a dialogue between the research team and the communities. Communities will provide feedback of their concerns and suggestions for incorporation into the next monitoring phase, encouraging willingness to participate in future studies.

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Preface

Blue Ventures Conservation

Blue Ventures Conservation is a small international conservation NGO that has been working in the village of Andavadoaka in southwest Madagascar since 2003. Blue Ventures (BV) aims to protect the region's coral reefs, biological diversity, sustainability and productivity, while improving the quality of life of the local community, which depends almost entirely on the region's marine resources for subsistence and income.

Blue Ventures is actively involved in working at a local level to protect some of the region's most precious and vulnerable marine habitats. It is continuously expanding and diversifying its work programme to encompass a broad range of research, capacity building and environmental education activities to help sustain the local community's traditional artisanal fishing economy and minimise anthropogenic impacts on marine ecosystems. Blue Ventures channels its funds and efforts directly into conservation projects on the ground, keeping administrative costs at a minimum.

Blue Ventures depends entirely on support from private donors, volunteers, research grants and fundraising initiatives to sustain its work alongside local project partners. Productive partnerships have enabled the pooling of resources, talents and experiences from a range of national and international organisations, providing a wealth of technical expertise to assist in the successful development of research initiatives. Blue Ventures and its main partners, the University of Toliara's Institut Halieutique et des Sciences Marines (IHSM) and the Wildlife Conservation Society - Madagascar (WCS), are currently focusing on developing a network of community-run Marine Protected Areas (MPAs) in the Andavadoaka region and are involved

in a range of regional conservation and education initiatives in Madagascar.

The Andavadoaka Project

The Andavadoaka Project is a multi-stakeholder marine conservation project originally established by Blue Ventures and IHSM in 2003. WCS and other partners joined the project as a pilot initiative aiming to demonstrate the effectiveness of marine protected areas for the conservation of the coastal environment and the sustainable management of marine resources in southwest Madagascar. The project is now expanding beyond Andavadoaka into other villages throughout the local administrative area (the Commune of Befandefa), and is a long-term multi-partner initiative involving national and local government, international conservation NGOs, IHSM, a commercial fish and seafood collection company (Copefrito), local community groups and newly-established environmental management committees.

The project has a range of objectives, including baseline ecological and socio-economic assessments, fisheries research, environmental education and awareness raising, demonstrating and developing sustainable fisheries management and developing alternative livelihoods for fishing communities in the 23 villages around Andavadoaka. Each objective has a leading partner. The socioeconomic objectives fall under the responsibility of Blue Ventures because of its extensive knowledge of the site and good community relations due to its permanent presence in the region. Blue Ventures was able to conduct a first comprehensive socioeconomic assessment with generous financial and technical support from CORDIO, helping to achieve the overall project objectives.

1.0 Introduction

1.1 Background

It is now widely recognised that marine resources cannot be managed from a biophysical point of view alone. Socioeconomic welfare, community attitudes and uses of marine resources have serious implications on coastal marine ecosystems and management. Likewise, marine resource management will have equally serious implications for the well-being of the local community. There is a close link between how people use coral reefs and their socioeconomic background (Bunce *et al.*, 2000). Recognising this link and the importance of understanding the people who use and depend on coral reefs and the driving forces associated with reef use is critical.

International conservation organizations often promise social and economic improvement to local communities as a direct result of the creation of national parks and protected areas, but this is seldom the outcome unless given direct compensation or alternatives to fishing. It is impossible to predict and change use patterns and perceptions - and therefore to protect them - without understanding the socioeconomic context, stakeholder's views and how communities use and affect the reefs. Marine conservationists must therefore strike a balance between conservation and the socioeconomic needs of the communities.

In recent years, there has been a global call to incorporate social science into coastal management. This awakening has been supported by institutional

and policy commitments to develop socioeconomic monitoring as a priority activity within marine conservation programmes and initiatives. In response to this, and with financial and technical support from CORDIO, a long-term socioeconomic monitoring programme was implemented using the Socioeconomic Monitoring Guidelines for Coastal Managers of the Western Indian Ocean (SocMon WIO). The programme was implemented in conjunction with the development of a Marine Protected Area (MPA) in and around the village of Andavadoaka, southwest Madagascar. As part of this programme, existing CORDIO SocMon guidelines were tailored to the needs of Andavadoaka's local community. The creation of an MPA in the Andavadoaka region will directly affect 23 villages in the region. The socioeconomic assessment and monitoring was undertaken in three of these villages, namely Andavadoaka and the two neighbouring fishing communities of Lamboara and Ampasilava.

1.1.1 What is SocMon?

SocMon is a Global Socio-economic Monitoring Initiative for Coastal Management (SocMon) based on the former SEMP (Socioeconomic monitoring project, 2000-2004). SocMon WIO is a regional initiative that aims to improve marine and coastal resource management in the Western Indian Ocean based on site-level monitoring systems with community participation. The initiative is a product of substantial collaboration among social scientists and coastal managers in the region, whose activities are coordinated by CORDIO East Africa (based in Kenya). The SocMon initiative is supported by CORDIO, Sida (Swedish International Development

Cooperation Agency), the University of Kalmar, NOAA, IUCN, WIOMSA, WWF, the World Bank and ICRI (the International Coral Reef Initiative).

The broad aim of socioeconomic monitoring in tropical coastal management is to increase coastal managers' capacity to understand and incorporate socioeconomic issues into coastal management activities. More specifically the initiative aims to:

- Evaluate the socioeconomic impact of the marine resource management programme;
- Understand the different factors and driving forces in helping to develop new programmes;
- Identify changes in local communities and disparities in benefit sharing;
- Identify which conservation interventions most benefit local populations.

A working group consisting of a network of regional experts developed tools (Bunce *et al.*,

2000) including a set of guidelines aiming to standardise socioeconomic monitoring in the region. These guidelines provide a list of priority variables, interview guides, data entry templates and analysis sheets. However, prior to being implemented in the field, these tools require adaptation to suit the specific circumstances and needs of each monitoring site.

1.1.2 Why use the SocMon guidelines?

The SocMon guidelines are straightforward to follow and can be used by scientists and coastal resource managers with little or no background in social science. The guidelines guide the management practitioner through monitoring step by step, providing a standard methodology that can be used to collect data comparable with other sites in the region, thereby standardising and coordinating data collection by organisations and institutions involved in marine and coastal

SocMon's objectives are to:

- Establish socioeconomic monitoring at a representative suite of sites in the region, managed by different partners under a single framework.
- Facilitate the coordination of monitoring activities in the Western Indian Ocean through a network of socioeconomic scientists, promoting standardised monitoring throughout the region.
- Establish a coordinated data archiving, reporting and sharing protocol for partners within the region, applicable to sites outside.
- Establish reporting and educational guidelines for disseminating the information widely, targeting managers, government policy makers, resource users and schools.

Source: SocMon Manual

management. This regional programme improves organisations' capacities to analyse the socioeconomic situation of a conservation initiative and integrate this information into the MPA planning and decision-making process. It also promotes increased awareness of the socioeconomic conditions and vulnerability of resource-dependent coastal communities in government and policy-making circles. Expanding SocMon to cover more sites in the region will serve to create an effective information-sharing network amongst marine conservation organisations at all levels, which will greatly improve the communication and sustainability of monitoring programmes in coastal and marine management organisations.

1.2 Aims and objectives of the Andavadoaka socioeconomic assessment

This study, carried out in April-May 2006, was conducted for two specific reasons. Firstly, to undertake a detailed baseline socioeconomic assessment of the Andavadoaka region, complementing and enhancing previous related studies carried out in the region. Secondly, to investigate community attitudes and perceptions towards marine resources, in particular those that might influence management planning and decision-making (Epps, 2007). The data collected record the current socioeconomic status of three Vezo fishing communities, all heavily dependent on marine resources, and will provide

basic information to enable analysis of the effectiveness of existing and proposed conservation interventions in the region over time.

Alongside its importance for data collection and research, the site-based socioeconomic training and monitoring pioneered in this project allowed Malagasy scientists to develop skills in collecting, entering, analysing and interpreting socioeconomic data. The project also increased the involvement of local communities in research and data collection.

Over time, the Andavadoaka socioeconomic monitoring will assist MPA stakeholders to better:

- understand socioeconomic changes (and drivers of change) in the communities;
- identify and monitor the distribution of benefits of conservation activities in the communities;
- understand communities' perceptions and attitudes towards past management initiatives, as well as those already in place, and the impacts of these initiatives on the communities (e.g. octopus no take zones);
- evaluate the socioeconomic impact of introduced management activities and
- disseminate the results to increase awareness in government and policy circles of the socioeconomic aspects of artisanal fishers and their vulnerability.

Other benefits include:

- increased capacity for socioeconomic monitoring in MPA and marine management stakeholders in Madagascar;
- improved local and national capacity for analysis of the socioeconomic setting of other marine and coastal conservation initiatives and integrate data into decision-making processes;
- development of specific training material for socioeconomic scientists working with Vezo communities in Madagascar;
- increased community participation in management of marine resources, data collection, and analysis;
- training of local personnel and communities to carry out monitoring in the future;
- promotion of effective networking, information dissemination and experience sharing among stakeholders at local and regional levels and
- improved sustainability of monitoring programmes.

Throughout the study local fishing communities were used as key informants, taking part in research and data collection whenever possible, as well as being consulted for their opinions on subjects under discussion.

1.2.1 Aims of this report

The aim of this report is to present and discuss the results from the socioeconomic monitoring. The first section provides an overview of the area, the stakeholders, demographics, infrastructure, business development and community profiles, identifying threats and problems facing traditional coastal livelihoods in the region. It also documents marine activities affecting coastal and marine resources, presenting communities' socioeconomic status in order to establish a baseline against which future changes – in particular those resulting from marine conservation activities - may be measured. Monitoring community socioeconomic development is essential in determining marine resource management effectiveness.

Identified gaps in community knowledge, based on assessment of community members' understanding of resource conditions and local threats, will help guide the development of future environmental education and awareness-raising programmes. This report also provides a dissemination strategy to guide the feedback of project results to local communities in recognition of their contribution.

1.3 The SocMon site

1.3.1 Geographical location

The SocMon sites include three fishing villages (Andavadoaka, Lamboara and Ampasilava) located in southwest Madagascar, approximately 150km north of the regional capital of Toliara and approximately 50km south of the town of Morombe (Figure 1). The village of Andavadoaka is the largest village in the administrative commune of Befandefa. It has

been developing linearly on the beachfront of a sheltered bay since settlement in the village began, in the early 1900's (Langley *et al.*, 2006). Lamboara is located on the northern shore of the mouth of the Baie de Fanemotra (also known as the Baie des Assassins), a large, shallow tidal mangrove habitat located approximately 12km south of Andavadoaka. Ampasilava is the smallest of the three SocMon sites, situated approximately 5km south of Andavadoaka, adjacent to a much smaller mangrove habitat.

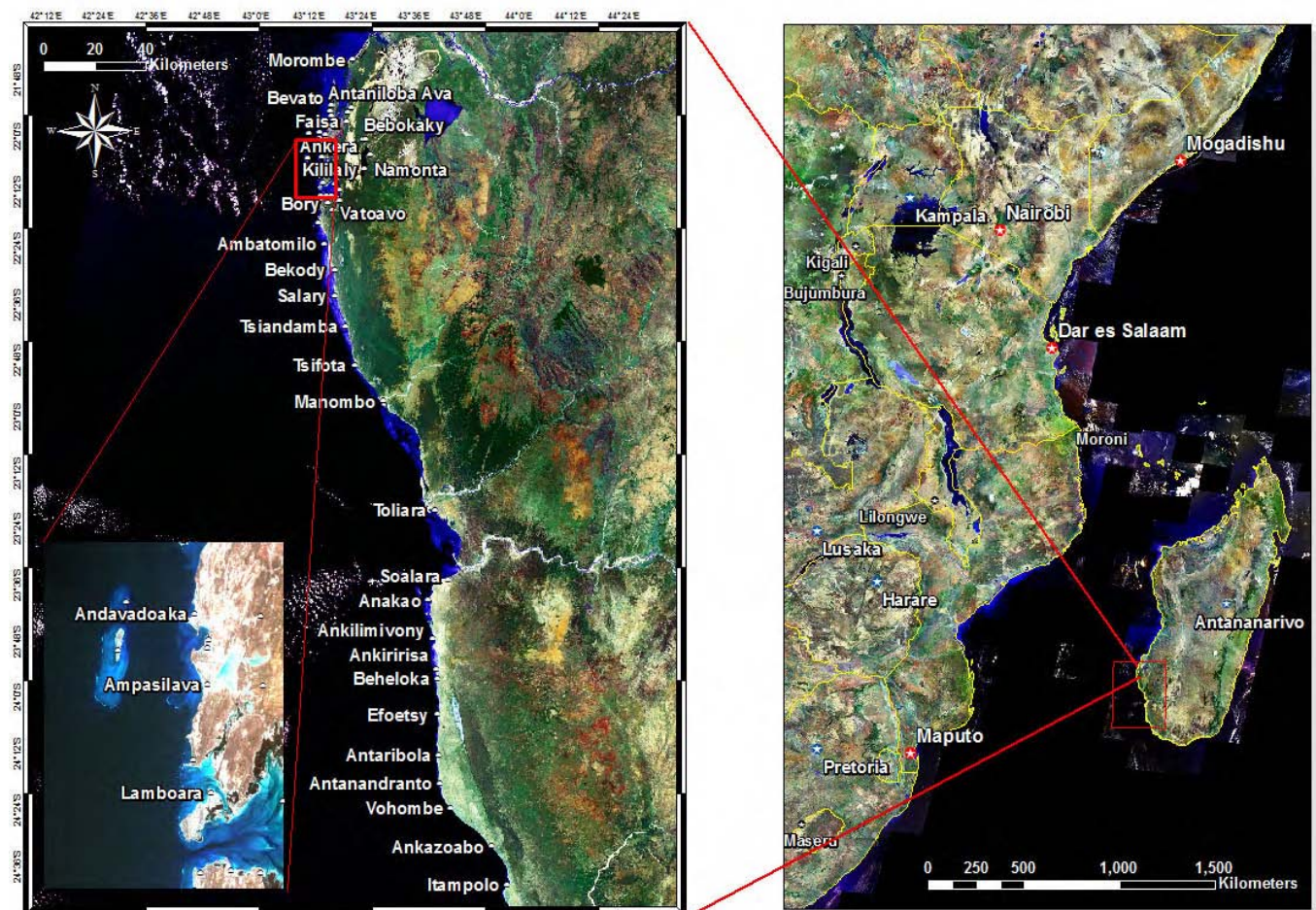


Figure 1. SocMon Study site, SW Madagascar

All three communities are almost entirely dependent on fishing for subsistence and income. In addition, the villages are extremely remote, with poor physical infrastructure, negligible access to electricity and no telecommunications. There is no public transport or terrestrial vehicular access to the villages, except by 4x4 vehicles from either Morombe or Toliara, the costs of which are prohibitively expensive for local communities. Communities depend on the sea for transport, using non-motorised traditional dugout canoes (pirogues), and as such are extremely isolated from other villages. This is particularly so during the cyclone season, when adverse sea conditions can prohibit sea travel between December and March each year. The region's terrestrial environment is semi-arid with an estimated precipitation of 350-400 mm/year. The hot, dry climate prohibits substantial agriculture and the region's aridity and isolation prevent business development and large-scale tourism. The region experiences strong southerly and southwesterly afternoon winds that change direction to northerly and northwesterly during the cyclone season. The large tidal regime, coupled with strong afternoon winds, dictates communities' fishing patterns.

1.3.2 The Vezo

Madagascar has 18 or 19 recognised tribes (depending on classification by anthropologists

or ethnographers) as well as numerous smaller sub-tribes and clans. The tribes are descendants from Malay-Polynesians who migrated from Southeast Asia approximately 2000 years ago, followed by several waves of immigrants from Arabia and mainland Africa. Each one has its own geographical distribution. *Vezo* is the name given to the coastal tribe inhabiting the coastal fringe of southwest Madagascar, over an area extending from Morondava in the north to Itampolo in the south (Figure 1). The Vezo have genetic similarities to other mainland African ethnic groups but little is known about their origins, and group identity is based primarily on the occupation of certain coastal areas and way of life rather than on ethnic characteristics. The Vezo use and depend on the sea for food and transport and are rarely found further than an hour from the sea or an estuary (Langley, 2006). The Vezo are also recognised to be a semi-nomadic people who undertake seasonal migrations to distant fishing grounds to fish for valuable commercial species such as sharks and lobster (Iida, 2005). The sea is a part of Vezo cultural identity, the term Vezo meaning "people who struggle with the sea and live on the coast" (Astuti, 1995). The Vezo form complex households and share fishing gear as well as other goods and services (Iida, 2005). Understanding social and household structure is particularly important when undertaking socioeconomic assessments.

1.3.3 Community power structures

Power structures in Vezo villages are based on traditional social structures where village elders are highly regarded, in particular those that communicate with the ancestors, *Hazomangas*. Ancestors are consulted for a wide range of purposes including marine conservation issues. Additionally, each village appoints a president who is usually a village elder: a *Nahoda* if male or a *Njarihy* if female. The president is appointed by a council of village elders, the *Fokonoly*, but the whole village, the *Fokotany*, is often involved. The village president has many roles, including land allocation, conflict resolution and mediation, as well as representing the interests of the village at the commune and district level (Langley *et al.*, 2006). The president does not make all decisions in isolation; his work is assisted by a vice president and he is required to consult the council of elders for many decisions. Each clan is represented by its own chief.

1.3.4 Status of the coral reefs

Coral reefs are the most productive and biodiverse marine habitats in Southwest Madagascar. They provide habitats to an estimated 6000 reef-associated species, including 752 fish species and 340 coral species (McKenna & Allen, 2003). These ecosystems are also the most fragile and most at risk from anthropogenic influence (McClanahan, 2000). The main threats

currently affecting the country's coral reefs are global warming, excessive sedimentation and overfishing (Nadon *et al.*, 2005). The Grand Reef of Toliara and neighbouring reefs in Southwest Madagascar constitute one of the Western Indian Ocean's largest coral reefs systems, and thus represent a significant marine conservation priority for the region. The Andavadoaka region is characterized by two distinct fringing and barrier reef systems, separated by a 5km wide lagoon, and several patch reefs inside the lagoon (Nadon *et al.*, 2005).

1.3.5 Reef monitoring

A standardised long-term coral reef monitoring programme has been carried out by trained Blue Ventures volunteers and marine biologists since 2004. This enables monitoring of the status of the region's coral reefs, providing a reference for assessing the ecological and biodiversity impacts of conservation interventions in the region. Successful collaboration with regional taxonomic experts enabled the production of a thorough species inventory for selected taxa of marine fauna, including hard corals, molluscs and reef fish. Nationally or globally threatened and regionally endemic species were also recorded during the monitoring so they could be incorporated in future monitoring programmes. Results from the reef monitoring suggest that the coral reefs of the Andavadoaka region are currently subject to moderate fishing pressure,

with higher pressure exerted on near shore fringing reefs than on offshore barrier reef sites (Harding *et al.*, 2006). This observation is consistent with other findings in the southwest (Woods-Ballard *et al.*, 2003). There is also considerable variation in fishing pressure between individual barrier reef sites, depending on the position and proximity of reef sites to fishing villages and whether the fishing sites are sheltered or exposed (Harding *et al.*, 2006).

Another explanation for the variation in fishing pressure could be the presence of *Fadys* limiting or restricting access at a particular time and/or place. The Vezo, like all Malagasy tribes, follow a vast, complex system of beliefs pertaining to all aspects of everyday life which varies from village to village and even from clan to clan. A *fady* is not a taboo *per se* but is based on beliefs related to action, objects or social events.

1.3.6 Are the coral reefs of Andavadoaka worth protecting?

According to an advanced marine ecological assessment carried out in the Andavadoaka region in December 2005 (Harding *et al.*, 2006), 376 fish species were reported at Andavadoaka, of which three are endemic or near-endemic. The CRDI (Coral Reef Diversity Index, used to estimate the total number of species) indicates that there could be 529 species in the south west, compared to 579 in the northwest (Fenner, 2006). In addition, a previously undescribed

species of wrasse (*Pseudocoris* sp.) was also recorded at Andavadoaka (Harding *et al.*, 2006). These results indicate that the reefs of Andavadoaka have a medium biodiversity with some endemism worth protecting. The area has also experienced several cyclone events, and the reefs in the southwest have suffered from extensive broad-scale bleaching and mortality events. However, certain patch reef sites monitored in Andavadoaka did not experience the impacts of bleaching observed elsewhere in the region, and displayed higher levels of coral cover and reef health than have been recorded elsewhere in southern Madagascar to date, indicating strong resilience and regional ecological importance (Fenner, 2006). These observations, combined with widespread evidence of overfishing, serve as a strong motivation for efforts to promote marine conservation regionally.

1.3.7 Characteristics of traditional fisheries in the Andavadoaka region

The Andavadoaka region's rich marine resources are critical to the livelihoods and culture of the local Vezo communities, whose principal source of protein, income and primary occupation is the pirogue-based traditional fishery. If weather permits, the Vezo fish every day. However, the large tidal regime and strong afternoon winds dictate the daily fishing pattern.

Fisheries throughout the region are low-tech, using sail or paddle-driven non-motorised pirogues. Fishers use a variety of hand-made fishing gear (nets, hand-lines and spear guns), each requiring its own fishing technique and expertise. Pirogue use for fishing is largely restricted to men. Women often engage in gleaning for octopus and other invertebrates in shallow lagoonal habitats and reef flats.

Since the majority of fishing is for local consumption or sale, the Vezo exploit many species. The main types of marine resources targeted are reef and pelagic finfish, octopus, squid, lobster, sea cucumbers, sea urchins, turtles, sharks and rays.

Vezo fishers in the region have limited access to markets due to geographical isolation and lack of sufficient fishing market infrastructure. Marine produce is typically consumed by the household, bartered for other food staples or sold locally. Communities have no refrigeration facilities to support export of valuable commercial species to national or international markets. The lack of refrigeration facilities has necessitated the preservation of seafood products by drying or salting for sale within traditional local markets and trade routes. These preservation processes greatly reduce the value of the marine produce from that which can be obtained for fresh products sold at markets in Toliara and other economic centres. However, the extreme remoteness of Andavadoaka and long journey

time to Toliara necessitates preservation of seafood products to avoid spoiling en route. At the time of this study, two commercial fish collection companies were operating in the Andavadoaka region. These Toliara-based companies, Copefrito and Murex, offer refrigeration at the point of collection within villages throughout the region, and in doing so provide access to more lucrative markets for local fishers.

Madagascar represents one of the few African countries that are still increasing octopus fishery output (Humber *et al.*, 2006). Octopus represents approximately 11.8% by wet weight of marine resources captured on the reef flat of the Grand Reef of Toliara. This represents 18.9 tons/km²/year, which is greater than the finfish catch from pirogues (Gabrié *et al.*, 2000). Octopus is therefore the socmon villages' most precious trade commodity, and without octopus collection from commercial export companies, the villages' economies would be jeopardised.

1.3.8 Status of the artisanal fishery

A Traditional Ecological Knowledge (TEK) study was conducted in Andavadoaka, providing information on Andavadoaka's fisheries for periods before monitoring programmes were established there (see Langley, 2006). The TEK study included observations of changes in size, quantity and distribution of the shark, turtle,

grouper, sea cucumber and octopus fisheries. Oral histories and semi-structured interviews with Andavadoaka's elders highlighted the effect of entry into the international seafood market on the exploitation of key economic species, as well as the social impact of this change. Fishers, fish traders, and foreign-owned seafood trade and processing companies have all observed a decline in marine resources. A fish biomass study in the aforementioned advanced ecological assessment in the Andavadoaka region revealed a significantly lower biomass compared to findings in the north west of Madagascar (33.5-53 T/km², compared to 182.3 T/km²; see Harding *et al.*, 2006; Maharavo, 2003) and other East African countries (Harding *et al.*, 2006; McClanahan, 1994; McClanahan & Kaunda-Arara, 1996). However, in the southwest there is already evidence of overfishing (Iida, 2005; Laroche *et al.*, 1997; McVean *et al.*, 2005; Woods-Ballard *et al.*, 2003), and national research organisations have raised concerns over fishing pressure (Humber *et al.*, 2006).

The higher fishing pressure in southwest Madagascar compared to the northwest can be attributed to the lack of other income-generating sectors, such as agriculture. Fishers attribute the decline in fish biomass to a variety of factors, which include increased numbers of fishers, introduction of particular fishing equipment and gear types, increased demand due to the arrival of foreign companies, lack of alternatives to fishing and natural phenomena such as cyclones.

TEK is no substitute for accurate fisheries monitoring, and to complement this study, finfish fishery catch monitoring has been in place in Andavadoaka since September 2003 (La-Trobe-Bateman & Harris, 2006). This monitoring programme includes demographic information of the fishers, details of fishing sites visited, methods used, species identification and catch data, recording species landed by pirogues on the beach of Andavadoaka. In addition to the fisheries catch monitoring a specific monitoring programme for octopus landings was established in Andavadoaka in October 2004. Data on octopus catch is recorded by local collectors (sous-collectors), who buy freshly caught octopus from fishers and sell them on to the collector companies during the spring tide *Tihaky* fishing periods, when reef flats are most accessible for gleaning.

1.3.9 Governance of marine resources

Regulation of fisheries provides the foundation for coastal zone management measures. In Madagascar however, the emphasis is placed on industrial fisheries such as shrimp and tuna. The lack of national capacity for fisheries surveillance means that most traditional and artisanal fisheries are still not formerly monitored or regulated. However, the Vezo communities in southwest Madagascar adhere to traditional local laws, known as *dina*, which are

recognised by the government and can represent valid and viable fisheries regulation mechanisms.

The Andavadoaka region's marine resources were largely unexploited, other than by local subsistence fisheries, until the arrival of commercial fisheries collection companies, which provided communities with ready market access for marine resources. Prior to commercial exploitation of local fisheries, the traditional way of life of Vezo villages, such as Andavadoaka, meant that there was little demand to create local rules and regulations for fisheries management.

Since 2003, Andavadoaka and surrounding communities have taken positive steps to work with conservation organisations such as Blue Ventures and WCS to develop plans and strategies for marine resource management for the first time in the region. The development of a new fishing cooperative in Andavadoaka, and plans for the establishment of a regional protected areas management committee have created opportunities for structural and functional interactions in the community. This has also coincided with the implementation, in 2005, of new national fisheries regulations on octopus fishing. These regulations were enforced on 31st October 2005 and included a minimum catch size of 350g, or octopus head width of two fingers. Also included was a closed season in SW Madagascar between December 15th and January 31st each year. The planned

establishment of a network of community-managed marine and coastal protected areas will represent an important step for Vezo communities in the region in creating a new coastal regulatory framework directly affecting traditional livelihoods.

1.3.10 Marine resource management initiatives in place

A range of marine conservation measures or steps has been introduced to Andavadoaka and adjacent communities since the arrival of Blue Ventures in the region in 2003. These measures include putting in place temporary no-take-zones, fish aggregating devices (FADs), developing a local fishing cooperative and initiating plans for a long-term regional marine protected area network. The perceptions and levels of understanding of the measures by local communities are explored in “Community Attitudes and Perception of Marine and Coastal Resources; the case of Andavadoaka, Lamboara, and Ampasilava” (Epps, 2006). A brief introduction of each measure is found in the following sections.

Octopus No Take Zones (NTZs)

Management of cephalopod fisheries has often been based on controlling fishing effort (Basson *et al.*, 1996; FAO, 2005; Humber *et al.*, 2006). Octopus NTZs (or biological rest periods) have proven to be a viable management tool to maintain the sustainability of octopus fisheries

elsewhere in the region, owing to the territorial nature, rapid growth and short life span of reef octopus (Guard & Mgaya, 2002). Nevertheless, their short life span does make them vulnerable to population crashes (Humber *et al.*, 2006).

In November 2004, a pilot seven-month octopus no take zone was implemented as an attempt to preserve the valuable fishery. The aim of the pilot was twofold: firstly, to demonstrate the tangible fisheries benefits of protecting one of the region's most economically important marine resources and secondly to increase the involvement of local communities in marine resource management. Success was measured by an increase in mean weight and decrease in catch per unit effort (CPUE) of octopus. Despite certain specific shortcomings of the project, notably concerning management of fisheries access after the closed area was reopened, the pilot project's success spurred increased interest in developing additional octopus no take zones. Support came not only from the Andavadoaka community, but also from adjacent fishing communities after witnessing the results from the first reserve. As a result, three octopus no take zones, used by nine fishing villages, closed in December 2005 for 4¹/₂ – 5 months. At the time of the second round of closures, a new national law had been implemented to close octopus fisheries throughout the southwest region during the spawning season of *O. cyanea*: 15th December to 31st January every year. This coincides with the cyclone season, when fishing

access is frequently restricted by adverse sea conditions and collector companies' presences are limited because difficult terrain hinders collection from the village sous-collectors. Consequently, the economical sacrifice is reduced. This was coupled with a minimum landing size (MLS) of two fingers (octopus head size) and/or a minimum landing weight of 350g. It should be noted here that under EU regulations, the minimum size for entering the European market is 500g, and that females do not reach sexual maturity until 650-800g (Raberinary, 2006). The regulation was a result of the July 2005 national cephalopod fisheries workshop in Toliara, which was brought about in part by an effort to discuss and share the experiences of the first Andavadoaka pilot no take zone project. Owing to concerns over no take zones resulting in increasing fishing pressure elsewhere, as well as uncertainty regarding the long-term sustainability of repeated temporary no take zone closures, communities discussed a long term aim of working towards the creation of a network of rotational temporary closures of octopus fishing sites. In view of the timing of the research covered in this report, the results presented here focus on perceptions of the results of the first two rounds of NTZ closures.

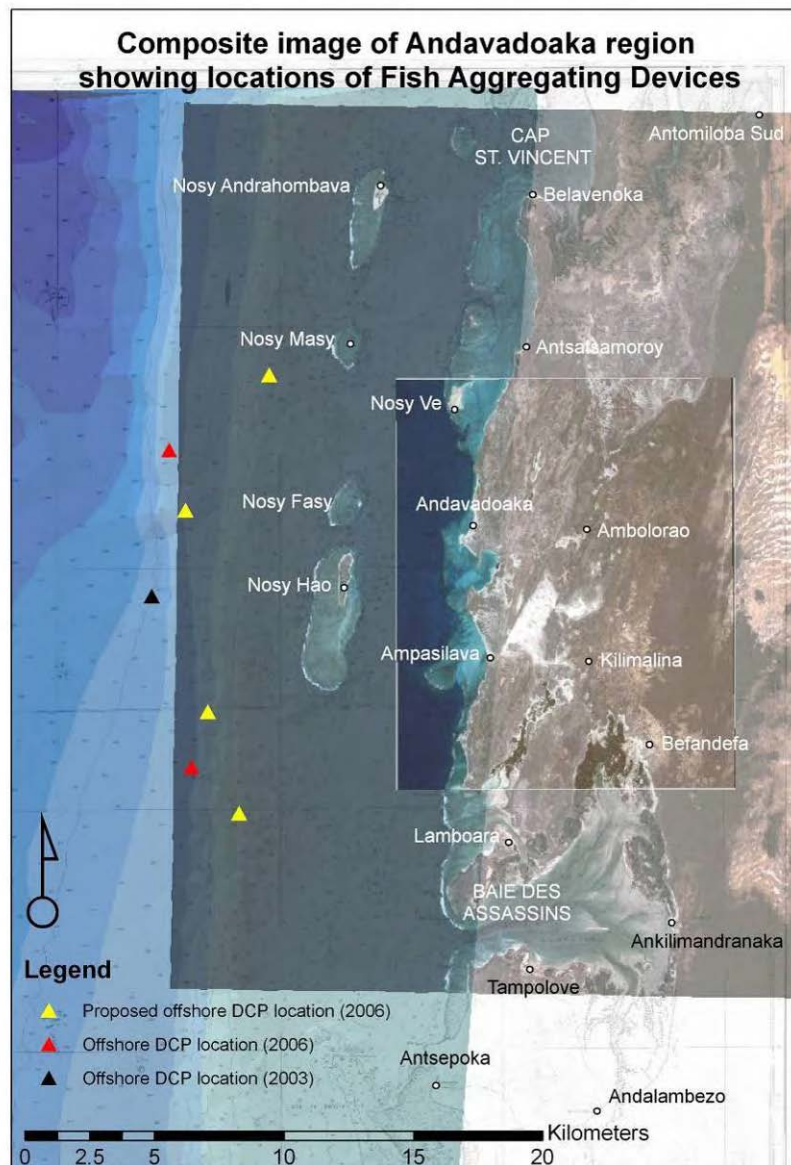
Fish Aggregating Devices (FADs)

A long-term objective of conservation efforts in the Andavadoaka region is to develop alternative

livelihoods to near-shore reef fishing. Fish Aggregating Devices (FADs) are one of the many possible solutions that have sprung from conservation partnerships with other NGOs, international development agencies and national fisheries bodies. A FAD is a structure placed in the open sea to attract and support the establishment of an entire ecosystem. Suggestions for FAD trials were greatly supported by local communities and national

fisheries authorities because of the potential of the structures to enhance fisheries. Literature shows a positive correlation between a FAD's depth and its productivity in aggregating fish from surrounding pelagic waters. Discussions in Andavadoaka focused on working with fishers to identify locations with sufficient depth to be effective while at the same time being safely accessible to local fishers.

Figure 2. GIS Composite map showing locations of deployed FADs (DCP in this case is the French translation of Fish Aggregating Device: Dispositifs de Concentration de Poissons).



With funding from the British Government's Department for International Development Small Grants Scheme (DFID SGS), two offshore FADs were deployed in late March 2006: one off the coast of Andavadoaka and one south of Andavadoaka closer to Lamboara and Ampasilava (see Figure 2). Local communities were involved at all stages of the planning and deployment process. Prior to the installation of the FADs village representatives were informed of the benefits of installing a FAD and later provided with technical assistance, and training in areas such as security and accessing and maintaining the FADs. After a FAD has been deployed, it can take up to several months for the structure to start to reliably attract and aggregate pelagic species. The official launch of the FADs took place in June 2006 during the time of socioeconomic monitoring research.

Fishing cooperative capacity building efforts

A new fishing cooperative, the *Cooperative Maritime du 22ieme Parallele* (CM22P) was officially established in December 2005 as part of conservation efforts underway in Andavadoaka. This was an attempt to unify the village's fishers to regulate fishing and to provide a recognised community body for negotiation of appropriate prices for fisheries products with collectors, in order to prevent fishers being underpaid by collectors and export companies. The president and vice-president of the cooperative were provided with technical support from WCS and Blue Ventures.

The aim of the new fishing cooperative is/was to play an important role in the advancement of activities currently underway and forthcoming activities included in the Andavadoaka Project¹. For example, the idea was for the cooperative to play a crucial role in managing the octopus reserves, FADs and the MPA. In addition, at the time of monitoring, the cooperative had taken on the responsibility to increase the level of understanding of sustainable fisheries within the fishing community, as well as to improve the well-being of the people in the village. As a result, several awareness raising missions to fishing villages and islands had been organised by the cooperative, increasing the overall interest in joining the cooperative.

There have been previous attempts to create a fishing cooperative that have lacked an elected board and suffered from poor communication and coordination between members. These attempts subsequently failed because of mismanagement, which led to a high degree of mistrust between the cooperative and community. Some of the key issues identified by the new members were the need for effective management, transparency and accountability. The members of the new cooperative acknowledged that they lacked the required management skills. In response to this, Copefrito

¹ The role of CM22P in planning for management and conservation has been largely replaced by the Velondriake committee, although this was not the case at the time of this research. Velondriake is the Community MPA management committee.

agreed to sponsor an experienced manager from April – June 2006 to help set up the structure of the cooperative and train its members appropriately.

As of May 2006, the CM22P started buying lobsters as one of their main activities. The total number of members significantly increased, therefore representing a greater proportion of village fishers, and women fishers in particular. There was a 32% increase in female CM22P members.

Marine Protected Area (MPA)

Madagascar has a strong commitment to protecting natural habitats and endangered species, including those of coastal habitats. The President of Madagascar set out plans to see the total size of protected areas in the country tripled by 2008 (IUCN, 2003; Conservation International Madagascar, 2006). The National Environmental Action Plan (NEAP) identifies the need to engage in the sustainable management of coastal and marine systems, and the Fisheries Department has taken on marine conservation as part of its strategic plan to ensure sustainable fisheries (pers. Comm.. Ministry of Fisheries, 2005).

Since 2003, discussions have been ongoing between conservation NGOs, the village of Andavadoaka and other surrounding villages within the commune of Befandefa regarding the

creation of permanent marine protected areas in the region. The establishment of a series of protected areas in the Andavadoaka region would result in the creation of the first community-run MPA network in Madagascar.

Conservation organisations often promise social and economic benefits to local communities as a direct result of the establishment of marine protected areas. However, these benefits are seldom realised unless communities are given direct compensation or provided with viable alternatives to fishing. Economic benefits through employment brought about by the establishment of marine protected areas, such as rangers or reserve managers, are more commonly given to individuals from outside the area. Local communities within protected areas often lack the specific technical skills and education required to work as part of the MPA programme.

To ensure that communities would reap the benefits of an MPA network in the Andavadoaka region, an elected management committee (*Velondriake*, which means ‘to live with the sea’) was set up in 2006. At the time of writing, it was in the early stages of discussions. The Velondriake committee members are responsible for raising awareness among the local populations regarding the benefits of protected areas and will be responsible for informing communities of the local *dina* and other laws developed as part of proposed protected area

plans, as well as enforcing the local regulations. Travel allowances and indemnities for committee members travelling to attend meetings or visit villages are covered by Blue Ventures and WCS.

These project partners also provided training for the committee members to raise awareness amongst the local communities, although this took place after socioeconomic monitoring was carried out. Capacity building for committee members includes training in:

- marine and coastal environment and protected areas;
- awareness raising techniques;
- budget management and
- use of computers and other scientific equipment.

Surveys of deeper offshore patch reefs have revealed a rich habitat displaying diverse soft corals and sponges that support and attract a rich fish fauna including large schools (Harding *et al.*, 2006). The marine protected area (MPA) that is set up in the Andavadoaka region will incorporate representative areas of all local habitats including mangroves, seagrasses and a range of reef types in order to protect the greatest number of species (Harding *et al.*, 2006). The size of the proposed MPA is estimated to be over 800km².

1.4 Alternative livelihoods

1.4.1 Tourism

Tourism has rapidly evolved in coastal areas throughout the Western Indian Ocean as an alternative livelihood to fishing. Development is often through large corporations and chains with limited benefits to local coastal communities and devastating environmental consequences for the region. However, community-based ecotourism could potentially play an important role as an alternative source of income for communities in coastal areas. This potential is likely to grow in the event of a protected area network being developed in the region. The industry is still in its infancy in Madagascar and particularly in the southwest, where remote regions currently lack the required transport and accommodation infrastructure to support all but the most adventurous independent visitors.

Townsend (2005) conducted a feasibility study into existing tourism enterprises and organisations, market opportunities and development needs in Andavadoaka. The study also assessed factors influencing community-based tourism development, including policy and regulatory support, land tenure issues, and public and private sector support for developing ecotourism enterprises.

Tourism Profile

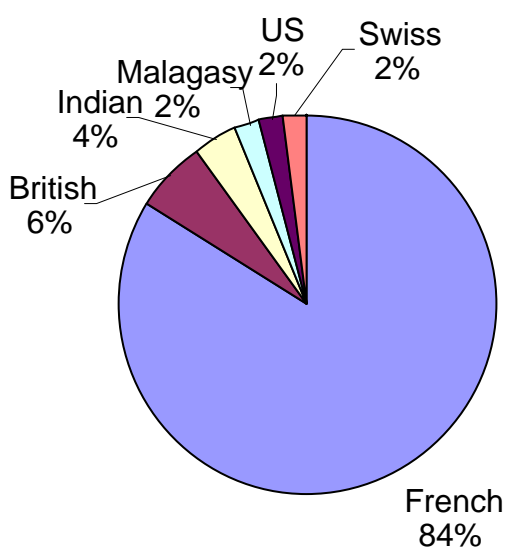
In addition to the aforementioned study, Blue Ventures conducted interviews with hoteliers in the Andavadoaka region as a part of SocMon, and introduced a survey questionnaire to visitors

(see Appendix I) at the Coco Beach hotel in Andavadoaka in late 2005. The latter was aimed at creating a tourism profile and investigating potential demand for ecotourism activities by the visitors.

Figure 3. Number of yearly visitors and percentage of nationalities

	Coco beach	Laguna Blu	Manga Lodge
Year built	1986	2000	2005
Total number of visitors per year	197	300	200- 280
Number of Bungalows	15	16	10 (expanding)
Nationalities	See Figure 4	Italian 60%	45%
French		35 %	55 %
Japanese		1 %	2 %
Swiss		1 %	2 %
Canadian		1 %	2%
Malagasy		1 %	-
Indian		-	-
UK		-	3 %
US		-	-
Others		1 %	1 %

Figure 4. Proportion of visitors by nationality at Coco Beach in 2005



NB: 17 % of the French visitors were Malagasy residents

Hotels in the region

At the time of monitoring there were three hotels in the Andavadoaka Region: Coco Beach, Laguna Blu and Manga Lodge (Figure 3). Coco Beach hotel was the first to be built in the region, by an influential family from Morombe. Laguna Blu is owned by Italians and Manga Lodge by an elderly French couple. Manga Lodge employs only people from the small neighbouring community. Coco Beach and Laguna Blu employ people from the villages where they are operating (Andavadoaka and Ampasilava) as

well as from larger towns such as Morombe, thus contributing to local employment.

Occupancy rates

Occupancy rates vary throughout the year, with two distinct peaks (Figure 5). The first peak is in June, July, and August during the northern

hemisphere’s summer months. This period is relatively cool in comparison with that of the rainy season (Dec- March). The second peak (October, November, and December) is at the end of the dry period, with warmer temperatures. During the rainy season the area is prone to cyclones and is largely inaccessible by road.

Figure 5. Seasonal Occupancy at Laguna Blu, 2005

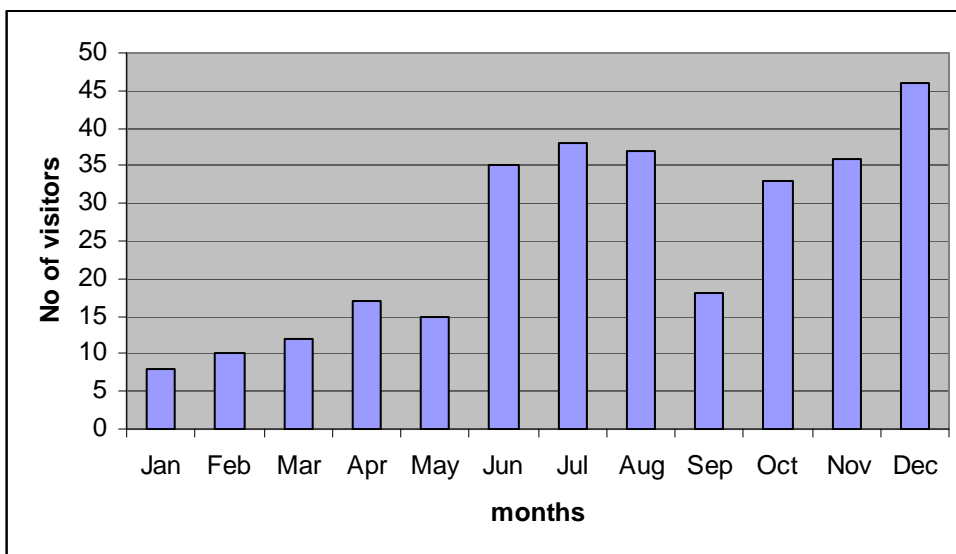
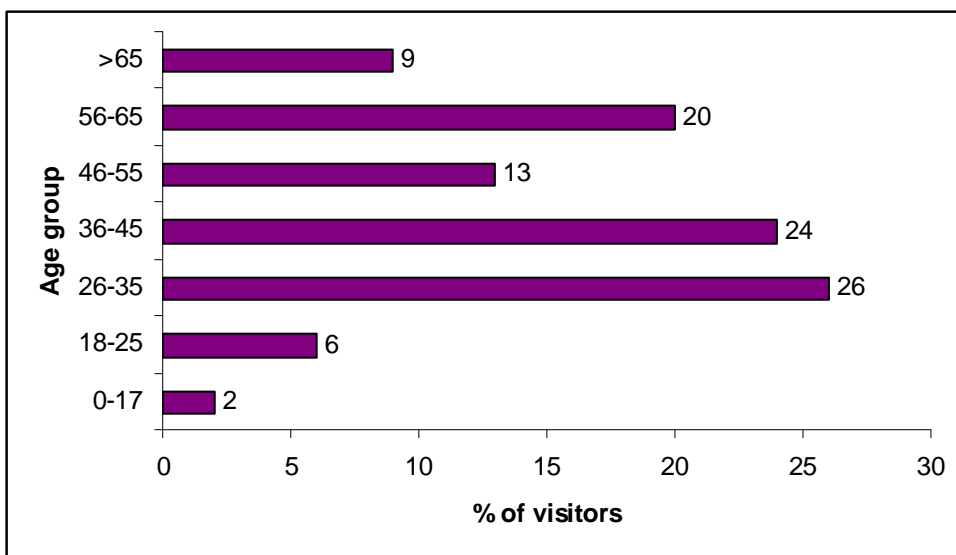


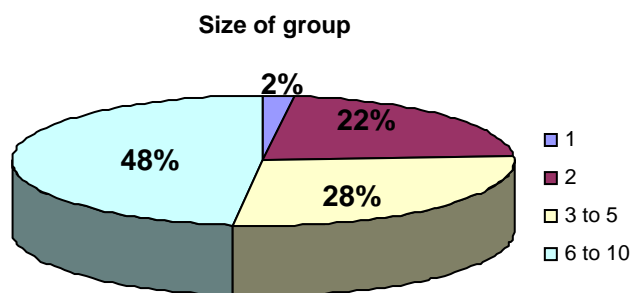
Figure 6. Number of visitors by age, Coco Beach hotel, 2005



Tourist Demographics

Almost 10% of all visitors to Andavadoaka’s Coco Beach Hotel are over the age of 65 (Figure 6). This is a relatively high number when taking into account the remoteness of the area. Forty-one percent of the visitors were female and fifty-nine percent male. The majority of female tourists were between the age of 26-35 and the majority of male tourists are between 36 and 45 years old.

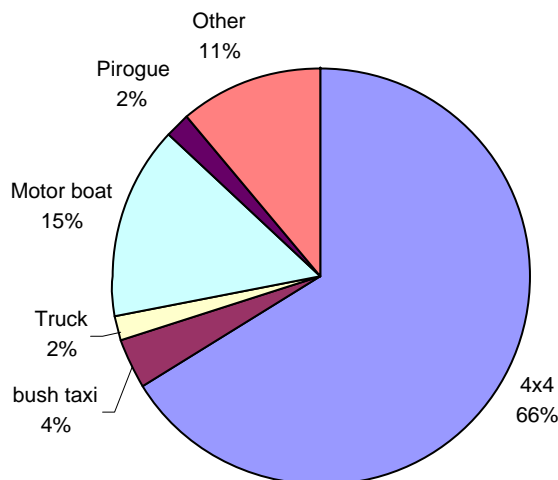
Figure 7. Size of groups visiting Coco Beach hotel, 2005



Duration and purpose of visit

Most of the visitors (52%) only stayed one night at the hotel. Twenty-four percent stayed 2-3 nights, and another 24% stayed 4-7 nights. None of the visitors in 2005 stayed more than a week. Typically, the guests arrived in the afternoon and left early morning, with little or no time to engage in tourism related activities or other means of contributing to the local economy. Additionally, almost half of the visitors travelled in groups of 6 or more (Figure 7), leaving little time for individuals to explore the villages on their own.

Figure 8. Means of transportation to visit the Coco Beach hotel, 2005



NB: there is no taxi-brousse to Andavadoaka, only to Morombe; tourists using this type of transport must rely on one of the other means of transport to get to the hotel.

It is also worth mentioning that many of the visitors to the hotels in the region (especially Manga Lodge and Coco Beach hotel) are friends and family of Blue Ventures staff. As much as 23% of the visitors at Coco Beach hotel listed research as the purpose of their trip. The Andavadoaka project is also bringing an increasing number of visitors for partner meetings, workshops and other events.

According to the survey respondents:

- 52% had visited Madagascar before.
- 67% had travelled independently,
- The remaining used one of the following French tour operators:
 - Humaine Adventure (54%)
 - Aina Travel (33 %)
 - Oceane Adventure (13 %)

Means of transportation and travel routes

Getting to Andavadoaka and surrounding villages can be both a time consuming and costly experience. Most visitors travel by 4x4 vehicles (Figure 8). The majority of visitors are coming from Ifaty and going to Tulear. Figure 9 shows visitor travel routes.

Figure 9. Travel routes of tourists in Andavadoaka.

Coming from	Percentage
Ifaty	35
Tulear	28
Tana	18
Morombe	15
Salary	4
Going to	Percentage
Tulear	48
Manja	17
Andavadoaka	13
Ifaty	11
Morombe	7
Tana	4

Willingness to engage in local tourism activities

The survey further explored visitors' interest in local tourism activities and their awareness of these activities offered by local tour guides. Visitors were asked which of the following activities would interest them (yes or no):

- Having a Vezo lunch in the village
- Sailing with the Vezo
- Visiting one of the surrounding islands/islets
- Snorkeling with a local guide
- Going fishing with local fishermen
- A guided village tour
- A guided baobab tour
- A guided mangrove tour

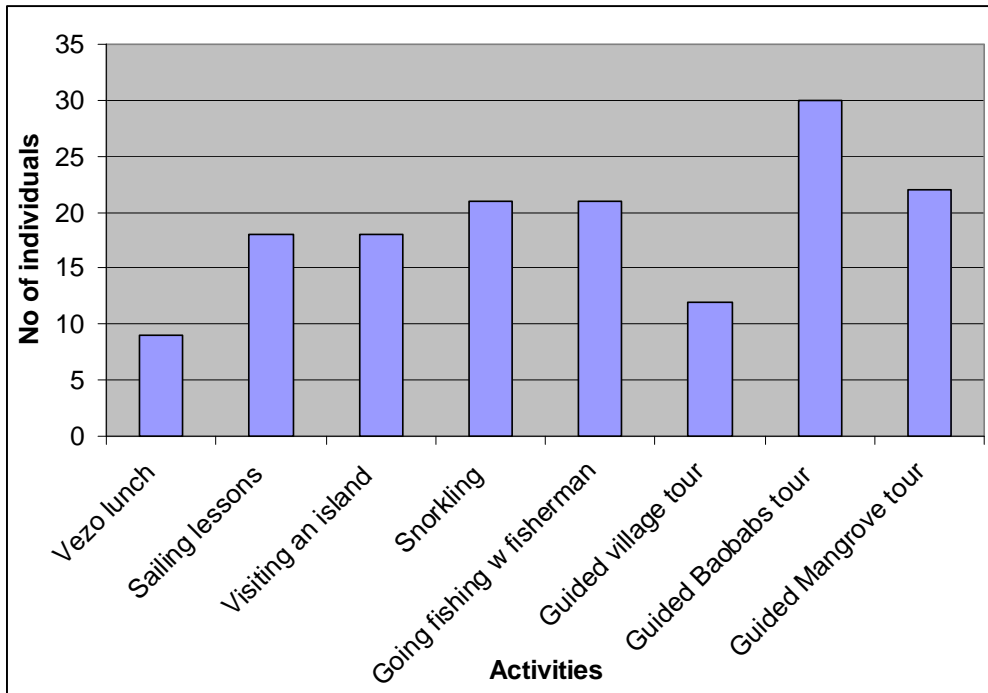
Most visitors said that they would be interested in a guided baobab tour (Figure 10). However, there was a noticeable difference between the different age groups. For example, of the visitors interested in a baobab tour, just 7% were between 18 and 25 years old and nearly four times that number were over the age of 56 (Figure 11). Of those who said that they would be interested in snorkelling, the majority were between 26 and 35 years old. There was no significant difference between genders.

Only 17% of the respondents knew about the existing activities offered by local guides trained by Blue Ventures.

Some of the respondents provided additional suggestions:

- Improve the standards of the hotels
- Increase marketing
- Promote ecotourism
- Increase availability of goods and services in hotels, including handicrafts
- Leave things as they are

Figure 10. Number of visitors willing to undertake local tourism activities

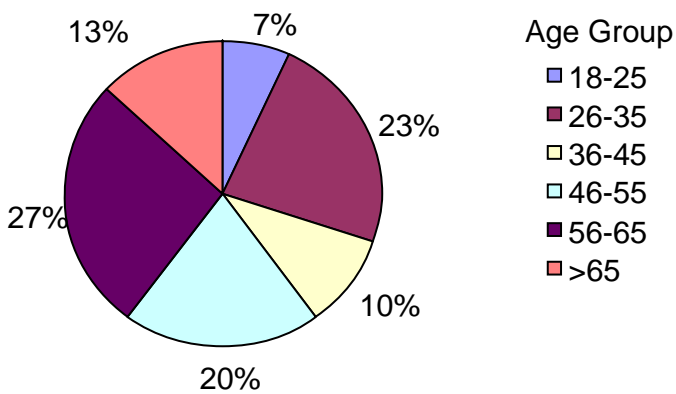


Tourism potential in and around Andavadoaka

There are several considerations that need to be addressed and further researched before investing in tourism as an alternative livelihood. In the case of Andavadoaka, tourism is seasonal, potentially leaving an economic gap in earnings during off-peak seasons.

For many visitors, Andavadoaka is not a holiday destination but a stop on the journey elsewhere. Another major challenge for developing tourism in the area is its remoteness. Getting there is not only challenging but a very costly operation, in most cases involving rental of a 4x4. Furthermore, the means of transport should be considered when assessing the ecological footprint made by visitors.

Figure 11. Different age groups of tourists interested in a baobab tour



Currently, tourism does account for some local employment. However, this would greatly increase if a hotel or lodge was run by the community itself. Furthermore, to reduce the economic gap between seasons, the hotel/lodge could be linked with research activities, creating a field centre specifically to host guest researchers. It is essential to look at the tourism profile and visitors’ demands and incorporate

them into the early stages of planning for any tourism development activities.

Ecotourism initiative in Andavadoaka

One ecotourism initiative currently being developed by the village of Andavadoaka is the creation of a community-run ecolodge. Blue Ventures began discussing this effort with the village in early 2006 by holding community meetings to discuss the possibility of building a lodge. It would be owned by the community and accommodate research volunteers brought to the region by Blue Ventures' existing ecotourism expeditions operation. Andavadoaka's village leaders donated 3,600m² of land for the construction of the new eco-lodge, which would be financed by Blue Ventures but fully owned and operated by the Andavadoaka community. This would provide the community with an economic alternative to fishing. Blue Ventures is currently raising funds for the lodge's construction. It will incorporate a classroom, restaurant, dive equipment room, shower blocks and bungalows to house up to 20 visitors. Seasonal camping sites will be available, with local cooks providing meals for visitors.

Local guides

In 2005, Blue Ventures ran an EcoGuide training programme in Andavadoaka in order to improve services available to tourists visiting the region. Blue Ventures provided 25 villagers with

training in specific areas identified as priorities for facilitating interaction with tourists. These included language training, basic ecological introductions to the key habitats of interest in the region (mangroves, spiny forests and coral reefs) and practice role-playing with tourists.

Figure 12. Photograph of a Women's Association meeting in Andavadoaka



1.4.2 Crafts

Blue Ventures has helped formalise the existing community-established Women's Associations in Andavadoaka (Figure 12) and Lamboara by assisting in official registration and the creation of an elected board. BV has also provided technical assistance to help develop products such as artisanal crafts for sale to tourists. One of many aims of the Women's Associations is for them to play an increasingly critical role in developing alternative livelihoods for women, such as selling handicrafts to generate income, especially during the national octopus closure.

1.4.3 Other tourism initiatives

Another suggestion has been to build a whale-watching platform on Nosy Hao, 5km from Andavadoaka, to conduct whale research by BV scientists. The island is frequently visited by tourists who could benefit from using the platform for a small fee, creating a contribution to the local economy.

1.4.4 Mariculture /Aquaculture

Farming of marine products has often been proposed as a potential substitute for capture fisheries in tropical coastal communities. These can be low-tech, semi-intensive or intensified operations but often require private sector investment and technical assistance. Several attempts to farm the algae *Euchaema* have been made by the IHSM, PSDR and private companies in Madagascar, including in the Andavadoaka region. Attempts in Andavadoaka have so far failed due to a lack of optimal physical conditions, with waves and sea swells destroying trial samples, and limited commercial interest.

There is a large market for algae, but it is a low value product and therefore needs to be produced in very large quantities to make it an economically viable alternative. Oyster farming is another option that private companies such as Copefrito are looking into within the

Andavadoaka Project because of their high value and increasing demand.

Another species that could be farmed is crab. Crabs are extremely stress tolerant species, being able to survive up to one week in transit from fishing grounds to market.

1.5 Sea Cucumber farming

Sea cucumber exploitation has grown considerably in recent years in response to growing market demands for all species of *Holothuria* found in the region. Fishers have raised concerns over the levels of harvesting of this resource, and the near disappearance of *Holothuria* from shallow waters throughout the Andavadoaka region indicates that it is now seriously threatened by overexploitation.

In 2007, Blue Ventures developed a new partnership with Aqualab, IHSM and Copefrito to set up a pilot sea cucumber farm initiative in Andavadoaka. Aqualab in Toliara will provide 250 juvenile *Holothuria atra*, grown in the laboratory at the IHSM in Toliara, every 3 months. The fisheries collection company Copefrito provides *Vehivavy Tehivoatse*, the Women's Association of Andavadoaka, with credit to purchase the juveniles from the laboratory and arranges transportation from Toliara to Andavadoaka. With support from Blue Ventures, the Women's Association is

responsible for monitoring and surveillance of the growing sea cucumbers, which are housed in enclosures secured in a sheltered lagoon near the village.

This project is still in its trial phase, however Copefrito has committed to bear the cost of building the farm enclosure, and to buy the sea cucumbers from the Women's Association at market price when the sea cucumbers have grown to commercial size (after approximately 8 months).

2.0 SocMon Methodology

2.1 Research Methods

2.1.1 Literature review

A comprehensive literature review is of great importance before embarking on a socioeconomic assessment. All secondary data such as available official documents, research reports and on-going projects in the area were assessed prior to commencing the SocMon research. At the time of writing, only limited information was publicly available in print or electronically. This is despite the wide range of research initiatives that have been conducted in the region by independent foreign researchers, Malagasy students, IHSM and conservation organisations. This paucity of reported information is often due to the lack of financial

resources and institutional capacity to translate and disseminate research in Madagascar, along with insufficient emphasis placed by researchers on the communication and transfer of results and knowledge on completion of a study.

In the case of the Andavadoaka region, there are no existing publicly available reports or data sets produced by the fisheries authorities.

Vezo communities have a tradition of oral knowledge transfer and are known to live life on a day-by-day basis. Written documentation describing the nature and complexity of a Vezo household and its structure, provided by Iida (2005), helped the author to comprehend and highlight potential difficulties one could face during the monitoring process.

2.1.2 Observations

Blue Ventures' long-term presence in the Andavadoaka community has provided an opportunity for *in situ* observation of resource-use patterns, as well as changes in fishing practices and demand over time. The author and SocMon team members were also able to observe and record community concerns and other social issues in the three villages monitored, helping to clarify meaning while collecting data. Furthermore, the integration of the research team into the community allowed data to be checked for feasibility through long-term observation and the use of experienced

researchers familiar with local fishing practices and resource use patterns.

The accumulated knowledge provided by an experienced local research team made it easier to tailor the socioeconomic monitoring variables to better suit the local conditions. SocMon data were also collected by direct observation during household surveys; i.e. instead of asking which socioeconomic indicators the household possessed, the interviewer recorded these directly through observation, reducing the overall interview duration. Interviewers and respondents were observed by the team leader during interviews to note reactions and to improve interview techniques accordingly.

2.1.3 Key Informant interviews

Key informants (KIs) were used to obtain information on infrastructure and business development, as well as available skills and competences in the communities. Village elders were approached to identify specific local taboos relating to the use of marine resources that may intervene with the monitoring. Community members with extensive knowledge of certain aspects of community life and structure and/or the area were selected to discuss community or group level information rather than individual perspectives. Semi-structured interviews, with a list of open-ended questions, were prepared by the SocMon team to be discussed with identified

KIs. Several KIs were used to obtain the full spectrum of the village opinion. Two to three informants were typically sufficient in each village.

2.1.4 Focus Group Interviews

In each village, a focus group interview (FGI) of six participants was conducted to obtain information regarding marine-related activities (such as resource use patterns, goods and services and markets). Participants were not chosen randomly but represented a common interest or knowledge, for example, octopus fishers, fin-fishers or fish traders. Specific attention was given to selecting participants as part of groups to avoid potential conflicts during discussions due to social power structures. When selecting informants representing different groups (such as different fishing methods) community leaders and elders were asked of awareness of any major conflicts between the suggested participants. Within each focus group efforts were made to ensure equal representation across gender, age and occupation (different types of fishers or sous collectors) in order to better represent the larger population engaged in marine activities.

2.1.5 Surveys

Alongside observations, KIs and FGIs, two surveys were conducted in all three study villages to obtain quantitative data. The first

survey looked at demographics and socioeconomic status, as well as perceived community threats (See Appendix II). The second survey (not presented and discussed here) looked at perceived condition of marine and coastal resources, non-use values, success and failures of management initiatives and perceived level of participation (Epps, 2006). The average duration of the two surveys was 12 and 17 minutes respectively. Every second household was systematically surveyed. Socioeconomic survey was conducted at household level and information was collected on all of the household members; the head of the household (HHH) was not necessarily interviewed. Across all three villages a total of 170 households were surveyed (Figure 13).

Figure 13. Summary table of survey questionnaire (SQ).

Socmon Village	Number of Surveys
Andavadoaka	97
Lamboara	40
Ampasilava	33

Sampling Strategy

The research team developed a sampling approach to determine who to interview based on knowledge of community structure. Non-probability sampling was used for qualitative data collection (KI and FGI) and probability sampling was used for quantitative data collection. Key informants were selected using non-probability sampling techniques such as

convenience sampling. Snowball sampling (where community members suggest appropriate respondents) was avoided to reduce bias of only sampling one segment of the community (such as prominent or authoritative community members who may have already developed a relationship with the survey team). Probability sampling was used for the collection of quantitative data (survey questionnaires) through systematic sampling of every other household.

The variables

To determine socioeconomic status (SES), a combination of indicators is needed: there is no one direct measure to this multi-faceted concept (Figure 14). Income is a potentially informative measure but can vary widely depending on money or goods borrowed and saved, and people may be reluctant to discuss their income. This study therefore uses consumption and expenditure to determine SES because it is less variable than income and has been used in similar community research in Madagascar (Cinner *et al.*, 2006).

Figure 14. Variables monitored at the three SocMon villages, Andavadoaka, Lamboara and Ampasilava.

Code	Variable	Method
Community level		
K4	Population	Derived from household number and size by a community member
K5	No of households	KI
K6	Migration rate	KI (derived comparing former census data)
K18	Marine activities	FGI 1
K19	Goods and services	FGI 1
K20	Methods	FGI 1
K22	Target markets	FGI 1
K23	Use patterns	FGI 1
K26	Use of Goods and Services	FGI 1
K16	Infrastructure & business	KI (3 informants)
K33	Informal tenure & rules (fady)	KI (3 informants)
K32	Formal tenure & rules	KI (3 informants)
K27	Tourist profile	KI (3 hoteliers)
1st survey Household level		
S1	Occupation (time spent)	SQ1
S2	Age	SQ1
S3	Gender	SQ1
S5	Education level	SQ1
S7	Langue(s)	SQ1
S9	Household structure	(derived)
S29	Material Style of Life MSL- Socioeconomic status <i>Using a list of socioeconomic indicators developed by the SocMon team, as well as investigating daily and weekly expenses*.</i>	SQ1
S13	Goods and services	SQ1
S14	Methods	SQ1
S25	Perceived community problems (list three)	SQ1

2.2 Data collection

Village census data were collected prior to commencing the SocMon study. These data were essential to plan sample size and strategy of data collection of the site-specific variables selected for Andavadoaka, Lamboara and Ampasilava.

Two separate community meetings were held in each village to inform community members of the SocMon initiative. They took place in early February and April of 2006 and were intended to reiterate the importance of the socioeconomic monitoring and give as many community members as possible the opportunity to partake

of the information and raise questions. Additionally, community leaders were included in planning the SocMon survey interview process to assist in identifying appropriate days, times and starting points (which clan) for surveying, as well as planning sampling to avoid conflicting with community events that might interfere with the monitoring, such as traditional ceremonies, funerals and celebrations. The SocMon team members also assisted fishers in detangling nets, unloading pirogues and similar activities while obtaining information, in order to minimise the amount of disruption of fishers' activities caused by the interview process.

A fundamental prerequisite to all data collection was gaining prior consent from the community to proceed with the study, and ensuring that all local traditions and laws were respected and adhered to during the course of sampling. Because of the Vezo's strong tradition of ancestral worship, the community *hazomangas*² are required to seek consent from the ancestors before any marine resource management initiatives are taken and before a *dina* (local law) can be agreed and signed. Below is an example of such communication.

“You the Doany (spirit), live here in this sacred land. We...have come here to present our collaboration with the “Vazaha” (foreigners/

² Village elder who communicates with the ancestors. These vary according to the *razana* (origin) of the ancestors.

strangers) regarding the octopus reserve and putting in place an MPA. They bring with them rhum and money (coins) for you... We accept to work with them if you permit because they want to help us to improve our fisheries. Bless them because the octopus reserve will be good, and please allow them and protect them from any danger when travelling on your seas.”

Hazomanga, Village of Lamboara

November 2005

2.3 Analysis

After collection, all field-recorded data were translated from Malagasy (Vezo) into French. The data were then coded and entered into spreadsheets for data analysis. Content analysis was carried out for qualitative data and was initially coded into different categories to investigate which common themes emerged in the responses. Codes were then eliminated, combined, or subdivided into coding categories to look for repeating issues and larger themes that linked or connected the codes, to avoid repetition of information if it has been assigned to several categories. Descriptive statistics were used to analyse nominal data obtained from the household surveys, such as occupational structures.

Results from the socioeconomic status survey and the survey to identify socioeconomic factors influencing perceptions of marine resource

conditions, management initiatives and their value were tested using analysis of variance (ANOVA) and simple t-tests ($p < 0.05$) in Microsoft Excel and Minitab 14. Although the data are not all normally distributed, a Mann-Whitney U test (non-parametric alternative to a t-test) was not used as parametric tests are more sensitive and therefore have more statistical power. Data were arranged along lines of central tendencies, ranges, frequencies and ranking. Pearson correlations were used to identify simple linear relationships, and multiple regression techniques were used to examine the more complex interrelationships between several factors that may have a bearing of interest.

Because of the large data set, only simple statistics and percentages are presented in this report. Summary results from all variables monitored are presented to provide a reference study against which future change may be monitored. This will allow environmental management plans to be adapted according to detected trends.

2.3.1 Data quality

With the exception of community leaders and a small number of fish traders, the community possessed no French language skills. All interviews were therefore held in the local Vezo dialect and then translated into French. All SocMon survey templates were developed in

French and then translated into Malagasy by the research team. It proved difficult to translate interview questions into Vezo, since the dialect has a limited vocabulary and care was needed to ensure the questions conveyed exactly the intended message. It is recognised that working in three different languages, combined with time and feasibility constraints on note taking during interview sessions, may have led to potential misinterpretation of certain data at the analysis stage.

The issue of bias in qualitative research demands special attention. It is impossible for the researcher to separate himself/herself from the subject or person, the so-called "qualitative research paradigm". Qualitative data are inevitably marked by researchers' subjectivity based on their biographical details (such as gender, age, ethnicity, religious belief, educational background and knowledge of the area and topic). In the case of the Andavadoaka region the research team consisted of men only (with the exception of the site-coordinator), with a strong scientific background. Efforts were made to counteract these potential biases of gender and educational background and researchers took pains to make no assumptions regarding how respondents might respond based on researchers' prior knowledge or research in the area. However, it was also recognised that attempts to counteract such biases might in turn demand subjectivity that could lead to further biases.

2.4 Summary of Research Methods

Figure 15 summarises the research methods used in this study across the three SocMon villages.

Figure 15. Summary table of research methods

	Andavadoaka	Lamboara	Ampasilava
Focus Group Interviews	3	3	3
Survey 1	97	40	33
Survey 2*	94	39	34
% Men (Survey 2)	52	53	73
% Women (Survey 2)	48	47	27
Key Informants	3	2	2
Observations	yes	yes	yes
Secondary Sources	yes	yes	yes

* Data presented in separate report (Epps, 2006)

2.4.1 Challenges/ Limitations

Time constraints

The monitoring had to be implemented within a certain period. Despite detailed survey planning, sampling was occasionally delayed by physical factors beyond researchers' controls, and local events often interfered with the socioeconomic monitoring plan.

Paying informants

The issue of whether or not to pay informants/interviewees is controversial. During the SocMon pre-data-collection community information meetings, the community members

had enquired what they would receive in return for their participation in the study. This was discussed at length when the objectives of the SocMon study were first introduced to the three study villages. It was agreed that the survey team would provide drinks and nuts as a token of appreciation, but only after focus group interviews. Male focus groups, which were held in the afternoon, received alcoholic and non-alcoholic drinks and peanuts. Female focus groups were held in the morning and often comprised of coffee and bokbok (fried dough ball). The issue of paying informants was often perceived to be a problem by the interviewer yet rarely so by the interviewee.

Cultural aspects

Cultural issues played a significant role in the interview techniques. For example, it proved difficult for interviewers to prompt questions because this was considered impolite. It was also a challenge to get the interviewers to overlook certain roles and authorities (such as village presidents) and the overall power structures within the community and their influences.

Gender aspects

The lack of women in the survey team to participate in conducting household interviews may have resulted in slightly biased interviewing or data recording. However, the nature of the survey questions was in no way gender-sensitive.

Survey fatigue

In recent years a large number of independent researchers have been involved in undertaking social and anthropological studies in Andavadoaka, often with little or no direct or indirect benefits to the local community, and without any clear feedback or communication process after completion of the study. Despite having developed a strong relationship with the community, a major concern of the survey team was the presence of survey fatigue on the part of the community respondents. At the time of the socioeconomic monitoring research, an anthropological study had been conducted in the same three villages only a week previously. It had been reported to community leaders that certain community members had found interview questions associated with this study intrusive, and as such, two households that had been the subjects of the anthropological research showed reluctance to participate in the SocMon study or further related studies. Despite this, following clear discussion and explanation of the SocMon aims and objectives, no major problems were encountered whilst collecting data in the field, and the majority of community members in the three SocMon villages showed a strong willingness to collaborate with the study.

Data accuracy

See 2.3.1 Data Quality

2.5 The SocMon Research Team

Field-based training on the SocMon monitoring rationale, principles and interview techniques was provided by CORDIO East Africa using role-play. All of the local team members (Figure 16) involved in the research participated in this 4-day socioeconomic monitoring training programme. See Appendix III for training agenda and contents.

The Socioeconomic monitoring team had limited prior training in research methods before the socioeconomic monitoring training provided by CORDIO in April 2006 (Malleret-King, 2006). The majority of the team members have had higher education, mainly in oceanographic and/or biological sciences from the University of Toliara. The main data collector had an academic background in law. Most of the team members were known by and familiar to the local community, having worked with Blue Ventures in the region prior to the commencement of the study. Although two members of each community were used in data collection for the census study, the broader use of community members in data collection and entry was constrained because of limited availability of appropriate training resources and available translators (French-Vezo-French). However, community leaders will be involved in coordinating the feedback and dissemination of results presented in this report.

All team members had prior experience either in conducting semi-structured interviews and survey questionnaires or in facilitating community meetings, although team members lacked previous experience in planning and designing survey questionnaires. The team found focus group interviews (FGIs) the most fruitful research method and team members were enthusiastic to develop their knowledge and

experience of social science research methods further.

Team members were involved in designing questionnaire data entry templates. If team members objected to a certain question (for example if a line of questioning was deemed inappropriate in view of traditional customs), the matter was discussed and the question modified accordingly.

Figure 16. The SocMon team members' roles and responsibilities

Name	Role & Responsibility	Organisation
Ms M. Epps	SocMon Site Coordinator: literature review, research coordination, planning, interview design, data entry template design, data analysis and report writing.	BV Socioeconomic Research Coordinator
Mr. G. Andriamalala	Core team members: survey planning and design, data collection (KI, FGI, and SQ), facilitate, translate, data entry, and disseminate	BV (formerly Univ. Toliara)
Mr. D. Raberinary		BV (formerly Univ. Toliara IHSM)
Mr. G. Manahira	Research assistant: data entry	BV Scientific research assistant
Mr. T. Thomas	Facilitator: marine activities focus group, data collection (household surveys), and data entry	BV and community member
Ms. P. Hajaso	Informer/Observer: informing community (including Women's Association), literature review and data collection (Observation and KI interview)	BV / Univ. Toliara
Mr. R. Samba	Community leader: assisting planning of monitoring and dissemination of results	Village President- Andavadoaka
Mr Ralesa		Village President- Lamboara
Mr. Venance		Village President- Ampasilava
Two community members per village	To conduct census- accompanied by one SocMon team member	Community members

3.0 Results

3.1 Demographic and Socioeconomic Status

3.1.1 Population

The administrative commune of Befandefa comprises 21 communities with an average population size of nearly 300 (calculated from WCS raw data). The villages sampled were

comparatively large: 1220, 526, and 321 respectively (Figure 17). Only five of the communities in the commune had populations of less than 100 at the time of the research carried out. Andavadoaka was the largest village studied. A mean of 5.6 people per household was recorded for the pooled data from all three study sites.

Across the whole commune, 90% of the people considered themselves to be Vezo and 8% considered themselves to belong to the

neighbouring inland Maskiro tribe, according to

census data collected by WCS in 2006.

Figure 17. Population and household numbers in the three monitored villages.

	Population Size	No of Households	Average size of household	Range of household size
Andavadoaka	1220	214	5.7	1-24
Lamboara	526	106	5.0	2-10
Ampasilava	321	63	6.0	1-11

The populations of Lamboara and Ampasilava are both 100% Vezo, whereas Andavadoaka is only 93% Vezo (Figure 18). Because the definition of Vezo is an elusive term and describes a life style as suppose to a defined ethnicity, people from inland tribes who move to coastal areas to take up fishing become Vezo (Astuti, 1995).

Figure 18. Table of origin of the population in the villages monitored.

	All SocMon villages	% of total population
Vezo	1975	95 %
Vezo masikoro	53	3 %
Vezo mikea	0	0 %
Vezo mpotaka	20	1 %
Other: Betsmisaraka	18	1 %
TOTAL	2067	

Settlement and migration patterns

All three communities are coastal villages. Andavadoaka and Ampasilava have developed linearly along beaches, whereas Lamboara, situated further south at the northern shore of the Baie des Assassins, is located on an island surrounded by dense mangroves, separated from the coast by a short sandy tidal causeway.

Traditionally the Vezo are a semi-nomadic group, following movements and migrations of

marine resources up and down the coast, depending on seasons and weather conditions. This largely seasonal migration creates considerable movement of communities between coastal villages. After the reopening of the octopus no-take-zone at Ampisorogna (located between Ampasilava and Lamboara) in April 2005, a small community of migrant fishers settled on the adjacent coast.

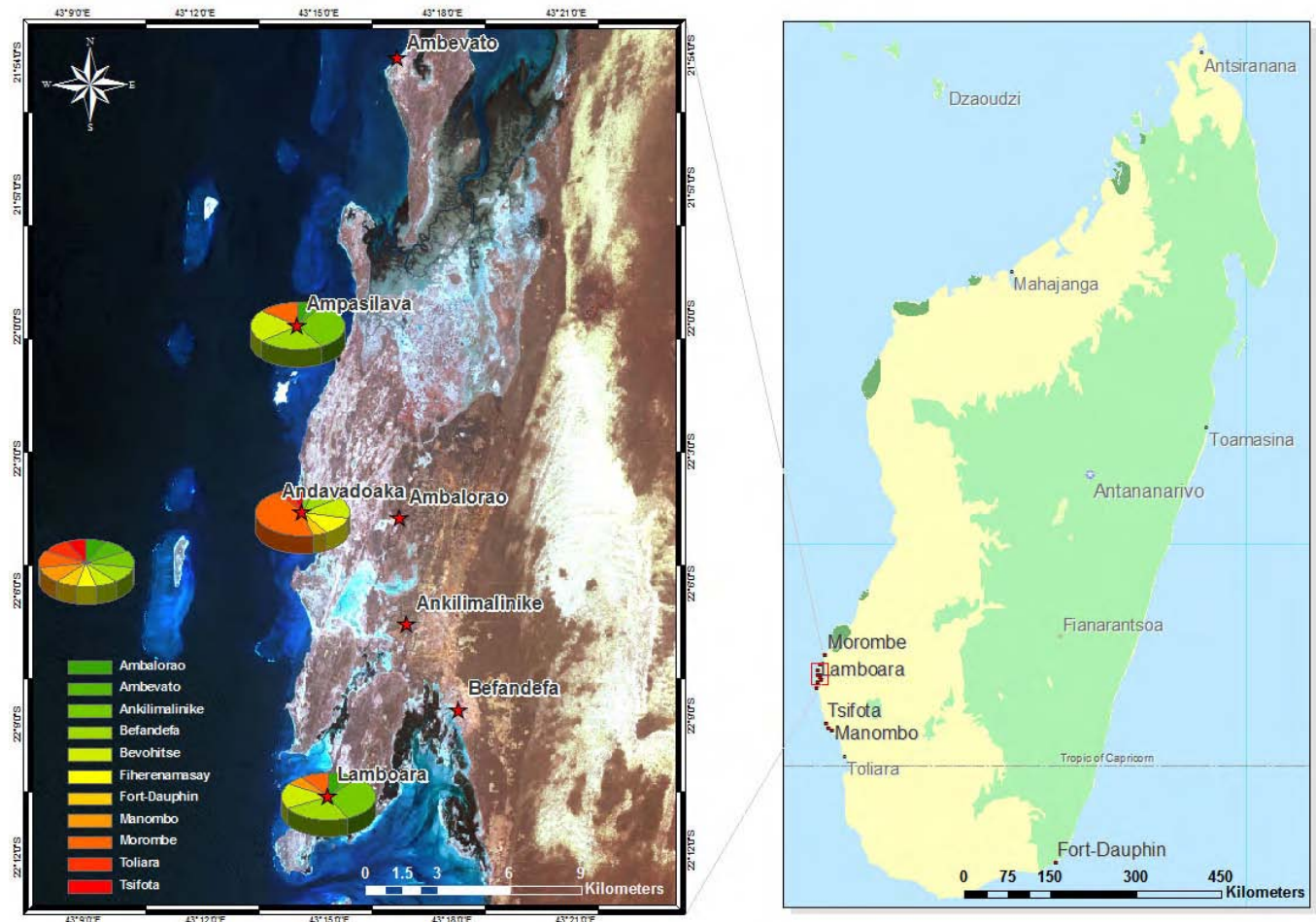
In addition to migrations brought about by the pursuit of marine resources, Vezo communities in the region have historically been forced to leave coastal villages for short periods when faced with unfavourable conditions, such as freshwater shortages, or threats of violence and raids from the Malaso tribe of cattle rustlers (whom the Vezo believe possess black magic or supernatural powers). At the time of conducting the socioeconomic assessment there had been several serious threats and invasions by the Malaso in neighbouring inland communities. These raids resulted in a large number of temporarily displaced people, many of whom left coastal villages to settle temporarily on the islands of Nosy Hao and Nosy Ve.

Figure 19. Breakdown of villages of origin for migrants in each SocMon village (percentage of immigrants from each village)

Village of residence: / Village of origin:	Andavadoaka	Lamboara	Ampasilava	Location
Ambalorao	0	9	4	(I) 5 km inland
Ambevato	0	4	4	(C) N of Andavadoaka
Andavadoaka	n/a	7	24	(C)
Ankilimalinike	6	25	20	(I) in the Befandefa commune
Befandefa	11	26	20	(I) District capital
Bevohitse	11	12	12	(C) N of Ambatamilo
Fiherenamasay	11	0	0	S of Andavadoaka
Fort-Dauphin	6	0	0	SE Madagascar
Lamboara	0	n/a	4	(C)
Manombo	0	5	0	S of Lamboara
Morombe	44	12	12	(C) 50km N, important market town
Toliara	6	0	0	(C) 150 km S, Regional Capital
Tsifota	6	0	0	S of Salary

(I) = Inland community; (C) = Coastal community

Figure 20. Map showing the location and breakdown of villages of origin for migrants in each SocMon village.



Population movement can provide an indication of people's perceptions of the state of local natural resources or market opportunities. Information was collected on how many respondents reside in their village of birth. 71% of all respondents in Andavadoaka originated from the village, while only 24% and 26% originated from Lamboara and Ampasilava respectively. In Andavadoaka, of those who had immigrated, 44% were from Morombe (the closest town, approximately 50km north of Andavadoaka), and a small percentage originated from the regional capital Toliara. The remaining number came from smaller inland villages within the commune de Befandefa (Figures 19 and 20).

Reasons for migration varied considerably between the three study sites. A high proportion of immigrants in Ampasilava had moved to the area because of reputed good fishing grounds. The majority of immigrants in Lamboara had moved there to escape the violent threat of the Malaso. Andavadoaka has seen high levels of coastal immigration from inland areas, which is perceived to have increased fishing pressure at near-shore sites, decreasing the productivity and profitability of local fisheries. This has in turn caused relatively high levels of emigration. Many fishers have left larger villages like Andavadoaka to reside on nearby islands such as Nosy Hao. Overall, "available fisheries resources" was the most commonly cited reason for migration. Within the Commune of

Befandefa 73.3% of households engage in fishing (WCS Census, 2006).

Estimating the rate of migration was complicated because of the temporary movement of community members between villages and settlements. In addition, the socioeconomic monitoring was conducted three months after the February 2006 cyclone event, which washed away 13 beachfront houses, and damaged approximately 70 houses in Andavadoaka that had to be reconstructed (R. Samba, pers. comm., 2006). The immigration rate to Andavadoaka was calculated at 4% and the overall population growth was calculated to be 18% (data from deaths and births in the village, recorded by leader) when compared with the Andavadoaka 2004-2005 census data (Langley *et al.*, 2006). No previous census data were available for Lamboara and Ampasilava to monitor population growth and migrations.

Languages

The Vezo dialect was the mother tongue of all three villages at household level except for Andavadoaka where three households spoke Masikoro, two Mahafaly and one Batsileo. All of the households that spoke these three dialects had also mastered the official Malagasy. In Vezo-speaking households only 35 % had at least one household member who spoke the official Malagasy language. In Lamboara 70% of households had one or more household member

who spoke the official language. In Ampasilava this figure was 62%.

Overall linguistic diversity was very low, as most respondents spoke only Vezo. The number of households that claimed to speak official Malagasy varied markedly between the three different sites (Figure 21). The two smaller communities had higher percentages of households speaking official Malagasy. This may be due to the high number of immigrants from outside the district. The results showed similar figures for all villages when looking at the number of households that claimed to speak French. When excluding households connected to the Catholic Mission in Andavadoaka, only 5 percent of the village’s households spoke French. According to the survey at an individual level, the majority of the respondents who spoke official Malagasy were men. The discrepancy

between men and women was less when looking at respondents who spoke French. This is due in part to the high number of nuns and female teachers in the village’s Catholic Mission. Individuals whose primary source of income was fishing were not represented in the respondents who spoke French.

Age structure

The three villages show a pyramidal age structure typical of a rural area in a developing country, where the majority of the population is under the age of 18. In Andavadoaka, 43% of the population was >10, compared with 36% in Lamboara and 46% in Ampasilava. According to the 2004/2005 census, 46% of the population support the remaining 54% financially, placing a huge economic burden on the working population (aged 15-64).

Figure 21. Percentage of individual respondents who spoke official Malagasy and French

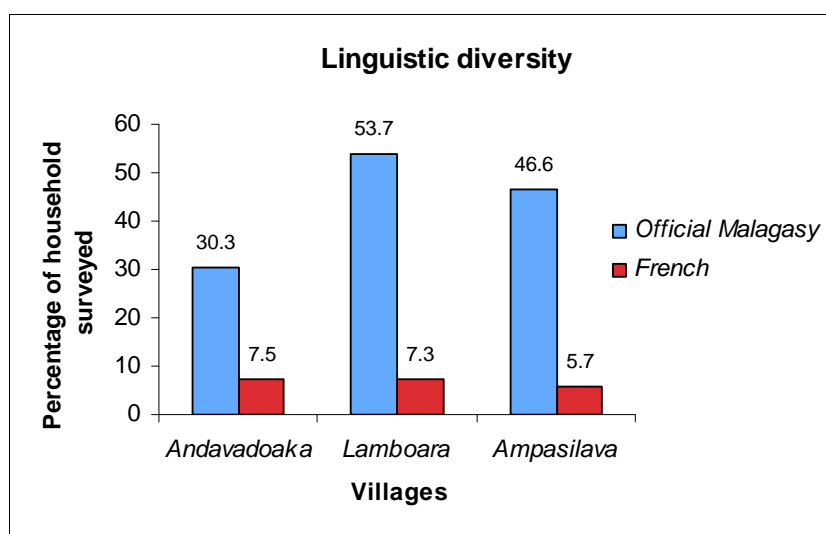
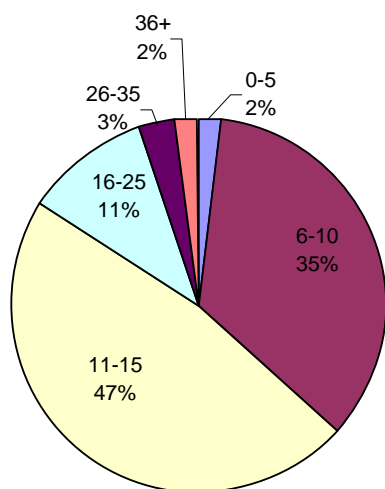


Figure 22. Age at which residents started fishing in Andavadoaka



Occupational structure

More than 80% of the population of Andavadoaka depends on fishing as its main source of income. In the two smaller communities, including secondary sources of income, 90% are dependent on fishing. Owing to the extremely high economic dependence on this one trade, the average fisher begins fishing at the age of 13 in all 3 villages. Figure 22 shows that

35% start at less than 10 years of age in Andavadoaka (27% in Lamboara, Figure 23, and 29% in Ampasilava), exerting enormous pressure on marine resources. Of the households with dependents, 25% had one or more dependents assisting in fishing. The average number of dependents per household is 3.45 (Figure 24).

Figure 23. Age at which residents started fishing in Lamboara

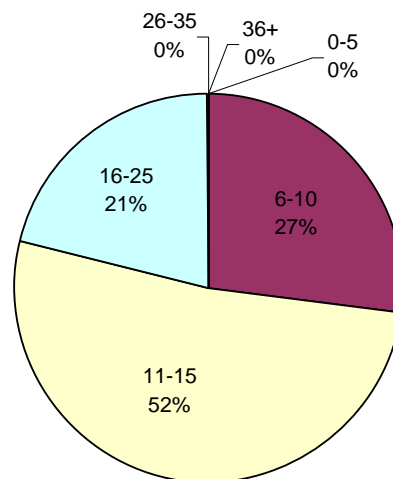
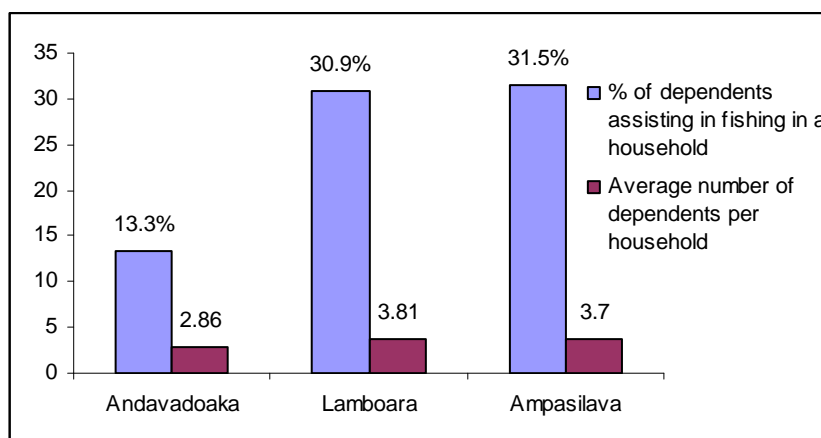


Figure 24. Percentage of dependents assisting in each household by village



The age of community members engaged in fishing across all three villages ranged from 4-

81. Because of the enormous dependence of communities on fisheries resources, most

occupations involved catching, buying, selling, processing or transporting fish. The different occupational categories recorded in the three villages are presented in Figure 25. The study

sites have relatively similar occupational diversity, but the two smaller and more remote sites, Lamboara and Ampasilava, show lower occupational diversity and fewer occupations.

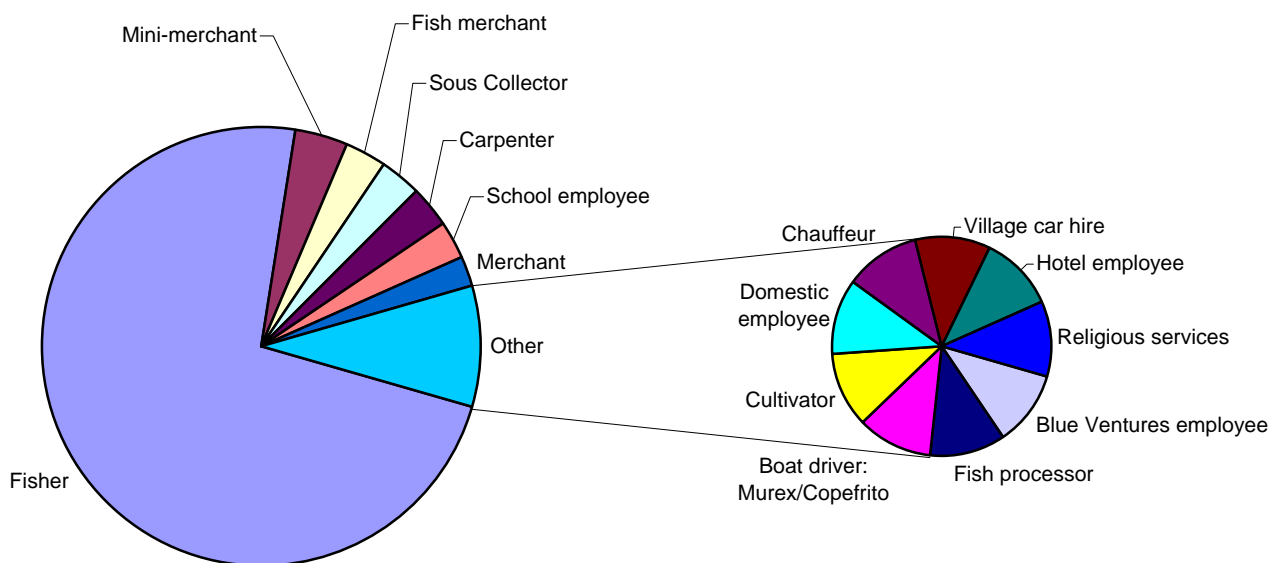
Figure 25. Summary Index of Occupations in Andavadoaka, Lamboara and Ampasilava.

Services/facilities	Andavadoaka	Lamboara	Ampasilava
Blue Ventures	✓	X	X
Boat builder	✓	✓	✓
Boat driver	✓	X	X
Carpenter	✓	✓	
Chauffeur	✓	X	X
College St. Famille	✓	-	-
Coco Beach Hotel	✓	X	✓
Cultivator	✓	-	-
Doctor	✓	X	X
Domestic	✓	X	X
Epi-bar owner	✓	✓	✓
Fish merchant	✓	✓	✓
Fish processor	✓	✓	✓
Fisher	✓	✓	✓
Merchant	✓	✓	✓
Midwife	✓	X	X
Mini-merchant	✓	✓	✓
Religious services	✓	✓	✓
School teacher	✓	✓	✓
Sous-collector	✓	✓	✓
Village car-hire	✓	X	X
Zebu cart hire	✓	X	✓

Figure 26 shows the occupational structure of all three villages, detailing the proportion of total income-generating activities accounted for by the different primary occupations of surveyed households. The figure excludes schoolchildren and people who have reached retirement age

(64). Occupations linked to fishing account for over 80% of all occupations listed. For a complete census of the village of Andavadoaka, please see Langley *et al.* (2006).

Figure 26. Occupational structure for Andavadoaka, Lamboara, and Ampasilava



3.1.2 Infrastructure and Business Development

All three communities are remote with poor infrastructure. Andavadoaka, as the largest village surveyed, had the most amenities available. Most of the present infrastructure is due to the Catholic Mission, who introduced educational and health services in the 1960s. Since then the Catholic Mission has increased in popularity and still has a strong influence on the villages.

3.1.3 Education

Primary education is compulsory and starts at the average age of five or six. This level of education begins at T₀, year 1, and stops at T₆, or year 7. There are only two public primary schools in the entire commune of Befandefa, located in the villages of Andavadoaka and Befandefa, and there is no public secondary

school. The Catholic Mission operates 18 primary schools and 1 secondary school in the district, the latter being located in Andavadoaka, employing approximately 40 teachers in the commune (Figure 27).

Children in neighbouring communities wishing to attend secondary education often stay with relatives or friends in Andavadoaka, whilst others walk up to 3hrs a day to attend school in the village. The public schools are free but the pupils have to bear the costs of all school materials (such as books and pens) themselves. The Catholic Mission charges a small monthly fee for school attendance.

An average of approximately 10% of the population in the three villages has no formal school education (Figure 28). The average age of people with no formal education was 31, meaning the phenomenon could not be explained merely by late introduction of schooling to the

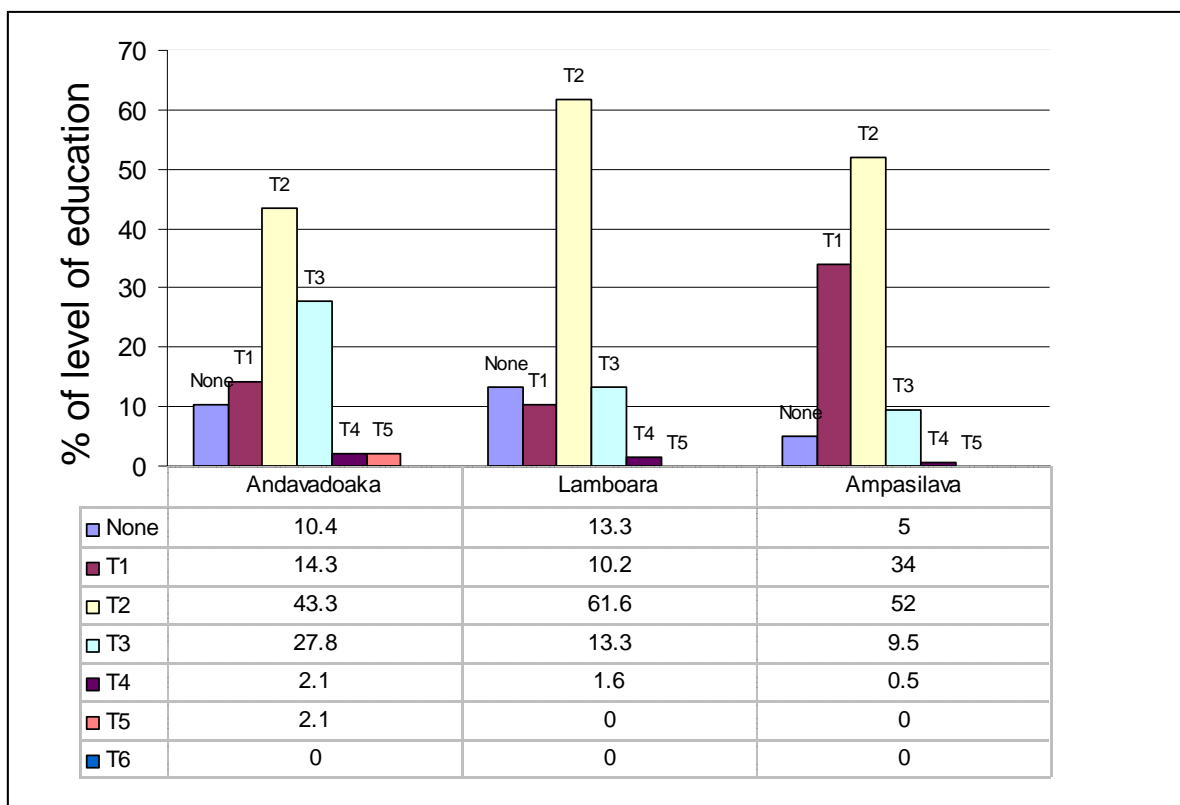
area (which would result in a much higher average age). There was no significant difference between men and women, except for in Lamboara, where 70% of the population with no formal education were women. The average community member across all three villages was educated to T₂ level, equivalent to a total of 3 years of education, and of the three villages

studied only Andavadoaka had community members who were educated to T₅ level. These included the village president, a doctor and schoolteachers. No females were represented in this group. The results also revealed that all non-Vezo households had significantly higher levels of education than Vezo households.

Figure 27. Number of pupils and teachers in the three villages by type of education.

	Public Primary School		Catholic Primary School		Catholic Secondary School	
	No of pupils	No of teachers	No of pupils	No of teachers	No of pupils	No of teachers
Andavadoaka	83	2	227	7	74	9
Lamboara	-	-	99	4	NA	NA
Andavadoaka	-	-	77	2	NA	NA

Figure 28. Level of education completed (respondents >12 years old)



3.1.4 Health

There is no hospital in the district of Befandefa. The nearest hospital is in Morombe, situated approximately 50km north of Andavadoaka. However, most serious medical cases are referred to the hospital in the regional capital Toliara. There is a small medical clinic in Andavadoaka, run with government funding, but it suffers from limited and infrequent supplies. Patients are required to pay for all medication privately. The Catholic Mission in Andavadoaka operates a dispensary and a maternity healthcare programme, and there are regular government inoculation programmes carried out throughout the district. There was previously a small hospital in Lamboara but it was destroyed by a cyclone many years ago. Lamboara is now supported by a representative from a Lutheran hospital, which supplies the villages with malaria prophylaxis and painkillers. The Laguna Blu Hotel adjacent to Ampasilava runs a temporary medical clinic for a few months every year, where a foreign doctor provides medical support and supplies for Ampasilava.

According to the medical clinic in Andavadoaka, the most common cause of death is still diarrhoea/dysentery. At the time of this study, no figure was available for the level of infant mortality.

Sexual health surveys carried out by Blue Ventures medical staff in 2006 showed that the

number of births per woman is between 1 and 17, the age of first pregnancy ranges from 10 to 15 years old and age of first sexual intercourse ranges from 8 to 15. Forty-three percent of women surveyed claimed to be aware of different kinds of contraception, most commonly condoms. Thirty-eight percent had access to some form of contraception. However, according to a survey conducted by BV in 2007 (which saw 55 respondents, aged 15-70 years) 32% were against using it despite having access because of lack of information and fear of potential negative impacts. This practice has serious implications for the transmission of sexually transmitted diseases. However, 80% of respondents said they would visit a health care worker to obtain information on contraceptives.

3.1.5 Access to water

Fresh water in the region comes from shallow aquifers. There are five wells in the village of Andavadoaka (one of which has a pump built by Toliara's development agency), four wells in Lamboara (only two of which are functional) and two in Ampasilava (only one of which is functional). Both wells in Ampasilava are provided by the Catholic Mission. The water table throughout the region is considered very low and fresh water drawn at the wells in all three villages becomes unpleasantly saline towards the end of the dry season. Water is mainly collected by women, and women and children often launder clothes and rinse food

adjacent to the wells because of inconvenient distances between the wells and households (Figure 29).

3.1.6 Waste management

There is no solid waste management or sewage disposal system in any of the three villages studied. Most waste, including hazardous medical waste, is burned in sand pits adjacent to the beach away from the houses. Children are

often seen playing around the burn pits. Organic waste is often eaten by domestic animals.

In addition it is commonly considered *fady* (taboo) to defecate at the same place as someone else, which rules out the social acceptability of introducing a WC. As a result, many people defecate directly on the beach, which causes a potentially serious risk of spreading faecally transmitted diseases.

Figure 29. Percentage of population with access to water in Andavadoaka, Lamboara and Ampasilava, 2006.

	Andavadoaka	Lamboara	Ampasilava
Access to water:			
➤ Tap	0 %	0 %	0 %
➤ Private well	1.5 %	5 %	0%
➤ Shared or Public well	98.5 %	95 %	100 %
Distance to well from households surveyed:			
➤ Average	329 m	127 m	257 m
➤ Median	300 m	100 m	300 m
➤ Mode	300 m	200 m	300 m
➤ Standard error	19.97	14.77	11.43
➤ Minimum	10 m	5 m	100 m
➤ Maximum	900 m	300 m	400 m

3.1.7 Electricity

There is no public electricity provision in the district. The Catholic Mission uses solar panels as a source of electricity. Electricity elsewhere in the villages comes from privately owned-generators, which run on diesel or gasoline. The number of generators has increased rapidly in recent years, having been relatively unheard of in smaller communities several years ago. Sixteen generators were counted in Andavadoaka at the time of this study, compared to only seven in 2004. Four people in

Ampasilava and four households in Lamboara owned a generator, usually linked to the provision of lighting and music for epi-bars. The first generator in Ampasilava was owned by the epi-bar owner from Morombe in 1998.

Fuel wood is used for cooking, although a small number of wealthier households have gas for cooking. Charcoal is used by a small percentage of households: fuel wood that is either collected or purchased is more commonly used. Wood used for cooking is bought by the bundle in the village by the majority of households, but around

20% of households do collect wood from the surrounding spiny forests. Fuels costs around 50-100 Ariary/kg when bought in the village. The kitchen or cooking area is separated from the main house, often outside the building. Most families use fuel lamps and candles as a source of lightning.

3.1.8 Transportation

Vezo communities traditionally travel by sea. Goods and people are transported in outrigger canoes powered by sail (pirogues). Larger sailing ships (boutre) bring cargo from the regional capital Toliara, taking passengers subject to space availability (Figure 30a).

There are no paved roads in the district. Cleared sand and dirt tracks link coastal communities to inland villages and two tracks lead to Morombe in the north, which has an airport/landing strip with weekly flights to larger towns and the capital. These roads are usually inundated during the cyclone season from December until March, and can be impassable to vehicular traffic for much of this time. Public ‘taxi-brousse’ transport from Toliara only goes as far as Morombe to the north (via the inland ‘Route Nationale’) or Salary some 100km to the south. Aside from the Catholic Mission, only one member of the village of Andavadoaka owns a 4x4 vehicle, and there are no private cars in Ampasilava or Lamboara. 4x4 vehicles can reach Andavadoaka, Lamboara and Ampasilava but are prohibitively

expensive for local villagers, and therefore not a viable option for local inhabitants wishing to travel between their villages and the regional capital, even in a medical emergency. Locals are able to travel with fisheries collection vehicles during the dry season subject to space availability. The neighbouring inland tribes use zebu-drawn carts as a means of transport (Figure 30b). According to the village president in Andavadoaka, zebu carts have been adopted as a more common means of transport by the Vezo. Today there are 13 zebu carts in Andavadoaka because of the immigration of Masikoro from Ambalora and Ankilimalinike.

Figure 30a) Photographs of a boutre under sail and b) a zebu cart in the shallows



3.1.9 Communication

There is no public provision of telecommunications in the district. Villages communicate with each other and with Morombe and Toliara through a high frequency BLU radio system. These require licenses, which can be both difficult and expensive to obtain. There are two BLU radios in Andavadoaka: one at the Coco Beach Hotel and the other at the Catholic Mission. Villagers from Lamboara have to walk to the district capital of Befandefa to use a BLU radio, and those from Ampasilava have to go to Andavadoaka to have radio access, in both cases

normally for a small fee. There are only four available BLU's in the district. There is no public postal service. Mail is typically delivered by vehicles visiting the villages from fisheries collection company Copefrito.

3.1.10 Community services and facilities

Of the three villages surveyed, Andavadoaka had the most services and facilities available to the community (Figure 31). These consisted of a dispensary, epi-bars, a restaurant, two hotels, and the aforementioned Catholic Mission and primary and secondary schools. The villages of

Figure 31. Summary Index of Services and Facilities

Services/facilities	Andavadoaka	Lamboara	Ampasilava
a. hospital	Yes (inadequate)	no	no
b. dispensary	yes	no	no
c. doctor	yes	no	Occasionally linked to the hotel
d. dentist*	no	no	no
e. pharmacy	no	no	no
f. primary school	yes	yes	yes
g. secondary school	yes	no	no
h. piped water	Only to the hotel	no	no
i. septic tanks	A few but insufficient	no	no
j. electric services	Yes	No	No
k. telephone services	No	No	No
l. postal services	No	No	No
m. market	No	No	No
n. Clothes shop	Yes	No	No
o. News agent*	No	No	No
p. epicerics and epi-bars	Yes	Yes	Yes
q. hotel or B&B	1 hotel (not locally owned) 2 B&B in the village	No	1 foreign owned hotel adjacent to the village
r. restaurant	Yes	Meals can be bought in the epi-bar	Meals can be bought in the epi-bar
s. gas station*	No	No	No
t. public transportation*	No	No	No
u. service/facilities index (sum a-t)	11/20	3/20	3/20

* Found in Morombe

Lamboara and Ampasilava only had one public building each, namely the Catholic primary school. The school functions as a church on Sundays and religious holidays and is also used for community meetings and other public gatherings.

3.1.11 Commercial activities

Almost all commercial activities in the three villages are fisheries-related. However, there are a growing number of small-scale merchants, usually women and young children, selling home made sweets, bread and seasonal fruits (Figure 32). There are also small shops (epiceries) stationed along the pathways with a wider selection of food staples. The larger epiceries

(epi-bars) have a much larger selection of goods including alcohol, as well as generators enabling them to play music. The concept of an epi-bar was first introduced to the region in the 1980s, and the bars now form a focal point for the village's social activities. The epi-bars are commonly not owned by locals. The amount of available goods is rapidly increasing (see Appendix IV for an index of available goods sold). The author observed a significant expansion of the number of epiceries and epi-bars and their supplies during a 10-month period. Goods arrive with *boutre* (cargo sail ships) from larger coastal towns. No fresh fruit or vegetables are transported to the villages and there may be periods with limited or no supplies.

Figure 32. Number of professionals with skills not related to marine resources.

	Andavadoaka	Lamboara	Ampasilava
Carpenter	18	6	
Mechanic	3	0	0
Electrician	1	0	1
Midwife	2 (government funded)	0	0
Baker	1	0	0
Boat builders	3	3	8 (all originating from Ampasilava)
<i>Hazomangas</i> traditional belief-practitioners	6	4	1
Handy-Crafts*			
- embroidery (women)	yes	yes	yes
- tapis-making (women)	yes	yes	yes
- baskets (women)	yes	yes	yes
- wooden boat models (men)	yes	yes	yes
Divers	0	2	0

* Crafts are often made for a functional need, and are not seen locally as artistic or as business opportunities. The demand for these products is low, although many community members possess the skills required to make them. The tourism demand for craft is still largely undeveloped, but the potential to create a business opportunity for local communities exists.

Andavadoaka has nine epi-bars and numerous epicerries. Lamboara has six epi-bars and seven epicerries; four of the epi-bars and five of the epicerries are locally owned the remainder are owned by villagers from Manombo, some 150km south of Andavadoaka. The first epi-bar in Andavadoaka opened in 1983 and the second

in 2003. Epi-bars have proven to be a profitable business venture for local entrepreneurs, with three epi-bars opening in 2005 alone in Lamboara. These are all locally owned. Ampasilava has two epi-bars; both owners are from Morombe. The village also has two epicerries one of which is owned by a local.

Figure 33. Breakdown of socioeconomic indicators in the SocMon villages

		Andavadoaka	Lamboara	Ampasilava	All villages
	House owners	90%	93%	100%	94 %
	Average no of units	1.6	2.0	1.5	1.7
Type of house	Wood house	20 %	10 %	16 %	
	Vondro	58 %	58 %	71 %	
	Shell pasted house	18 %	28 %	12 %	
	Metal shack	4 %	4 %	1 %	
Windows	Framed	33 %	41 %	21 %	
	Open	21 %	3 %	4 %	
	None	46 %	56 %	73 %	
Toilet facilities	Flush toilet	1 %	0	0	
	Out house	1 %	0	0	
	No toilet	98 %	100%	100 %	
Cooking Facilities	Use of wood	99.5 %	100 %	100 %	
	Other	0.5 %			

3.2 Socioeconomic indicators

Until relatively recently little attention has been paid to potential indicators that may be used to assess the economic and social status of fisheries and the link to the pursuit of sustainable development objectives (Tietze *et al.*, 2006). There is growing demand from policy makers to develop socioeconomic indicators, such as those in Figure 33, to assess the effectiveness of implemented policies and management

initiatives. These indicators facilitate assessments and comparisons of communities over time, and describe the extent to which project objectives are achieved. Developing a set of sustainability indicators not only assists in assessing the performance of marine resource policy and management initiatives, but also serves to stimulate action to better pursue these project objectives.

Figure 34. Photographs of the common house types in the three villages: a) Vondro, b) White pasted and c) plank



Over 90% of all households own the house that they live in. The houses are constructed from local materials. The most common type of house

is the bush material house *vondro* (Figure 34a). Wooden plank (Figure 34c), corrugated iron and white-pasted houses (Figure 34b) are considered to indicate a higher material style of life than the traditional *vondro* houses. Wooden planks and metal pieces are brought to the villages from Morombe. White-pasted houses are made from two seashells: 'Tsakodia' (*Pyrazus palustris*) and 'Bozike' (*Murex ramosus*), which are imported from Morombe and Toliara. The houses are simple with limited furniture, often with no windows or toilet facilities.

Material Style of Life (MSL), a method of measuring wealth based on the presence or absence of items, can be a powerful indicator of relative wealth or social status within a community (Cinner & Pollnac, 2004; Pollnac & Crawford, 2000). An inventory of 21 household possessions such as electrical appliances, furniture, vehicles and livestock was developed, alongside inventories of fishing materials, and home building materials (types of walls, roof and floor).

Figure 35 lists the distribution of household items and the proportion of households with selected material possessions. The percentage of respondents with material possessions that are indicative of a relatively high material style of life (e.g. television/VCD, generator, car livestock, etc.) was very low. Andavadoaka had the highest proportion of respondents with these items, suggesting that when combined with the

infrastructure indicators discussed above, there is a higher quality of life in this village than in the others. Andavadoaka was also the only community in which respondents possessed a car or motorcycle, a significant indicator of wealth for the respondents in question. However, the MSL also indicated that, with the exception of the small wealthy population of Andavadoaka,

the villages' MSLs were largely homogeneous. Andavadoaka was the only community that possessed some of the wealth indicators such as a car or motorcycle, but overall Ampasilava had a slightly higher percentage of the majority of indicators, especially when looking at fishing material.

Figure 35. Material Style of Life of households surveyed (HH = Households)

	Andavadoaka	Lamboara	Ampasilava
Electrical			
Generator (there is no public provision of electricity)	15 % (14 HH)	10 % (4HH)	3 % (1HH)
Television	13 %	8 %	1 %
VCD/DVD	10 %	5%	7 %
Radio/cassette	56 %	51 %	57 %
Batteries	8 %	0 %	3 %
Furniture			
Fridge	0	0	0
Table and chairs	96	76	93
Bed	97	79	97
Other indicators			
Pasta machine	10 %	3 %	4 %
Sewing machine	23	10	13
Transport			
Car	1	0	0
Motorcycle	1	0	0
Bicycle	3	2	2
Motor boat	0	0	0
Pirogue without a sail	14	49	53
Pirogue with a sail	46	46	43
Average number of pirogues	1.5	1	1
Zebu cart*	9	13	30
Livestock*			
Poultry	41	31	43
Zebu	17	28	37
Goat	13	21	17

*Livestock and zebu carts: the numbers of zebu carts and zebu change according to settlement patterns. The number of zebu carts is considered to increase with the number of non-Vezo Masikoro in the village, since zebu ownership is intrinsically linked to ethnicity. Ampasilava has a higher percentage of livestock because it is close to Ambalorao and other inland villages with a lot of livestock, which are brought to Ampasilava to escape attacks from *Malaso*.

3.2.1 Household Expenditures

The weekly expenditures of each household were also studied as an indication of household income (Figure 36). Expenditure was studied as opposed to income since respondents are often more willing to discuss expenses than earnings

(Cinner *et al.*, 2006). Median values were calculated to summarise the data and to remove the effect of outliers. Respondents were asked to make estimates based on daily, weekly or monthly approximations of expenditure. These were then standardised as a weekly measure across all respondents.

Figure 36. Weekly household expenditures (MGA)

	Andavadoaka	Lamboara	Ampasilava	Average
Food	(74%) 26548	(73%) 18487	(78%) 19717	21584
Hygiene Articles	1339	1042	863	1081
Petrol	1576	1087	1100	1254
Gas	2043	1615	1400	1686
Transport	827	1192	136	718
Education*	736	624	809	723
Leisure	2851	1188	1127	1722
Total expenditure per week	35919	25237	25152	28770
Average household size	5.675	5.154	6	5.6
Range of household size	1-24	2-10	1-11	

Rate: 1 USD = 1,869.45 MGA

Figure 37. Total weekly household expenditure in all three communities

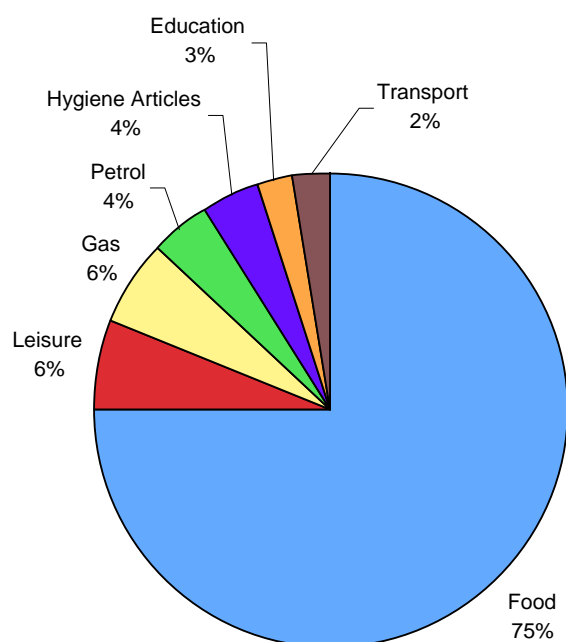


Figure 38. Inventory of fishing gear in a household engaged in fishing.

Fishing Gear	Andavadoaka	Lamboara	Ampasilava
Fishing net	42 %	69%	50%
See Figure 39 for the various types of nets			
Spear gun	11%	38%	47%
Average number in a household	1.2	1.6	1.9
Harpoon	82%	89%	100%
Average number in a household	3.2	2.8	4.0
Mask	48%	56%	77%
Average number in a household	1.9	1.3	1.7
Fins	8%	23%	13%
Average number in a household	1.2	1	1.5
Snorkel	1%	5%	3%
Average number in a household	1.0	1.0	2.0

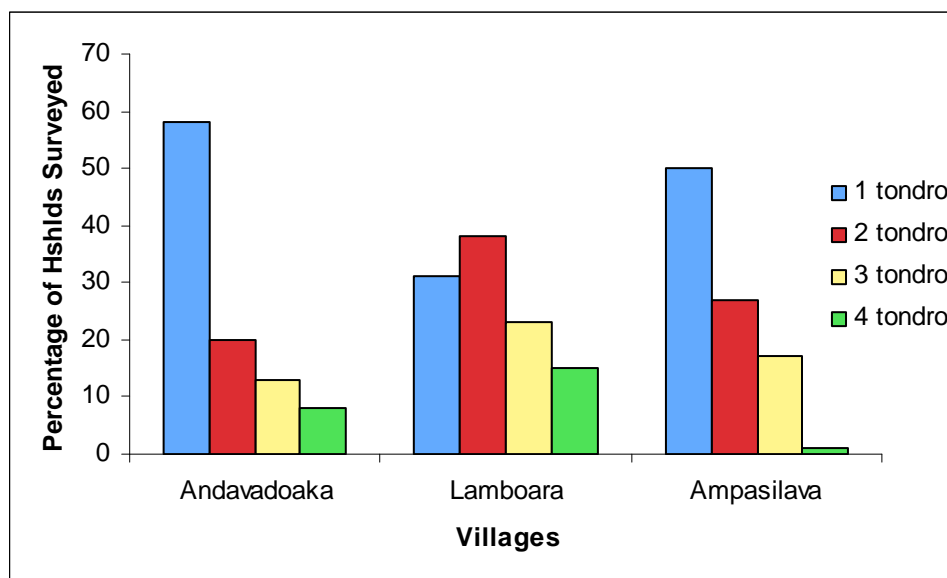
The village of Andavadoaka reported the highest average weekly expenditures, at \$17 US (\$13.5 US in Lamboara and Ampasilava). For the two smaller communities, this translates into less than two dollars a day for a household of between five and six people.

The expenditures of respondents within villages varied considerably. In Andavadoaka, household expenditure varied from as little as \$4.1 US to as much as \$73.4 US per week. The weekly expenditures in Lamboara ranged from \$4.4 US to \$52.6 US and from \$4.2 to \$40.4 US in Ampasilava. However, there are fewer goods and services available in Lamboara and Ampasilava; Andavadoaka households spent

significantly more on leisure, including alcohol, which is intermittently available in Lamboara and Ampasilava.

Results showed little variation between villages and households on what they spent their money on. The largest expenditure in all of the villages was food and the second largest expense was gas and leisure activities (Figure 37). Lamboara spent more money on transport than the other two villages because of its geographical location. Education represented 3% of the total expenditures for all three villages.

Figure 39. Percentage of different sizes of nets per household in each community



NB: Tondro is a Vezo measure for fishing net mesh size equivalent to a finger’s width.

3.2.2 Fishing Materials

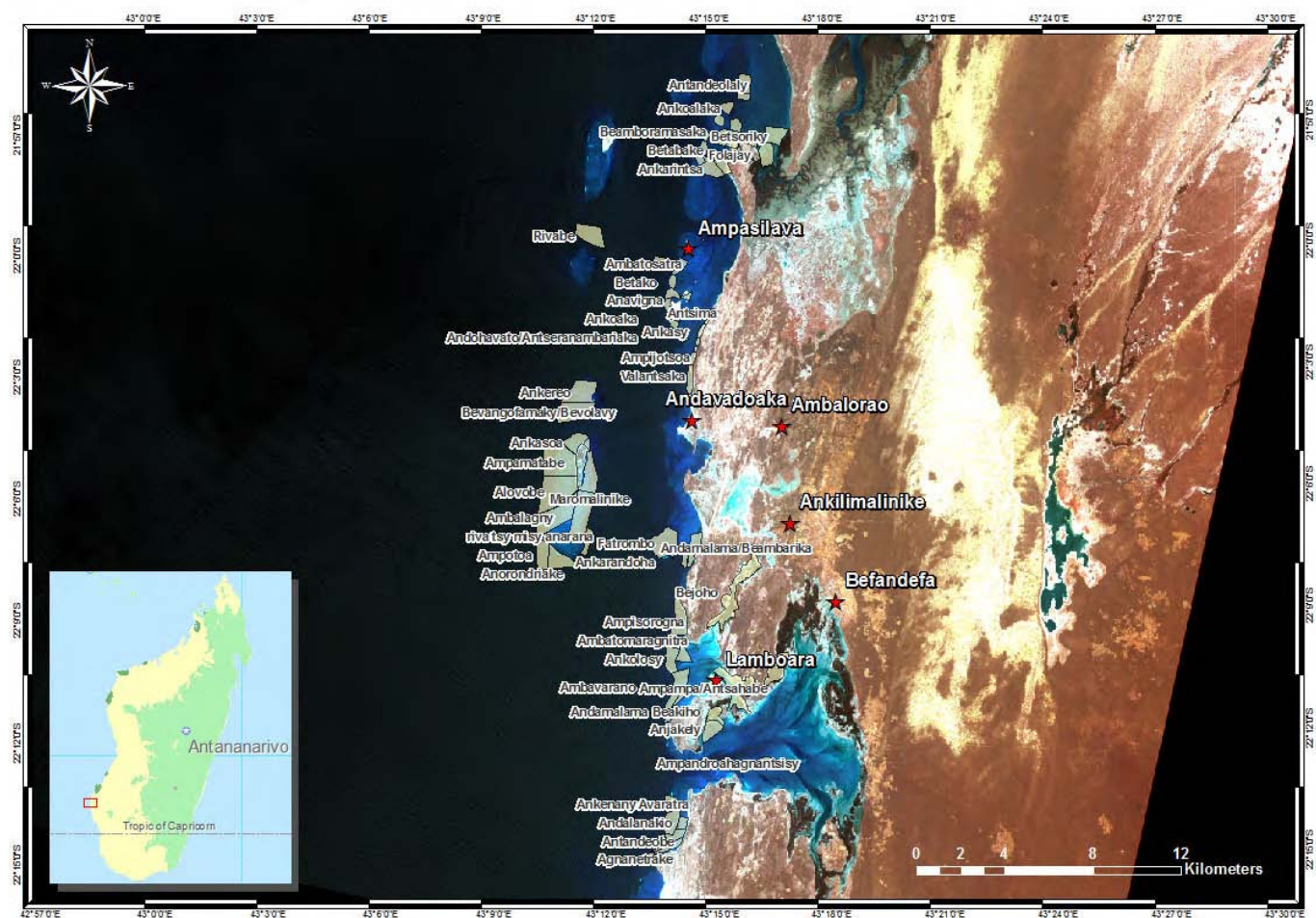
The type and amount of fishing gear was monitored as a further indication of

socioeconomic status (Figure 38). Conducting household inventories of fishing gear can also be an effective way of measuring a change in fishing pressure or switch to alternative methods

over time. The type of fishing gear may vary in villages because of different specialisations/targeted species. For example, Lamboara has the highest percent of large nets (Figure 39), which may be attributed to a higher percentage of shark fishers. Overall Ampasilava has significantly higher percent of fishing items per household (excluding fishing nets). However, this is not

necessarily indicative of a higher socioeconomic status because of the different costs of various gear types. Ampasilava has a significantly higher percentage of masks compared to the other two villages, which can be explained by the fact that spearguns and harpoons are used in combination with a mask.

Figure 40. Map of Vezo fishing sites



3.3 Marine Activities

As discussed previously fisheries throughout the region are low-tech, using sail or paddle-driven non-motorised pirogues. Fishers use a variety of

hand-made fishing gears (nets, hand-lines and spear guns) each requiring its own fishing technique and expertise. Pirogue use for fishing is largely restricted to men, however women often engage in gleaning for octopus and other

invertebrates, at shallow lagoonal habitats and reef flats. Traditionally the Vezo share fishing grounds but access to fishing grounds for a fisher can vary according to ancestral beliefs. The wind intensity and direction is another determinant of fishing since the pirogues have no out-board engines. The location of Vezo fishing sites can be seen in Figure 40.

To monitor marine activities, a combination of research methods were deployed. The households surveyed in the first survey questionnaire (SQ1) were asked which marine activities they were engaged in, what products/species they involved, and what methods they used in catching, collecting or processing the products. For each product and activity, the respondents were asked whether the product was for subsistence, for sale, or both. If a product or service was for sale then the respondents were asked to specify whether it was for the local, regional/national or international market. In addition to the SQ1, a focus group interview (FGI) was held in each village to investigate marine activities and to confirm the survey results. The FGI included five participants engaged in marine activities (three men and two women).

Marine produce is typically consumed by the household, bartered for other food staples or sold locally. Since the majority of fishing is for local consumption or sale, the Vezo exploit many species (Figure 41). The main types of marine

resources targeted are reef and pelagic finfish, octopus, squid, lobsters, sea cucumbers, sea urchins, turtles, sharks and rays. Vezo fishers in Andavadoaka, Lamboara and Ampasilava have limited access to markets due to geographical isolation and lack of sufficient fishing market infrastructure. The lack of refrigeration facilities has traditionally necessitated the preservation of seafood products by drying or salting for sale within traditional local markets and trade routes. These preservation processes greatly decrease the value of the marine produce from that which can be obtained for fresh products sold at markets in Toliara and other economic centres.

At the time of this study, two commercial fish collection companies were operating in the Andavadoaka region. These Toliara-based companies, Copefrito and Murex, offer refrigeration at the point of collection within villages throughout the region, and in doing so provide access to more lucrative markets for local fishers. 99.5% of octopus is for sale and accounts for over 95% of all fish exports products. Octopus is therefore the villages' most precious trade commodity and without octopus collection from commercial export companies the villages' economies would most likely collapse.

Figure 41. Marine resource use and destined markets

Activity	Species/ Products	Method	Utilisation/ Market	Percentage
Fishing	Octopus	Gleaning	Subsistence	0.5
		Diving	Local market	1.5
		By-catch	National/Regional	5
			International	93
	Small pelagic fish	Net Line Speargun	Subsistence	10
			Local	30
			Regional (inland)	60
			International	0
	Lobster	Speargun	Local	70
			National	20
			International	10
	Shrimp	Net (mosquito)	Regional	50
			National	50
	Shark	Line	Regional	50
		Net	National	50
Turtle	Net	Local	100	
Sea Cucumber	By foot/ Diving	Regional/International	100	
Crab	By foot	Mangrove Local	100	
		Local	1	
Sea Shells	Collect harpoon	Regional/National	69	
		International	30	
		Local	80	
Urchins	By foot	Subsistence	20	
		Local	100	
Salt extraction	Salt	Local	100	

During the time of monitoring, the SocMon team observed sharkfin barter at the village's main epi-bar (Figures 42a, b and c). Local shark fishers had been encouraged to increase their effort to fish for shark fins by higher payments (3000 – 3600 MGA, e.g. 1.6- 2.0 USD). The epi-bar owner would make a large profit selling it on to traders for 130,000 MGA in Morombe, and 160,000 MGA in Toliara who will export these to further lucrative markets in Asia for 65-90 Euros/kg (IHSM, pers. comm., 2006).

The shark fishing sites are currently too far from land to be fished regularly by the local fishers but are likely to become more accessible through the provision of outboard engines. However, this is an alarming situation considering the findings of a recent documentary on shark fisheries of the region (Shark Fin Soup and Fried Sea Cucumbers, 2004), which showed that some shark species have become locally extinct.

Another market that Lamboara has tapped into is *katra* or cowrie shells (*Cyprae sp.*). As demonstrated in Figures 43a and b, *katra* is

collected *en mass*, mainly by women and young children. The shells are bought by the epi-bar owner for as little as 300 MGA/kg (eq. 0.16 USD/kg). This can have devastating ecological consequences since almost ten tonnes can be collected during a period of 7 months.

Figure 42. Photographs of a) Shark fishers meeting in Lamboara, b) Large shark fin and c) Shark fin being weighed



Figure 43. Photographs of a) Woman gathering dried shells in Lamboara and b) Children selling collected seashells at night



3.4 Perceived Community Problems

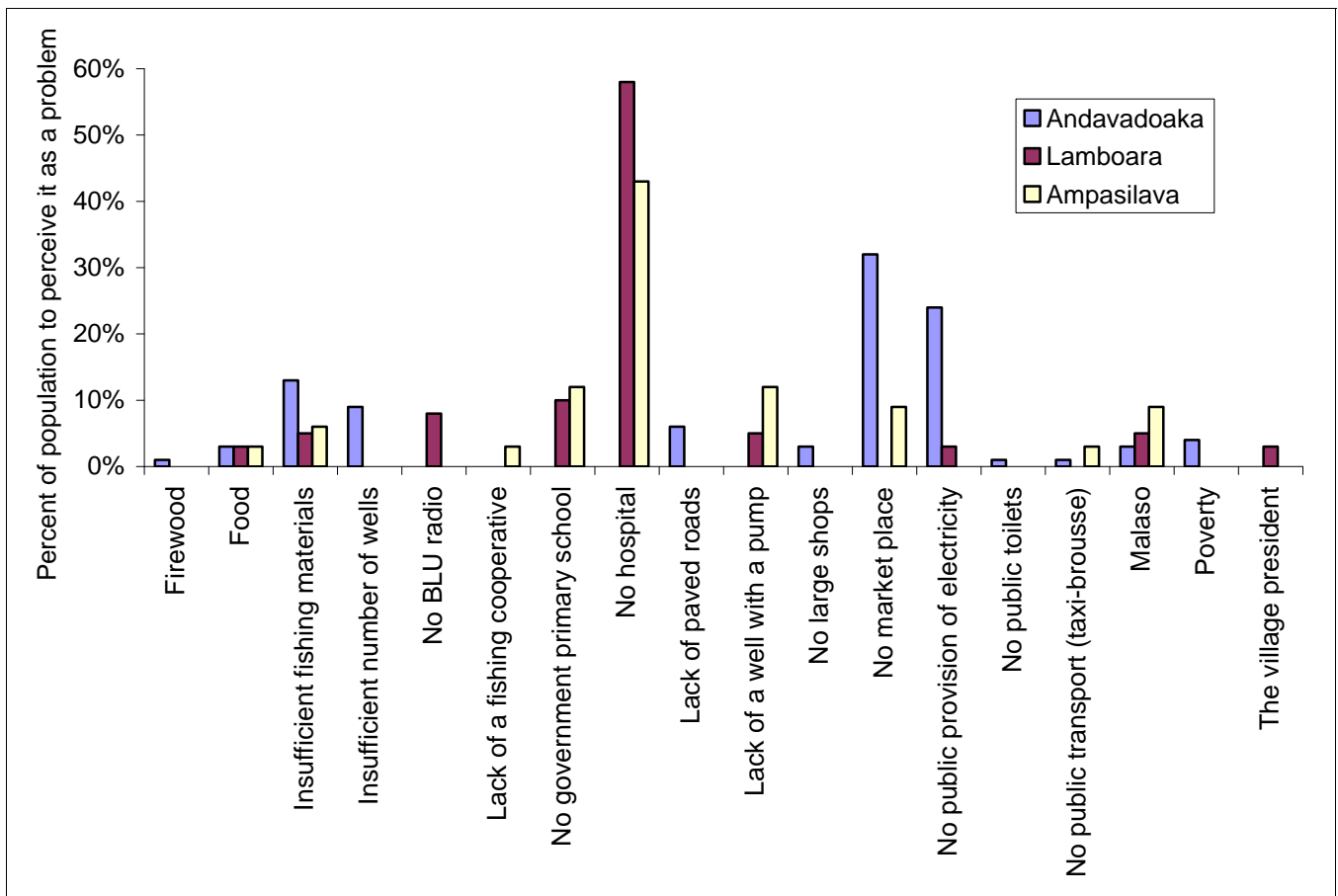
The head of the households in all three communities were asked to list three community problems. In Andavadoaka, 26% of the respondents did not list any problems. Of the respondents who did list problems, the majority listed two problems and only one-fifth listed three problems. In Lamboara, 96% listed one or more community problems. Of those, 69% listed two problems and 31% listed three community problems. In Ampasilava, all respondents (100%) listed problems, 67% listed two problems and 30% listed three community problems.

The village of Andavadoaka identified the lack of a market place to buy and sell goods, and the

lack of public provision of electricity as the main problems in the community (Figure 44). Other identified problems in Andavadoaka included insufficient number of wells and fishing materials, as well as the lack of a paved road to

increase market access. Three percent of the respondents listed the *Malaso* as the main threat, compared to as much as nine percent in the two smaller villages.

Figure 44. Perceived community problems according to household surveys in Andavadoaka, Lamboara and Ampasilava. Percentages are of those who listed problems, not of the total village populations.



The villages of Lamboara and Ampasilava had different perceptions of community needs and problems. Lamboara and Ampasilava both listed the lack of a hospital as the communities’ main problem (58% and 43% respectively). The other major problems in Lamboara and Ampasilava were the lack of a well with a pump, lack of a government primary school and insufficient

fishing materials, including public vedette (small motorised boat) and motorised pirogues.

Eight percent of the respondents in Lamboara listed the lack of a BLU radio as the community’s main problem and all respondents who listed more than one community problem listed BLU radio. Significantly fewer respondents in Ampasilava listed not having a

BLU radio as community problem, most likely because Ampasilava is within 5km distance from the two BLU radios in Andavadoaka. Andavadoaka was the only community who listed not having toilets, and subsequent beach defecation, as a community problem. Lamboara was the only community who identified the village president as being the main problem in the community (1%).

Secondary community problems included bad weather, bad geographical location (Lamboara), lack of public transport and the opportunity to buy necessities.

4.0 Acknowledgements

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Appendices

Appendix I. Blue Ventures Visitor Survey (French)

Enquête de tourisme d'Andavadoaka (2005)

Blue Ventures Conservation.

Cochez les cases appropriées s'il vous plait. Merci de votre coopération.

Date: _____ Nationalité: _____ Sexe : H F

Age : 0-17 18-25 26-35 36-45 46-55 56-65 > 65

Combien de temps comptez-vous passer à Andavadoaka?

1 Jour 2-3 Jours 4-7 Jours 1-2 semaines > 2 semaines

Le but de votre visite? Recherche Vacances Autre

Vous voyagez comment ? Seul En groupe de 2 3-5 6-10 11-20 plus de 20

Moyen de transport jusqu'à Andavadoaka ?

En : 4x4 Taxi brousse Camion Vedette Pirogue autre (veuillez spécifier s'il vous plait)

Venant de ? _____ Allant a _____

Est-ce votre première visite à Madagascar ? Oui Non

Qui a organisé votre voyage? Vous-même ou Une agence de voyage/tourisme Si oui, laquelle _____

Quelles activités vous intéressent à Andavadoaka? (Plusieurs possibilités)

- Déjeuner avec une famille vezo
- Apprendre comment faire de la voile en pirogue avec les locaux
- Visiter une Îsle avec un guide local
- Faire des randonnées palmées sur les récifs coralliens avec un guide naturaliste local
- Sortie avec un pêcheur
- Une visite guidée dans la village avec un guide local
- Visiter la forêt de baobabs avec un guide local
- Visiter les mangroves avec un guide local

Saviez-vous que ces activités étaient disponibles? Oui Non

Avez vous d'autres opinions sur le tourisme et l'environnement, ou avez vous des suggestions pour le futur d'Andavadoaka?

Appendix II. SocMon Survey Questionnaire

QUESTIONNAIRE 1

Nom enquêteur:

Village:

Durée:

Date:

Nom enquêté:

N° Questionnaire:

1. INFORMATION DEMOGRAPHIQUE (S1- S9)

Membre du ménage	Age	Sexe	Occupation	Niveau d'Education accompli	Langue Maternelle	Langue Officiel O/N	Française O/N

2. MARCHANDISES ET SERVICES (S13, S14)

ACTIVITÉS CÔTIER ET MARINES	MARCHANDISES COTIER ET MARINES ET SERVICES	MÉTHODES	UTILISATION PAR MENAGE (C/V)
1			
2			
3			

C= CONSUMER
V=VENDRE

3. STATUT SOCIO-ECONOMIQUE (Style de vie matériel S29)

Est-ce que vous êtes le propriétaire de votre maison ? Oui / non

Taille de maison : nombre de pièces/unités_____

Les Matériaux de ménage :

Construire en : planche_____ ; vandro_____ ; saux_____ ; autre_____

Fenêtres : cadre_____ ; ouvert_____ ; aucune_____

Accès a l'eau : conduite en tuyau_____ ; puit prive_____ ; puit partagé_____ ; (distance de la maison_____)

Facilites pour faire la cuisine ; _____

Toilette : Toilette avec chasse d'eau_____ ; simple toilette_____ ; pas de toilette_____

Les indicateurs socio-économiques:

Est-ce que vous avez :

Les appareils électroménagers

- Générateur
- Frigiteur
- Machine a pates
- Télévision
- VCD/DVD
- Radio/cassette
- Batteries
- Machine à coudre

Fornitures:

- Table et chaises
- Lit

Transport/ intrants productif

- Pirogue a voile (taille et nombre)
- Pirogue a rames (taille et nombre)
- Vedette
- Voiture
- Charrette du zébu
- Velo

Pour les actifs servant a la production :

- Volailles
- Zébu (nombre)
- Chèvre (nombre)
- Machine a pates
- Patates (Manioc) (cultivation)

La pêche seulement :

Est-ce que vous avez :

- filets de pêche ? Le (les) quel(s) _____ et combien? _____
- Bassim pia (spear gun) le quel ? ; _____ ; et combien _____ ?
- Voloso (harpoon) ; _____ ; et combien _____ ?
- Masques ; _____ ; et combien _____ ?
- Palmes; _____ ; et combien _____ ?
- Tubas; _____ ; et combien _____ ?

Les dépendances:

- Alimentation (Fmg ou Ariary par jour) _____
- Articles d'hygiène (Fmg ou Ariary par semaine) _____
- Petrol (Fmg ou Ariary par jour) _____
- Essence (Fmg ou Ariary par jour) _____
- Transport (Fmg ou Ariary par semaine) _____
- Education (Fmg ou Ariary par mois) _____
- Loisir (Fmg ou Ariary par semaine): alcool _____ ; cigarettes _____ ; autres _____

4. Problèmes perçus de la communauté (S25)

Quels sont les trois principaux problèmes se posant à la communauté ?

1. _____
2. _____
3. _____

Appendix III. SocMon Andavadoaka Training Schedule

Day	Heure	Sujet	Matériel
1	9 :00	Introduction	
	9 :15	Présentation – tour de table	
	9 :30	La formation	
	9 :45	Introduction à Socioeconomic monitoring WIO (objectifs, structure, activités, avantages)	Info sheet
	10:30	Break	
	10:50	La proposition d'Andavadoaka (objectifs structure)	Proposition
	11:15	Obligations/Termes de Référence	TORs
	11:30	Discussion	
	11:45	Suivi et évaluation, qu'est ce que c'est?	Fiche Mémo
	12 :30	Déjeuner	
	14:00	Méthodes (4 méthodes principale)	Fiche Mémo Flip Chart
	15:30	Break	
	16:00	Jeux de rôle & Discussion sur problèmes et solutions	Flip Chart
	17:00	Fin	
2	9:00	Programme	
	9:10	Comment utiliser Socioeconomic monitoring WIO?	Diagramme/projecteur
	9:30	Utiliser le Guide dans le contexte d'Andavadoaka (revoir les variables choisies)	Guide Tableau variables
	10:30	Break	
	10:50	Adaptation des Guides d'entretiens pour une sélection de variables	Guide Variables and guide d'interview/Groupes
	12:30	Déjeuner	
	14:00	Test sur le terrain.	Guides d'interview/Groupes
	17:00	Retour, programme jour 3	
3	9:00	Entrée des données et analyse	Ordinateur Fiche d'entrée et d'analyse de données/Groupes
	10:30	Break	
	10:50	Entrée des données et analyse	Ordinateur Fiche d'entrée et d'analyse de données/Groupes
	12:30	Lunch	
	14:00	Présentation des résultats et discussion sur la qualité des données	Flip Chart
	14:45	Discussion sur l'expérience de terrain	Flip Chart
	15:15	Break	
	15:30	Elaboration d'une stratégie de communication	Matrice/photocop./Groupe
	17:00	Fin	
4	9:00	Programme	
	9:10	Commencer à planifier Socioeconomic monitoring Andavadoaka	Flip Chart
	10:30	Break	Flip Chart
	10:50	Les étapes suivantes...	Flip Chart
	12:00	Fin de la formation	

Appendix IV. Epi-bar Inventory: 15/12/2006

Product	Epi-bar name	Price (ariary)	Number of product
Batteries	Chez Daladoodle	700	84
Batteries - Cassett	Kaborara	1500	10
Batteries - Separd	Miriam	700	12
Batteries - Yarrico	Kaborara	200	1
	Miriam	500	48
Batteries - Yarrico (small)	Supermarket	300	36
Batteries - Large	Kaborara	700	40
	Supermarket	800	15
Beans (1 cup)	Kaborara	400	
Beer	Che Da Da	2000	100
	Kaborara	1800	22
	Supermarket	2000	40
Biscuit - Bolo	Che Da Da	250	30
	Kaborara	250	15
	Miriam	300	23
	Supermarket	250	60
Biscuit - Family	Miriam	300	4
Biscuit - Frego	Kaborara	700	52
	Supermarket	700	60
Biscuit - Glucose	Miriam	500	4
Biscuit - Goldie	Miriam	600	8
Biscuit - Gouty	Che Da Da	400	20
	Chez Daladoodle	600	24
	Supermarket	600	25
Biscuit - Malagasy	Chez Daladoodle	1200	15
	Kaborara	1200	3
Biscuit - Metro	Kaborara	100	30
Biscuit - Nice	Kaborara	700	7
	Supermarket	600	9
	Miriam	500	13
Blanket	Chez Daladoodle	7000	2
Bon bon (bag)	Che Da Da	1000	20
	Chez Daladoodle	1000	30
	Kaborara	1000	7
Bon bon (each)	Supermarket	50	400
Bon bon paddle	Kaborara	100	100
Bread	Supermarket	400	5
Bucket	Miriam	3500	8
Bucket - Big	Chez Daladoodle	3500	3
Bucket - Small	Chez Daladoodle	1800	6
	Miriam	300	2

Product	Epi-bar name	Price (ariary)	Number of product
Candles	Che Da Da	300	3
	Chez Daladoodle	300	70
	Kaborara	300	50
	Supermarket	250	50
Casava (per kg)	Miriam	600	
Chocolate	Kaborara	400	50
	Miriam	2600	2
	Supermarket	2800	50
Cigarettes - Boston	Supermarket	1700	55
Cigarettes - Good Look	Che Da Da	1600	12
	Chez Daladoodle	1400	60
	Kaborara	1600	100
	Supermarket	1400	15
	Tantely	1600	9
Cigarettes - Mela	Miriam	1000	2
	Tantely	1000	10
	Che Da Da	1000	10
Cloth	Supermarket	2500	10
Cloth - Lamba	Kaborara	3000	10
Cloth - Small	Chez Daladoodle	3500	10
Coffe beans (per tin)	Chez Daladoodle	1000	
Coffee (1 cup)	Kaborara	1200	
Cooking oil (1 Litre)	Chez Daladoodle	3500	
	Kaborara	3600	
	Miriam	3000	
	Supermarket	4000	2
Crisps - Cracky	Kaborara	500	14
	Supermarket	300	50
Cups	Chez Daladoodle	1000	6
	Supermarket	2200	1
Dried berries (per cup)	Julien	200	
Fake hair	Kaborara	5000	2
Fishing net	Kaborara	30 000	6
Flip flops	Chez Daladoodle	2600	2
	Kaborara	2500	20
	Supermarket	2700	6
	Tantely	2000	8
Flour (1 cup)	Supermarket	1800	
Flour (1 kg)	Kaborara	1700	
	Miriam	1800	
Garlic	Julien	300	30
Greece	Kaborara	2500	8
Hair dye	Tantely	2000	5

Product	Epi-bar name	Price (ariary)	Number of product
Hair oil	Chez Daladoodle	200	50
	Miriam	250	12
Maize (1 cup)	Kaborara	200	
Mango	Julien	50	30
Matches	Chez Daladoodle	100	50
	Miriam	100	20
Mosquito coils	Kaborara	1000	3
	Miriam	1000	2
	Tantely	600	5
Noodles	Chez Daladoodle	600	7
	Kaborara	800	8
	Miriam	1000	12
	Supermarket	750	34
Note book	Chez Daladoodle	1000	40
	Kaborara	1000	150
	Supermarket	350	46
Nylon line - Thick (100m)	Kaborara	5000	
Nylon line - Thin (1000m)	Kaborara	6000	
Nylon line (small roll)	Supermarket	8000	20
Onion	Che Da Da	100	50
	Julien	50	13
Paint	Chez Daladoodle	2500	15
	Miriam	2700	13
	Supermarket	2700	14
Paint brush	Kaborara	1000	2
Peanut (small cup)	Julien	50	
Pen	Miriam	300	100
	Supermarket	200	100
Pencil	Che Da Da	200	9
Petit beurre	Miriam	800	3
Petrol (per litre)	Che Da Da	2800	
	Kaborara	2400	
	Miriam	2600	
Plastic bag	Che Da Da	100	30
	Chez Daladoodle	100	60
	Julien	100	10
	Kaborara	100	50
	Tantely	100	50
Razor blades	Chez Daladoodle	700	15
Razors - Gillette	Supermarket	900	5

Product	Epi-bar name	Price (ariary)	Number of product
Rice (1 cup)	Chez Daladoodle	250	
	Kaborara	250	
	Miriam	250	
	Supermarket	250	
Rum	Che Da Da	1600	13
	Chez Daladoodle	1600	12
	Supermarket	1100	80
Rum - red	Kaborara	1600	10
Rum - white	Kaborara	1500	10
Salt	Kaborara	300	6
Scissors	Kaborara	1000	17
Scooper	Chez Daladoodle	1000	9
Scrubbing steel	Kaborara	400	15
Shampoo	Chez Daladoodle	200	30
	Kaborara	200	10
	Supermarket	200	30
Shoes	Kaborara	4500	2
	Supermarket	4900	14
Soap - Citrix	Kaborara	700	6
	Miriam	900	7
Soap - Giv	Chez Daladoodle	800	10
	Miriam	600	2
Soap - Kris	Miriam	900	1
	Tantely	800	4
Soap - Large	Che Da Da	300	6
Soap - Malagasy	Chez Daladoodle	300	8
	Julien	350	7
	Kaborara	200	50
Soap - Malagasy (Large)	Miriam	350	6
	Supermarket	500	15
	Tantely	350	14
Soap - Malagasy (Medium)	Supermarket	400	15
Soap - Malagasy (small)	Chez Daladoodle	200	25
	Miriam	200	14
	Supermarket	300	20
Soap - Ola	Miriam	700	21
	Tantely	800	2
Soap - Santex	Chez Daladoodle	800	22
	Kaborara	800	10
	Miriam	900	4
	Supermarket	600	8
Soap - Small	Che Da Da	200	15

Product	Epi-bar name	Price (ariary)	Number of product
Soap - White	Miriam	400	8
Soap powder	Tantely	250	15
Socolait	Chez Daladoodle	2500	9
	Tantely	2500	2
Softdrink Large	Che Da Da	2000	16
	Kaborara	2000	7
	Miriam	2600	10
	Supermarket	2000	7
Softdrink Small	Che Da Da	1000	22
	Kaborara	1000	25
	Miriam	1200	5
	Supermarket	1000	50
Spices	Kaborara	600	18
	Supermarket	400	40
	Tantely	600	15
Spoon	Chez Daladoodle	250	80
Sugar (1 cup)	Supermarket	700	
Sugar (1 kg)	Chez Daladoodle	2400	
	Kaborara	2400	
	Miriam	2600	
Sweet Rolls	Supermarket	100	40
Tana foty (for infection)	Julien	200	7
Tea (bag)	Chez Daladoodle	1000	20
Tea (per spoon)	Miriam	50	
Tobacco - small packet	Chez Daladoodle	100	7 (large packets)
	Kaborara	200	8 (large packets)
	Miriam	100	7 (big packets)
	Tantely	200	7 (large packets)
Toga gash	Chez Daladoodle	2000	
	Tantely	2400	
Toga gash (1 litre)	Kaborara	2400	
	Supermarket	2000	
Toilet roll	Tantely	1000	20
Tomato	Chez Daladoodle	600	15
	Kaborara	600	19
	Supermarket	60	30
Tomato Ketchup	Miriam	2500	1
Tomato Paste	Miriam	600	10
	Tantely	200	5
Toothbrush	Chez Daladoodle	700	9
	Kaborara	600	9
	Miriam	700	8
	Supermarket	400	11

Product	Epi-bar name	Price (ariary)	Number of product
Toothpaste	Chez Daladoodle	700	14
	Supermarket	3300	10
Torch	Kaborara	2500	8
	Supermarket	2700	5
Vinegar	Kaborara	800	6
	Supermarket	800	12
Washing Powder	Chez Daladoodle	250	60
	Julien	250	8
	Kaborara	250	60
	Supermarket	300	12
Water	Miriam	1800	10
	Tantely	1500	3