Garth Cripps

Understanding migration amongst the traditional fishers of West Madagascar

blue ventures
discovery through research

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RECOMAP
INDIAN OCEAN

Submitted in fulfilment of ReCoMap service contract PE2/014/2008

Keywords: Fishers, poverty, migration, Madagascar.

Acknowledgements: This study was undertaken as a short consultancy for ReCoMap (service contract PE2/014/2008). I would like to thank all Blue Ventures staff who helped – particularly Abdul, Bravo Haja, Fav and Sahid – and the migrants who participated in the study.

Recommended citation: Cripps, G. (2009) Understanding migration amongst the traditional fishers of West Madagascar. Blue Ventures Conservation Report for ReCoMaP.

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Abbreviations and Acronyms

BV – Blue Ventures

CBO – community-based organisation

CBM – community-based monitoring

CBNRM - community-based natural resource management

CMPA – coastal and marine protected area

DPRH – Direction de la Pêche et de Ressources Halieutiques

DSRP – Document de Stratégie de Réduction de la Pauvreté

EIA - Environmental Impact Assessment

FAO – Food and Agricultural Organisation

GELOSE – Gestion Locale Sécurisée

INSTAT – Institut National de Statistique

ICZM – integrated coastal zone management

MAEP – Ministère de l'Agriculture, de l'Elevage et de la Pêche

MMTD - Melaky Miaro ny Tontolo an-Driakany

MPA – Marine protected area

ONE – Office National de l'Environnement

PSDR – Projet de Soutien au Développement Rural

PSP – Projet Sectoriel Pêche

SAPM – Systeme d'Aires Protegees de Madagascar

NTZ – not-take-zone, an area closed to all extractive activities

VA – the Velondriake Association

WCS – Wildlife Conservation Society

ZAC – Zone amenagement concertee

Glossary

Artisanal fishers as defined by Malagasy fisheries law are fishers who use motorised vessels in mostly shallow depths. The power of the motor was initially limited to 25 hp, but was upgraded to 50 hp.

Dina A law, convention or contract established collectively by the people of the same community or village in order to govern a particular concern .

Enrolment ratio, gross combined, for primary, secondary and tertiary education The number of students enrolled in primary, secondary and tertiary levels of education, regardless of age, as a percentage of the population of theoretical school age for the three levels.

Faly A taboo or prohibition (fady in official Malagasy).

Foko A group sharing the same place of residence and having the same lineage guided by the elder of the group in the village.

Fokonolo Village assembly that brings together the different socio-political groups of the village.

Fokontany The smallest administrative level in Madagascar that consists of one or several villages within the boundaries of a commune.

Gender-related development index (GDI) A composite index measuring average achievement in the three basic dimensions captured in the human development index — a long and healthy life, access to knowledge and a decent standard of living—adjusted to account for inequalities between men and women.

Human Development Index (HDI) A composite index measuring average achievement in three basic dimensions of human development – a long and healthy life, access to knowledge and a decent standard of living.

Human Poverty Index for Developing Countries (HPI-1) A composite index measuring deprivations in the three basic dimensions captured in the Human Development Index - a long and healthy life, access to knowledge and a decent standard of living.

Income poverty line, population below The percentage of the population living below the specified poverty line: US$1.25 a day and US$2 a day – at 2005 international prices adjusted for PPP.

National poverty line — the poverty line deemed appropriate for a country by its authorities. National estimates are based on population-weighted sub-group estimates from household surveys.

Income classifications Countries are grouped by income using World Bank classifications: high income (gross national income per capita of US$11,116 or more in 2006), middle income (US$906–$11,115) and low income (US$905 or less).

Karani Malagasy of Indian descent.

Nosy Isle; island; describes also immerged coral cays.

Purchasing Power Parity (PPP) A rate of exchange that accounts for price differences across countries, allowing international comparisons of real output and incomes. At the PPP US$ rate, PPP US$ 1 has the same purchasing power in the domestic economy as US$ 1 does in the US.

Traditional fisher Malagasy law distinguishes small-scale fishers as either: traditional fishers, who use non-motorised vessels of limited reach ("rayon d'accès très limité") or fish on foot; or artisanal fishers, who fish using motorised vessels to fish mostly shallow depths. The power of the motor was initially limited to 25 hp, but was upgraded to 50 hp.

Water source, improved, population using. The percentage of the population with reasonable access to any of the following types of water supply for drinking: household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collection. Reasonable access is defined as the availability of at least 20 litres per person per day from a source within one kilometre of the user's dwelling.

Water source, improved, population not using Calculated as 100 minus the percentage of the population using an improved water source.

Velondriake the Velondriake community-managed protected area, which encompasses 25 villages in the commune of Befandefa; many of these villages have a strong tradition of fisher migration.

1. Summary

Socioeconomic conditions of Malagasy coastal fishing communities

Madagascar is classified by the World Bank as a low income country, with acute poverty and in 2006 a per capita GDP of 878 US$ PPP (purchasing power parity). The Human Development Index (HDI) for Madagascar is 0.533, which gives the country a rank of 143rd out of world's 179 countries for which data are available. From 2000 to 2007, 71.3% of the population lived beneath the national poverty line. Overall poverty is more prevalent in rural areas, where 78% of the population and 84% of poor people live. In eight of Madagascar's twelve coastal districts both rural and urban poverty are more prevalent than the national average, ranging from 70.7% (Sava region) to 81.6% (Androy region).

The socio-economic characteristics of most traditional fishing communities in Madagascar are characteristic of tropical coastal poverty:

- They have large households with a high proportion of children and a high birth rate;
- Child labour is prevalent and schooling of children is low; household heads are poorly educated;
- Access to basic health services and drinkable water are poor;
- Households are often physically isolated from markets, schooling, transport links and other basic services;
- Livelihood strategies are based on marine and coastal resources that are open-access with no clear ownership;
- There is a high degree of immigration to coastal areas with easily-accessible livelihood opportunities;
- The natural resources upon which poor coastal people depend are degraded.

Migration drivers

The present migration of traditional fishers is symptomatic of the many challenges faced by poor coastal people in South West Madagascar. On a macro-level the principal migration routes simply reflect a livelihood strategy of poor, resource-dependent people who are moving from areas of high poverty, high dependency on fishing as a livelihood and depleted coastal fisheries to areas of lower poverty, low dependency on fishing and still-productive fisheries. This overarching driver is rooted in a number of causal direct and indirect drivers of migration. Principal among these are:

- the strong demand for shark fins and sea cucumbers (trepang);
- the widespread degradation of coastal ecosystems underpinning fisheries in South West Madagascar because of climate change, hyper-sedimentation and over-fishing;
- and poverty engendered by over-population, resource degradation and the lack of alternative livelihoods to fishing.

In addition to these - the most powerful drivers of migration - traditional fishers also move for other reasons. For example: insecurity caused by armed bandits, to have access to education for their children, to live closer to

markets, to have access to fisheries opportunities unexploited by the resident communities, and to settle in scarcely populated sites where competition for natural resources is lower.

Migration patterns

Significant migrations of traditional fishers take place over the entire west and southwest coasts of Madagascar. Here, myriad movements take place, ranging in distance from tens to hundreds of kilometres, and in time scale from short fishing trips lasting a few weeks to seasonal migrations of three to nine months. Some migrations are even definitive, with migrants settling permanently at their destinations. These migrations can be roughly grouped as follows:

- a recent distant migration of Vezo fishers driven by the strong demand for sea cucumbers and shark fins;
- a more traditional distant migration of Vezo and Sara fishers in search of better 'traditional' fishing resources – fish for their own consumption and local sale;
- and localised seasonal migrations of fishers seeking better 'traditional' fishing resources.

The migration that is driven by the strong demand for shark fins and sea cucumbers typically involves fishers moving long distances north from the Morombe and Befandefa regions as far as Maintirano, and south from the Tulear and Anakao regions as far as Androka. The migrant traditional fishers are of both urban and rural origins.

In addition to long distance migrations several more localised, seasonal migrations take place with the fishers mostly seeking more productive fishing sites. An example of such a migration takes place within the Velondriake community-managed marine protected area in the Befandefa commune, where local fishers move seasonally to the offshore islands of Nosy Hao and Nosy Andragnombala.

Farmers and herders from the interior of the South West, faced with drought and insecurity, have moved to the South West coast to subsist by gleaning for sea cucumbers and octopus. This presents a paradox of a continuing influx of migrants from inland to the coast while traditional fishers migrate away from their villages because of population pressure and resource shortage.

In the North East and far South West Madagascar there are significant movements of people with no tradition of fishing (mostly farmers) to the coast to seek out new livelihoods from fishing. In the North East people began to move seasonally to the coastal villages of Ambaro Bay to fish shrimp in the 1990's. This phenomenon significantly increased the size of these villages.

A number of small-scale movements of artisanal fishers take place on the Northern coasts of Madagascar that are determined by the seasons and the weather patterns that they bring. These fishermen are targeting large pelagic fish and shark, while others free dive for sea cucumbers. In contrast to the traditional migratory fishers of the West coast, the migratory artisanal fishermen have only recently come into being. Their boats are equipped with outboard motors; they have substantial nets and in some cases are equipped with compressors and scuba gear. They are often employed by wealthy urban bosses and themselves come from urban centres. As money-driven operations they strip-out local resources, targeting particularly sea cucumbers, sharks, lobster and sometimes even turtles. Traditional fishers cannot compete with them and must often stand aside and watch the pillaging of their resources. It is chiefly along the Northern coast of Madagascar that artisanal fishers move itinerantly along the coast or according to the seasonal weather conditions.

The fishers of South West Madagascar have a long tradition of migrating and are widely seen to be a semi-nomadic people. Historically migration served as a safety-valve to over-population and diminishing resources in a particular area – when the resources were no longer adequate to sustain a village's growing population people moved to previously unexploited areas that were either uninhabited or more sparsely populated. Many of today's coastal villages were so established, with the general direction of Vezo fisher movement being northwards. Many Vezo - or "fisher" - villages are made up of people of diverse ethnic origins. One becomes Vezo by a way of living rather than through inheritance of ethnicity through a bloodline. Nor do the Vezo have a tradition of sea tenure or fishing rights. The semi-nomadic nature of the Vezo probably reflects their origin of being a poor people moving to the coast to seek a livelihood and source of subsistence that was unavailable elsewhere; with moving being an indirect mechanism of natural resource management.

Migration dynamics

However, rapid population growth, widespread degradation of coral reefs and related marine ecosystems, and the relatively recent arrival of external commercial markets have drastically changed the characteristics of Vezo migrations. The number of migrants travelling long distances has increased dramatically in the last five years and is at unprecedented levels, both in absolute and relative terms. 68% of migrants surveyed in 2009 had never migrated before 2004; moreover 64% of their parents had themselves never migrated. A large proportion of the population of the migrants' villages of origin are now migrating; for the villages surveyed in this study this was estimated to range from 15 – 60% of the village population (for Lamboara and Ampasilava respectively). Results show that a majority of today's young male migrants do not return home to their villages of origin.

Migrant fishing activities

Surveys of migrant fishermen from the South West in this study show that most practice shark and sea cucumber fishing as primary activities. 90% use *jarifa* nets to fish for sharks either as a primary or secondary activity; while 70% fish for sea cucumbers as a primary or secondary activity.

Management measures and conflicts

There are no existing national laws governing fisher migration in Madagascar *per se*, nor has the government developed any specific policy towards fisher migration. However, migration is increasingly characterised by conflict between migrants and resident communities. The increasingly large numbers of migrants settling in the islands of Belo-sur-mer and the Barren Isles – in particular since 2005–2006 – have been particularly contentious. In 2008 these recent conflicts caused the local authorities to create new by-laws in order to protect the biodiversity of both archipelagos. These actions by local government do not form part of a coherent national or regional policy towards migration and are not supported by any efforts to provide migrants with viable alternatives to visiting prohibited areas.

Fishing and coastal resources are open-access to traditional fishers under Malagasy law and furthermore there is no village tradition of marine tenure or explicit management of access to marine resources on the West coast of Madagascar. Nevertheless, much of the effective management of migrants' actions has traditionally taken place at a village level. Migrants are pushed out of a fishing community if they use destructive fishing methods that the community does not accept, particularly when the migrants have no family ties with the resident community. Some villages have taken management actions by asking migrants to pay for the right to fish from their villages. In these cases there is little conflict between residents and migrants.

Traditionally resource use has been governed indirectly through *faly*, a societal taboo based on ancestral beliefs and laws articulated by village elders. An example of this that is particularly pertinent to the current migration is the *faly* of not living on the Belo-sur-Mer isles. Historically migrants considered *faly* as inviolable; they would never have even considered breaking them. But the sacredness of *faly* is being increasingly eroded by the growing numbers of migrants arriving and by many of the drivers that have driven the fishers to migrate. This disrespect of local *faly* has not only caused deep offence to the residents, but has also implicitly weakened their control over their local marine resources. Many leaders from resident communities expressed this to be the single most serious problem created by migration.

Existing national fishing regulations bring little governance to the fishing activities of migrants for two reasons. Firstly, the local authorities do not have the capacity to enforce them and their application is negligible. Secondly, the existing national legislation effectively does not govern the primary activities of most migrants – shark and sea cucumber fishing. In other respects migrant fishers do break national laws, as do most traditional fishers, for example by using fine nets and killing marine turtles. However, they see many of the national fishing regulations that should affect them as being disconnected with the realities of their daily existence and long-standing fishing practices.

The majority of traditional migrants are not competing directly with resident communities for the same fishing resources. The vast majority of migrant Vezo fishers on the West coast target sharks using deep-water gill nets and sea cucumbers by free-diving. The non-migrating Vezo Sakalava communities – the primary resident populations in most of the destination areas, for example Belo-sur-mer and Maintirano - do not have a tradition of practising these techniques (with the exception of some permanent fishing communities in Maintirano, they themselves of migrant origin); indeed migrant Vezo from further south introduced residents to the offshore marine resources of the northern areas, along with the practice of spear-gun fishing. The conflict over marine resources stems more from residents seeing the Vezo migrants intensively harvesting “residents’ resources”, and often earning considerable income from them, whilst bringing little or no benefits to the local communities.

The Belo-sur-mer and Barren Isles are high conservation priorities and migrant fishers have undoubtedly caused some damage to the ecological condition and biodiversity of these archipelagos. Besides removing keystone species such as sharks and sea cucumbers, they have also, for example, been responsible for decimating colonies of nesting sea birds, introducing rats and harvesting nesting turtles. Conservation planning and actions have been taken to establish marine protected areas around both archipelagos. For Belo-sur-mer these plans are more advanced than the Barren isles, with the government of Madagascar affording legal “temporary protection” to a marine extension of the Kirindy-Mitea National Park in 2008. For the Barren isles these plans are nascent, although conservation activities have been carried out in the region for a number of years. Activities have included the establishment of a community association to protect the marine biodiversity and the passing of laws by local authorities to protect the island biodiversity. The current trends of human migration are incompatible with attaining these conservation objectives and substantial stakeholder consultation will be necessary if conservation actions in either archipelago are to be successful and sustainable.

Socio-economic importance

In 1998, six years before the migration began to take on its current size and importance, published research judged that it was through migration to Andriamitaroke that fishers of a typical migrant village, Ampasilava, earned the major part of their annual livelihood. Furthermore, they were not able to meet their basic living needs by only fishing in their home village. All of the drivers of this migration (ecosystem degradation, fishery depletion, over-population, poverty, external demand for shark fin and trepang) have intensified over the intervening decade. Conservation management measures that seek to limit the damaging impact of migrants on marine ecosystems in destination areas must take into account the socio-economic importance of migration.

There is generally little leadership of the migrants at the places of destination. Migrants are commonly disparate groups with, on the one hand, little voice for participating in dialogue with the resident authorities, and, on the other hand, a law unto themselves, freed from the social norms of their home communities.

Prevention of fishers' contemporary migrations would exacerbate localised population pressures, contribute to further exhaustion of already dwindling natural resources in the villages of origin, and mean that certain migrants would struggle to feed their families. Since migration is a manifestation of the many socioeconomic and environmental difficulties fishing communities face, there is a critical need to address the underlying drivers of migration rather than have a migration policy *per se*. The causal, inter-linked drivers - over-population, lack of alternative livelihood opportunities to fishing, lack of local environmental management frameworks, widespread resource degradation and resultant poverty - need to be addressed directly as a prerequisite to attempting to manage the traditional fisher migration.

The establishment of a regional network of locally-managed marine areas would be a practicable step towards tackling these problems. This would:

- empower communities to effectively manage their own marine natural resources;
- facilitate the formalisation of community marine resource tenure currently lacking in South West Madagascar,
- enable effective communication and conflict mitigation between migrant and resident communities;
- and most importantly, form a community structure around which population growth could be tackled and alternative livelihoods catalysed.

Only such localised solutions – expanded to a regional scale – would make tackling the multitude of problems that cause migration, as well as the conflicts that it itself engenders, possible.

2. Literature review

The existing literature on fisher migration in Madagascar describes migrations in the North East and South West of Madagascar. In the South West two migrations are described: firstly, a movement of people who are not traditionally fishers towards the coast where they settle; and secondly, movements of traditional fishers up and down the coast. This literature review presents: the Vezo and Sara – the main groups of fishers who migrate in the South West Madagascar; traditional fisher migration in the South West; migration to the coastal villages of South West Madagascar; and finally migration in North East Madagascar.

2.1 South West Madagascar

2.1.1 Vezo

The Vezo are historically the fishers of the West coast of Madagascar. Their origins are between Tulear and Morombe, but they are spread out over the entire 1000 km of coastline bordering the Mozambique canal, from the Androka region in the South to the Mahajanga region in the North. Studies carried out on Vezo communities have shown them to be a people of multiple origins, with the majority being descendants of diverse agro-pastoralists (Mahafale, Tanalanà, Tandroy, Masikoro, Bara or Sakalava) who turned towards the sea as a livelihood.[1]

Despite the diversity of their origins the Vezo share a number of common traditions characteristics of their identity. These include:

- A number of common taboos (*faly*), notably the taboo of eating mutton.
- Until the end of the 19 century the hunting and eating of turtles was a defining institution amongst Vezo. In particular this practice was embedded in a number of customs and rules that were uniform throughout Vezo communities the length of the coast.
- But above all they share a belief in a common founding myth to which a number of Vezo lineages hold fast and which unifies this group. This is the myth of Ampelamananisa - a siren who married a fisherman from the Manombe area; from this union a son, Bibiandrano (animal in the water) was born and became the common ancestor of the Vezo. After their union the siren return to the sea for the rest of her days to escape the cruelty of human kind towards her.

These elements common to Vezo led Marikandia to remark that there is a movement of the [Vezo] society towards the constitution of an ensemble that goes beyond the framework of lineage or clan.

Regardless of their origin, when a group settles on the coast and derives their livelihood from the sea, they become Vezo by this very fact.[2] In the dialects of the South West, Vezo is simply the current way of calling a fisher, whatever

[1] "De la "terre des ancetres" aux territoires des vivants. Les enjeux locaux de la gouvernance sur le littoral sud-ouest de Madagascar." Benjamin Pascal, these de doctorat, Muséum National d'Histoire Naturelle, 2008, and references cited therein.
[2] Astuti, R. 1995. People of the Sea. Identity and Descent Among the Vezo of Madagascar. Cambridge University Press, Cambridge. "The Vezo Are Not a Kind of People": Identity, Difference, and "Ethnicity" among a Fishing People of Western Madagascar, Rita Astuti, American Ethnologist, Vol. 22, No. 3 (Aug., 1995), pp. 464-482.

his origins may be. As such the term Vezo can be used as both a "technonyme" and an "ethnonyme".[3] Pascal notes that these two terms are certainly not incompatible in the eyes of the local people, for whom the term Vezo holds two distinct senses. Certain lineages distinguish themselves from other groups - agro-pastoralists (Mahafale, Tanalanà, Masikoro…) or fishers (Sara) - by calling themselves Vezo pira ("Vezo pure") or Vezo vatane ("Vezo in body, in his body"). They express either an ancient belonging to the Vezo group or a loss of memory of their true origins or lineages. Others claim to be both Vezo and Tanalanà or Vezo and Sakalava.

2.1.2 Sara

The Sara are fishers who occupy the same coast as the Vezo, with whom they are often grouped. The centre of their origins is the area around the mouth of the Onilahy, principally the villages of Lovokampy, Soalare and, above all, Anakao, often referred to as their capital. Their origins are even less understood than those of the Vezo. They differ from the Vezo in a number of ways:

Not all claim a line of descent from the siren Ampelamananisa, though some do.

- Their social institutions also diverge in several ways – they share several taboos that the Mahafale also respect, but which the Vezo do not.
- They are not forbidden to eat mutton – a taboo that Marikandia considers as a trait of Vezofication.
- In contrast to several other local ethnic groups, traditionally the Sara do not practise circumcision.
- The institution of *hazomanga* is less structured and defined than with the Vezo and was probably previously absent in the Sara.

It is therefore principally their activity as fishers that makes the Sara a sub-group of the Vezo – Vezo in this case as a technonyme. They see themselves as Vezo, but more than that as Sara (*Vezo fa Sara*) and not as Vezo *pira*. However, the Vezo and the Sara share more than an identity of livelihood, or a way of living. They are tied together by a sentiment of *filonga* – where Vezo and Sara lineages contract between them symbolic alliances / kinships.

2.1.3 Traditional governance and migrants

Within Malagasy communities in the South West the village is a basic unit of organisation. Within its boundaries a social hierarchy is established on the basis of anteriority/precedence of occupation by family lineages. The model requires that new migrants must establish a formal relationship, often through marriage, with the founders of the village and it is this that invests their social standing.

Rejela explains that the integration of migrants is always difficult and never complete. It is rare that migrants, even if they have been there many years, will have the same power or freedom to exercise their prerogative, as the villagers who founded the village. In addition the communities of migrant fishers stay apart, keeping their independence from the host community as they want to maintain their own socio-cultural identity.

In his study on local governance in coastal villages of South West Madagascar Pascal found that most residents denied the existence of any structure or conditions that would control migrant access to resources. Residents systematically said: "everyone has the right to meet his needs". Access to the seascape is free for everybody; the "sea has no master" "*riake tsy mana tompon"*. However, Pascal relates that this hides a subtlety different reality and the

[3]Goedefroit, S., 1998b. L'identité de terre et de territoire chez les Sakalava du Menabe (Madagascar). in Guillaud, D., Seysset, M., & Walter, A. (coords.). Le voyage inachevé… à Joël Bonnemaison. pp.179-184

sea appears to be appropriated to differing degrees by groups of residents. There are a large number of diverse rules, beliefs and taboos that fishers respect when fishing. The residents regulate resource access discretely by diffusing notions of danger, through the integrity of the fisher (towards traditional beliefs), but above all by controlling the access to certain key production resources (pirogues) and markets.

2.1.4 Traditional fisher migration in South West Madagascar

Traditionally the Vezo are semi-nomadic, moving up and down the coast according to the seasons, weather conditions and the availability of marine resources.[4]

Koechlin noted that traditional coastal peoples' way of being is in symbiosis with their environment. The sparsely populated coastal areas of West and South West of Madagascar provided a medium well-suited to semi-nomadism. Koechlin characterised the Vezo as semi-nomadic since they were inclined to become sedentary if the conditions allowed it and parts of the South West coast were suitable for settlement. In contrast true nomadic fishers, such as the Moken, live in isles where mangroves cover the coast too extensively to allow them to settle. This environment means that the Moken live on their boats and are truly nomadic.

The nomadic movements of the Vezo were organised so as to allow them to follow the migration patterns of certain species, such as *lamatra* (tuna), and to be able meet their own needs. These seasonal migrations to search for fishing resources for their own consumption led to the fragmentation of Vezo lineages the length of the coast. Later the migrations evolved to meet commercial demands for specific species and the routes reflected the localisation of these sought-after resources. For example, from the beginning of the 20th century the Vezo sold sea shells and their opercules to European and Karani traders. Many elders of Anakao relate their migrations to the south in order to find such seas shells.[5]

Rejela recognised several reasons for contemporary fishers to migrate in South West Madagascar:[6]

- a tradition of Vezo fishers moving away from their village of origin when the resources there become insufficient for a growing population;
- the movement of Vezo fishermen along the coast in the pursuit of migratory species;
- drought and the degradation of agricultural lands pushing farmers and agro-fishers alike to move to areas of the coast where they can better sustain themselves;
- movements in order to be in closer proximity to markets, such as centres of tourism and urban centres;
- and migration of Vezo fishers to urban centres in order to educate their children.

Epps gives further reasons for Vezo migration: In addition to migrations that are motivated by the pursuit of marine resources, Vezo communities in the region of Befandefa have historically been forced to leave their coastal

[4] "Les Vezo du Sud-Ouest de Madagascar : contribution à l'étude de l'éco-système de semi-nomades marins." Koechlin, B., 1975. ed. Mouton, cahier de l'Homme, Paris-La Haye, 243p.
[5] Conservation et patrimonialisation de la tortue marine dans le sud-ouest de l'Ocean Indien, Valérie Lilette, these de doctorat, 2007, Université de La Réunion Faculté des Lettres et Sciences Humaines.
[6] La peche traditionnelle Vezo du Sud-Ouest de Madagascar: un systeme de'exploitation depasse? Michel Norbert Rejela, these de doctorat, Iniversite Michel de Montainge-Bordeaux.3, 1993.

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.[7]

Generally the fishers migrate in the hope of finding richer fishing grounds and so overcome the difficulties imposed by population growth, aridity and poor soils. Rejela relates that previously an equilibrium existed in Vezo fishing villages between the population and the natural resources that they exploited: when the population became too large and the resources exhausted the excess population would move. Historically this was one of the principal drivers of migration along the coast.

Initially fishers would leave the village of origin momentarily (three days to one week), set up camp tens of kilometres away, and stay until they had caught sufficient fish. They would go alone, without their wives. With time these temporary camps became true villages. Examples of villages founded in such a way include Ankilibe, Ambolimailake, Andrevo, Ankaramifoke and Beangolo.

Beforehand these migrations (temporary or definitive) overcame the problems of over-exploitation of local resources caused by population growth and allowed a natural equilibrium to be re-established as the stress was removed.

This ancient strategy was viable while the coast was sparsely populated and the resources plentiful. But contemporary Vezo had to contend with new scarcity and poverty. In an area characterised by chronic droughts the sole recourse of coastal people, including farmers, is the exploitation of coastal and marine resources. With population explosion, the massive increase in the number and effectiveness of fishing techniques and new markets (both Malagasy and international), lagoonal resources within 15 km of coastline were seen as exhausted in the 1990's. Rejela noted that in the early 1990's Vezo fishers were trying to contend with this "crisis situation" by turning opportunistically to other livelihood strategies that often had nothing to do with fishing: rearing ducks and pigs, selling basic necessities, transport using their pirogues, lime fabrication from shells and women increasingly growing vegetables.

Likewise Lillete reported that though fishing remains the principal activity of the Vezo in Anakao, there was a significant economic migration from the village. The livelihoods pursued by fishers had significantly diversified as they were no longer able to meet their needs solely through fishing. Migration made the pressures of over-population bearable.[8]

2.1.5 Ampasilava

Taku Iida reported that 55.5% of the adult males from Ampasilava (a Vezo fishing village situated today within the Velondriake MPA) travelled seasonally to at least one of two remote fishing camps in 1996.[9] These destinations were: the city of Morondava 240 km north of Ampasilava, and Nosy Andriamitaroke, an isle 140 km north of Ampasilava. The period when the fishermen undertook the seasonal migration depended on factors such as health, family events, and the availability of fishing partners or travel allowances. However, fishermen moved during the dry season, and none migrated from the end of December to the beginning of March when the northwest monsoon

[7] "A Socioeconomic Baseline Assessment: Implementing the socioeconomic monitoring guidelines in southwest Madagascar", Epps, M. 2008, Blue Ventures Conservation Report.
[8] Conservation et patrimonialisation de la tortue marine dans le sud-ouest de l'Ocean Indien, Valérie Lilette, these de doctorat, 2007, Université de La Réunion Faculté des Lettres et Sciences Humaines.
[9] "The Past and Present of the Coral Reef Fishing Economy in Madagascar: Implications for Self-Determination in Resource Use", Taku Iida, Indigenous Use and Management of Marine Resources, Edited by Nobuhiro Kishigami and James M. Savelle, SENRI ETHNOLOGICAL STUDIES 67: 237-258, 2005.

prevails. During this season, intemperate weather would make it difficult to sail back and forth to the fishing grounds. Women rarely went to remote areas, but frequently left the village to visit their relatives during the dry season when their husbands were absent.

In 1996 the seasonal migrants undertook only two fishing activities at Nosy Andriamitaroke: sea cucumber spearing and shark netting; at Morondava they only harvested sea cucumber. Iida noted that Morondava was linked to Antananarivo and had many middlemen wanting to purchase sea cucumbers. Thus, for the fishermen of Ampasilava, Morondava provided both fishing grounds and market opportunities.

Iida carried out a census on Nosy Andriamitaroke in October 1996: there were 135 people camping on the isle comprising 106 males, 20 females and 9 infants. The fishers were present in 25 groups; only one group was from the village on the opposite side of the strait, ten from the city of Morombe (85 km away), and the others from villages 20 to 70 km farther South than Morombe.

Fishing activities in the remote areas (shark netting and sea cucumber spearing) brought in more cash than did regular fishing near the village. Seasonal migration to the remote destinations was characterised by being an opportunity to obtain a sizeable sum of cash.

A largely seasonal migration from the villages of Velondriake MPA still occurs today and creates considerable movement of communities between coastal villages and temporary fishing camps.[10]

2.1.6 Ambohibola

In a study of the Ambohibola region Pascal found a strong tradition of migration amongst the Sara fishers. Within the Sara the young, as the old, habitually migrate. Movement is a practice that is both encouraged and supervised. The young Sara are quickly incited to move to and join other fishing settlements; to go and see other lands "*manenty tany hafa*". In migrating the young fishermen learn new techniques and become familiar with new zones of the coast in company of experienced fishers who have a body of knowledge particular to that area. On the other hand the Vezo and fishers of Tandroy origin were markedly more sedentary than the Sara of this region.

In the region the Sara have a historical strategy of migration and have established a network of camps, temporarily or permanently populated. These cover a wide range of habitat types; the species targeted and the methods of fishing varying from village to village as a function of the habitat exploited.

The destination chosen for temporary migration depends on the fishing envisaged (the fishing material and know-how that the migrants have, economic and ecological factors) but above all the social networks that the Sara can make use of. As such the Sara migrate to settlements that they know already – frequented by their ancestors and forefathers, and where they still have relatives or formal alliances.

The mobility of fishers can be seen as an economic strategy of adaptation to changing environmental conditions. It enables fishers to take advantage of a diversity of opportunities – the abundance of target species, such as the *libatse* in the 1990s or sharks today, as well as markets for their catch.

In addition migration is also a means of resolving conflicts that arise within a group (village but also within a production group). Temporary movement to another production unit in another village is a common resort to alloy tensions.

[10] "Vezo Knowledge: Traditional Ecological Knowledge in Andavadoaka, southwest Madagascar." Langley, J., 2006, Blue Ventures Conservation.

Through over a year of investigations in Ambohibola, Pascal established the importance of migrating for fishing over other reasons for moving from the village. Just considering seasonal migration, fishing accounted for 85% of the time villagers left Ambohibola. Other reasons for leaving the village included acquiring basic living essentials (pirogues, basic food and living items, forest products) and movements for traditional ceremonies (funerals, marriages, consultation of the possessed etc.).

2.1.7 Multiple migrations to the coastal villages of South West Madagascar

As has been noted the Vezo have been shown to be a people of multiple origins, with the majority being descendants of diverse agro-pastoralists (Mahafale, Tanalanà, Tandroy, Masikoro, Bara or Sakalava) who turned towards the sea as a livelihood.m

Pascal's recount of the histories of Androka and Ambohibola illustrates well the diverse migrations of farmers and fishers alike who came to found coastal fishing villages in South West Madagascar:

> Local history recounts that a Vezo from the Manombe region (Andavake) first settled Androka in the middle of the 18th century. At the same time a few Vezo Tanday, a group of fishers and blacksmiths migrated there from the Andavadoaka area north of Manombe. Together they founded the village of Androka. A third group of Mahafale, who migrated here with their herds from the East of Ejeda, later joined the first two groups – they took the name of Vezo Vavalinta (Vezo of the mouth of the Linta river) – and today are considered a distinct Vezo lineage.
>
> In the last quarter of the 19 century a small group of Sara (five men and one woman) migrated to the area from the mouth of the Onilalhy; after setting up temporary settlements at Lembetake and Anjahava (between Itampolo and Androka) they settled at Ambohibola. Situated further South than the seasonal fishing camps between Anakao and Itampolo, Ambohibola was for the first half of the 20 century the first and only permanent Sara village South of Anakao. As soon as the Sara were settled they continued to be highly mobile, returning regularly to Lembetake and Anjahava to fish and hunt turtles and barter with the Mahafale for grain; they developed temporary fishing camps on the island of Nosy Manitse, and on the perimeter of the Bevoalavo lagoon (Nengengy, Ankazondrato, Fanambosa).
>
> In the 1930's widespread famine, caused by the broad-scale eradication of prickly pears, pushed groups of Tandroy from the extreme South of Madagascar to emigrate. A small group of from Marovato-Bevazoa settled with the Sarà of Ambohibola and adopted fishing as their principal subsistence. With the development of fishing in the 20 century and the diversification of fishing materials, the area attracted more and more migrant fishermen from the North as well as traders. Certain settled permanently in the area with the original Sara and Vezo.

The Mahafale do not have a tradition of migration; but to overcome the crises they face in the South because of drought they have undertaken migrations, particularly towards urban areas, to find work since 30 years ago.[11] Likewise the Tandroy, faced with repeated food shortages have migrated to other parts of Madagascar (West, North West, Highlands), since the 1930's to find work; often they settle long term in the destinations, rural or urban. People such as the Mahafaly and Tandroy continue to move to the coastal villages south of Tulear.

[11] Kaufmann, J. and Tsirahamba, S., 2006. Mahafale pastoralists and change. Conservation & Society, vol.4 n°2 : 231-261.

Socio-economic surveying carried out in 1994 in a number of villages south of Tulear found that 74.1% of fishers were Vezo, 11.4% were Mahafaly and 9.8% Tanalana.[12] The further South that one descended (Itampolo, Androka and Ambohibola), the more the villages were made up of other ethnic groups, though the Vezo still dominated.

By comparison surveying of 17 villages south of Tulear in 2006 showed that the ethnic groups making up the populations of the coastal villages were less dominated by Vezo. On average there were 60% Vezo, 20% Tanalana and 19% Mahafaly. In the commune of Itampolo the Vezo (32%) were less dominant than the Mahafaly (35%), with the Tanalana making up 30%.

The study showed that a significant part of the village populations were made up of immigrants: on average there were 34.7% immigrants versus 64.7% permanent residents (see Table 1).[13] Certain villages, such as Ankarampona, Maromitilika and Anakao Andovoka, were villages formed by immigrants (100% of the respondents), though the authors did not specify which ethnic groups they belonged to. Other villages, such as Anakao bas, Befolotsy, Besasavy Sud, Beheloka bas, Beheloka haut and Tongaenoro, were principally composed of permanent residents.

Table 1. The proportion of immigrants versus residents for 17 villages south of Tulear

Village	% Immigrants	% Residents
Anakao bas	12.8	87.2
Anakao Haut	60	40
Maromena	53.3	46.7
Befasy	53.3	46.7
Beheloke Bas	9.5	90.5
Beheloke Haut	13.3	86.7
Ambola	47.1	52.9
Ankarampona	100	0
Itampolo	80.6	19.4
Tongaenoro	11.1	88.9
Andranovao Nord	66.7	33.3
Besasavy Sud	13.6	86.4
Befolitsy	11.1	88.9
Andoharano	58.8	41.2
Taribola	23.1	76.9

[12]"Enquete socio-economique sur les communautes de pecheurs traditionnels dans la region de Toliara", G. Dasylva, V. Ranarivelo and J. Razanoelisoa, March 1994, Programme Sectoriel Peche PNUD/FAO. Mag/92/004-DT/4/94:57 pages

[13] "Rapport final des diagnostics marin et socio-economique dans la zone du systeme corallien de Toliara", L. Ranaivomanana, J.P. Quod, H.O. Ralison, C. Randriamahaleo, F. Rakotomanana, J. Maharavo, R. Garnier, J. Brand, R.J.L. Komeno, E. Bemanaja, A. Barrere, WWF, 2008.

Village	% Immigrants	% Residents
Lanivato	41.7	58.3
Anakao Andovoke	100	0
Ankarampona	100	0

The study showed that 12.4% of the population were nomadic – following fishing resources the length of the coast and establishing temporary and seasonal camps.

These studies would indicate that there is a sustained immigration of inland people to the coastal villages south of Tulear.

An anthropological study carried out in the villages of Andavadoaka and Ampasilava in 2006 showed a similar phenomenon was taking place in the commune of Befandefa:[14] Andavadoaka was only settled by the forefathers of today's residents one or two centuries ago, probably at the beginning of the French colonisation. The first individuals to have settled in Andavadoaka were of Bara origin, or assimilated by this group. It is strongly possible that they were descendants of freed slaves.

In 2006 Andavadoaka was experiencing a significant increase in growth of the population, with the flux of immigrants almost tripling in absolute value the previous six years versus the precedent decades. This growth was explained mainly by the insecurity in the area caused by the Malaso; many of the new arrivals were from Ambalorao and Ankilimalinike, villages that had been attacked by bandits. The fact that Andavadoaka is also becoming a centre of economic activity for the commune has also attracted new immigrants. The authors remarked on the significant number of new lineages amongst the immigrants, notably the Tahoaomby, Sarà, Marofoty, Timarà, Tsimanavadrasa and Mahafaly.

The neighbouring village of Ampasilava had also experienced a significant influx of immigrants: the six preceding years had seen a doubling in the influx of immigrants relative to the precedent decade. There had already been a doubling of the influx during the decade of 1990, and a doubling since the decade of 1980. So historically Ampasilava had been experiencing a constant influx of immigrants. This is likely to be a result of the movement of rural, inland populations towards the coast.

Many of the agro-pastoralists who move to the coast to become fishers in turn themselves migrate as fishers after one or two generations. Migration generally takes place from areas that are arid to those that are less so – a South to North flux. Migrant fishers from the South are recognised by the fishing techniques that they use, such as *beangata*,[15] that Vezo *pira* shun, as well as their non-observation of Vezo faly. For example, in contrast to the Vezo, the Mahafale eat mutton. Fiherenamasay is a village comprised largely of Mahafale. These migrants integrated into existing villages or formed new villages apart and in doing so they contributed to the population of the coast. Through inter-marriage the migrants take on the customs of the Vezo and so there distinctness begins to diminish.

[14] Etude anthropologique des genealogies de residence d'Andavadoaka, Ampasilava, Lamboara et Nosy Hao (AVRIL-MAI 2006), Hélène André-Bigot, IRD, "LIttoraux MAlgaches" (LIMA), 2006.

[15] *Beangata* beach seine net, *angata* refers to the shells used as weights for beach seine nets.

2.2 North West Madagascar

Before the 1960's, shrimps were virtually unexploited by traditional fishers and the subsequent extraordinary growth of this fishing sector was not based on the growth of a traditional fishing activity. Rather it grew from an impoverished rural population who were motivated by the possibility of earning well from it. This commercially-driven exploitation of the resource brought about significant migrations to the coast of North East Madagascar.

The following account of migration to such an area, Ambaro Bay, is taken largely from "La part maudite des pecheurs de crevettes a Madagascar" by Sophie Goedefroit.

Ambaro Bay is situated in the North East of Madagascar and initially was an area where the residents lived from farming and rearing animals. With the exception of the village of Ankiny, fishing was a marginal activity. From the beginning of the 1970's it experienced a sustained and exponential growth in shrimp fishers migrating into the area.[16] Ankazomborona, the largest village of the bay, was a village of only about ten houses in the 1970's; by 1999 it had 932 houses and a population of 3 818 persons. The vast majority of the population were new arrivals, with only a handful of original residents.

The migrants were not a homogeneous group as they arose from three waves of migration, which Goedefroit describes as follows:

- The first took place between 1970 and 1985 and was small in comparison to the following two. The migrants were rural people who came from within the region and were not considered as total outsiders by the residents. Through marriage with local women they built family ties and are now more or less considered as residents themselves. They continue to fish using traditional methods, own the sites where they put in place their fixed-fishing barriers, and continue to fish as a family undertaking.
- From 1985 to 1995 the possibility of earning a significant amount of money from fishing in these villages as well as a system of commercial collection based on the leasing of nets to fishers had two notable effects:
    - A large increase in the number of fishers, who come not only from the region but from other, more remote areas of Madagascar, such as the Highlands, the West coast and the South.
    - These migrants fished seasonally and their presence in the villages was only temporary. Many came from farming regions where they cultivated coffee and vanilla – commodities that had been badly affected by the drop in the market for these products and government policy. Farming families in difficulty sent members of their family to earn money through shrimp fishing so that they would be able to buy the seed essential to them carrying on farming. As fishing and farming activities peak at different times they were able to do this. The migrants' presence became markedly transitory and these migrants did not often settle in the fishing villages. During the high season these migrants, for the large part aged between 20 and 39 years, almost doubled the population. There was nothing to incite them to build a house, to integrate into the community or to become collectors or shopkeepers.
- From 1995 onwards the face of migration progressively changed to one where migrants had little family ties.

[16] "La part maudite des pecheurs de crevettes a Madagascar", Sophie Goedefroit, Etudes Rurales, "Exclusions" 159 -160, 2001; Goedefroit, S. et T. Razarasoa**,** 2002, « Migrants et pêcheurs à Madagascar », in S. Goedefroit *et al..*, eds. *op. Cit.*: 100-114.

> Migrant fishers no longer returned to their origins to share the benefits of fishing, but many moved to other areas where they could continue to earn money – in particular mining for semi-precious stones in Ambondromifehy and Ilakaka, which opened up at this time. The life of a migrant became an end to itself – one of independent, itinerant workers. These individuals, from farming but also urban areas, were often marginalised, had broken ties with their family, or were escaping the law. For these migrants fishing was just a transitory activity as they moved from one area of opportunity to another.

This social dynamic had a determining and negative influence on the structure of the communities. The family lineages and alliances that normally define and hold the community structure together only existed amongst a handful of resident families. The balances and principles of solidarity that characterise ordinary village communities no longer existed. The "community" was now made up of a mobile mass of migrants who were young, shared neither family lineages nor alliances, and as such were not open to the influences of these.

Symptomatic of this loss of family and community fabric was the propensity of migrants to form associations of fishers, where they grouped together according to their origin or religion, profession or age. In doing so they created a 'family network' for themselves. These associations were political groupings that opposed different economic and political agendas within the villages. Deep differences and tensions crystallized around the political groupings – the fact that Ankazomborona had already been totally destroyed by fire several times was a manifestation of this.

Goedefroit's reasoning for the excesses of migrant shrimp fishers in North East Madagascar must hold true for the current young Vezo migrants:

> New arrivals are pulled into a new dynamic that distances them from the normal mechanisms of lineages and family alliances of a village. Here, the principles of precedence and of anteriority of settlement that are generally the basis of all hierarchies prove to be ineffectual. Activities, revenues and spending no longer take place within the structure of lineages. They are places of excess. Where the individual is faced with a new, unknown situation; and without the references of family, does not master the practices.

3. Socioeconomic conditions of Malagasy coastal fishing communities

In order to provide a basis for understanding small-scale fisher migration, the socioeconomic conditions of coastal fishing communities is presented in this section. In addition, an overall analysis of poverty within Madagascar was undertaken for this study to establish the national socioeconomic context of fishing communities (and to fulfil the deliverables of this consultancy). This is presented in Appendix 1.

3.1 Characteristics of coastal poverty

In "Poverty and Reefs" the authors describe a number of characteristics of coastal poverty pertinent to understanding migration:[17]

- overty is frequently masked by developments in agriculture, industry, tourism and urban areas often associated with the coast. The poor fall into the gaps between this development and become hidden. This **interstitial nature of coastal poverty** often obscures it from the view of development planners leaving the poor out of the development equation.
- oastal areas frequently attract the poor as they offer a range of **easily-accessible livelihood opportunities** often not available in inland areas. Poorer groups living in coastal communities exploit a diverse range of resources from both land and sea and from the interface between the two. Many of these resources, such as marine fisheries, mangrove areas, coral reef resources, rivers and estuaries, are 'open-access' which means that the poor are able to make use of them, even when other opportunities are limited.
- he livelihoods of the poor in coastal areas depend on diverse **activities that are reliant on open-access resources;** these are vulnerable to overexploitation or 'occupation' when there are clear economic advantages of doing so. This means that, while the coast offers opportunities for the poor, these are opportunities that are often 'fragile' and vulnerable to changes that may ultimately result in them becoming inaccessible to poorer resource users.
- **oral reefs are not easily 'occupied'** for purely economic motives, in contrast to many other coastal resources that the poor use. Their shallow and complex physical structure and high biodiversity do not lend themselves to intensive exploitation and economies of scale, so they often remain 'open-access' even when other coastal resources have been 'privatised'. This, however, is changing as tourism and conservation lay claim to large areas of reef.
- he **accessibility of coral reefs** provides important opportunities for the poor, including the

[17] "Whittingham, E., Campbell, J. and Townsley, P. (2003). Poverty and Reefs, DFID–IMM–IOC/UNESCO, 260pp."; Research carried out by the DFID-funded Sustainable Coastal Livelihoods Project, see www.ex.ac.uk/imm/SCL.htm

young, old and women, to directly harvest resources on foot and by hand, or using simple, cheap and locally available technology. For female-headed households and widows, who are frequently some of the poorer and more marginalized households in the communities, the accessible reef resources provide a vital source of food and income.

- ignificantly, the principle threats to poor people's access to coral reefs are the **degradation and disappearance of the reefs** themselves. Over-exploitation combined with the effects of climate change, pollution and sedimentation from up-stream deforestation degrades natural resources and impairs ecosystem functioning. It is no longer able to deliver the same ecosystem benefits per capita, forcing the poor into more intensive, destructive extraction in an effort to maintain the flow of benefits. The increasing fishing pressure further degrades the ecosystem. A self-reinforcing negative feedback is created that pushes people deeper into poverty.

3.2 Household characteristics of poverty

Dissou *et al.* found that in Madagascar poor households have general characteristics that are indicative of poverty: an agricultural household with a high birth-rate; an importance of child labour and so a low rate of schooling of the children; labour that is uneducated; poor access to basic health services and drinkable water; and few links with markets.

It is more likely that a large household will be poor; similarly households with a larger proportion of children have a higher probability of being poor. The household head's level of education is a very accurate predictor of the level of poverty. Physical isolation is determinant: the further rural households are from schooling, transport links and other basic services, the poorer they are and, what is more, the poorer they have become since 1993.

3.3 Malagasy fishing communities

In comparison to the world's other tropical coasts, the WIO region has the highest proportion of its population living on less than US$1.00 per day as well as the highest proportion living below national poverty lines.[18] This section examines in more detail the socio-economic status of Malagasy fishing communities by synthesising existing data from socio-economic studies carried out in coastal communities. The data is presented under the themes, articulated above, which are characteristic of both household poverty in Madagascar and of tropical coastal poverty. They are summarised as follows:

(i) **Demographics**: large, agricultural households with a larger proportion of children and a high birth-rate.

(ii) **Education**: child labour is prevalent and so schooling of children is low; household heads are poorly educated.

(iii) **Social infrastructure**: poor access to basic health services and drinkable water;

[18] "Socioeconomic conditions along the world's tropical coasts: 2008" Christy Loper, Robert Pomeroy, Vineeta Hoon, Patrick McConney, Maria Pena, Arie Sanders, Gaya Sriskanthan, Sheila Vergara, Michael Pido, Ron Vave, Caroline Vieux, Innocent Wanyonyi. GCRMN, NOAA, CI.

(iv) **Physical isolation**: rural households remote from markets, schooling, transport links and other basic services.

(v) **Reliance on open-access resources**: livelihood strategies are based on marine and coastal resources that have no clear owner-ship. These resources, particularly coral reefs, are easily accessed and exploited using simple, cheap and locally available technology.

(vi) **Immigration**: Coastal areas frequently attract the poor as they offer a range of easily-accessible livelihood opportunities often not available in inland areas.

(vii) **Natural resource degradation**: Significantly, the principle threats to poor people's access to coral reefs are the degradation and disappearance of the reefs themselves. A negative feed-back exists between the degradation of resources, impairment of ecosystem functioning and deepening poverty.

Data is drawn from four recent studies that were carried out chiefly in South West Madagascar:

Tulear South: Quantitative and qualitative surveying was carried out in 17 villages over three communes (Anakao, Beheloke and Itampolo) during the last quarter of 2006. The 17 villages surveyed were: Anakao bas, Anakao Haut, Maromena, Befasy, Beheloke Bas, Beheloke Haut, Ambola, Ankarampona, Itampolo, Tongaenoro, Andranovao, Malangiriake, Besasavy Sud, Befolitse, Andoharano, Tariboly and Lanivato.[19]

Ambaro Bay: Quantitative surveying was carried out in three villages bordering Ambaro Bay in North East Madagascar: Ambavanankarana, Ankazomborona and Ampapamena.[20]

Tulear: Seven villages were studied: Ambohibola, Beheloka, Itampolo, Mangily, Maromena, Sarodrano and Songoritelo.

Velondriake MPA 1 and Velondriake MPA 2: two separate studies carried out within the Velondriake MPA in 2006 and 2007 respectively. MPA 1 studied three villages Andavadoaka, Ampasilava and Lamboara (MPA 1);[21] and MPA 2 studied nine: Bevato, Andragnombala, Belavenoke, Tampolove, Ambalorao, Vataova, Ankindranoke and Ankitambagne.[22] These studies are complimented by a census of Andavadoaka, a major village at the geographical centre of Velondriake, which was carried out in 2004–2005.[23]

Madagascar MPAs: Cinner *et al.* conducted a socio-economic assessment in thirteen communities within or adjacent to Madagascar's Marine Protected Areas (MPAs); Nosy Atafana MPA in the Mananara Nord biosphere reserve; Tampolo, Tanjona, and Masoala MPAs in the Masoala National Park, and the recently designated Sahamalaza MPA. The villages were as follows:

Masoala MPA: Ambinambe, Ankitsoko, Ambodilaitry;

Tanjona MPA: Tanjona, Ifaho, Andomboko, Ankarandava, Antsabobe;

[19] "Rapport final des diagnostics marin et socio-economique dans la zone du systeme corallien de Tulear", L. Ranaivomanana, J.P. Quod, H.O. Ralison, C. Randriamahaleo, F. Rakotomanana, J. Maharavo, R. Garnier, J. Brand, R.J.L. Komeno, E. Bemanaja, A. Barrere, WWF, 2008.

[20] « Gestion equitable de la pecherie: allegement de la pauvrete et environment marin », RASOLONJATOVO Harimandimby, RABEARISOA Ando, WWF, 2005.

[21] "A Socioeconomic Baseline Assessment: Implementing the socioeconomic monitoring guidelines in southwest Madagascar", Epps, M. 2008, Blue Ventures Conservation Report.

[22] "Evaluation socio-économique de base de l'AMP Velondriake, sud-ouest de Madagascar." Andriamalala, G. (2008) Blue Ventures Conservation Report.

[23] "The 2004-2005 census of Andavadoaka, southwest Madagascar", Langley, J., Harris, A. & Nihalani, N. 2006, Blue Ventures Conservation Report.

Tampola MPA: Ambodiforaha, Marofototra;

Nosy Atafana MPA: Sahasoa;

Sahamalaza MPA: Antranonkira, Nosy Berafia, Nosy Valiha.[24]

As each study used different methods and indicators the data are summarised in tabular form under each theme.

3.3.1 Demographics

	Demographics indicators
Tulear South	• Average household size is 5.9 persons
Tulear	• Average household size for fishers is 5.25 persons • On average 4.25 persons depend directly on the earnings of a fisherman household head
Velondriake MPA 1	• Average household size of 5.6 persons • The average number of dependents per household is 3.45 • 42% of the population was >10 years old • 46% of the population support the remaining 54% financially • Census data for the village of Andavadoaka show a doubling of population input rate (births and immigration arrivals per year) in the 10 years leading up to 2003, with 53% of the population being 14 or under.
Velondriake MPA 2	• Average household size is 5.5 • 53% of the population are 15 years or younger • 39% of the population aged between 16 and 50 years is active – a number that is significantly less than the number of children
Ambaro Bay	• Average household size of 3.68 persons
Madagascar MPAs	• Masoala (average people per household 3.5), Tanjona (4.8), Tampola (5.1), Nosy Atafana (5.4), Sahamalaza (4.4)

3.3.2 Education

	Indicator of education
Tulear South	• Almost half of the population have two years of formal schooling • The villages of Lanivato, Itampolo and Anakao Bas have the highest level of schooling with 25% of the population having 4 to 6 years of education. • On the other hand, for the villages of Ankarampona, Tongaenoro, Besasavy Sud and Andoharono 75% of the population have less than two years of education
Tulear	• On average 74.8% of household heads are illiterate; those household heads who are literate have a very low level of schooling • The village of Songeritelo has the highest illiteracy rate – 89.1% of household heads • Globally 57.5% of children attend school, but the majority stop attending school at a

[24] "Human Dimensions of Madagascar's Marine Protected Areas", Joshua Cinner and Mariana Fuentes

	Indicator of education
	primary level • More than 80% of children do not reach secondary school • The level of schooling for children of less than 12 years is low: the majority of children stop attending school before the age of 12 • The communities have a low education level with the majority of children ending their education before the age of 12 so that they can concentrate on fishing activities that need the whole family's participation • 43.5% of children fish and more than 20% participate in the treatment and sale of catch
Velondriake MPA 1	• 10% of the population in the three villages has no formal • School education • 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 • "The average community member" was educated to T2 level, equivalent to a total of 3 years of education • The average fisher begins fishing at the age of 13 years • 30% of children start fishing at less than 10 years of age
Velondriake MPA 2	• 67% of the population aged 16 years or more stopped attending school at a primary level and more than half had only 3 years of schooling • the average age at which children begin to fish is 8 years • 34% of children aged less than 16 years attend school • There is only one secondary school in the commune; to study until the baccalaureate pupils must leave home for Morombe or Tulear
Ambaro Bay	• 77.7% of household heads are literate; but their level of schooling is only two to three years • In contract 83.33% of household heads in the village of Ambavanankarana are illiterate • In the village of Ambavanankarana 19.4% of children attend primary school; in Ambavanankarana this is almost 100% due to the recent construction of a school in this village • Though the majority of children attend primary school, though two-thirds stop their education at primary school • 56.4% of children fish and 25.7% are involved in transformation of the catch
Madagascar MPAs	• The mean number of years of formal education of all respondents was 3.2 years, and ranged from 2.5 $\pm$ 0.5 at Sahamalaza to 5.2 $\pm$ 0.8 at Nosy Atafana.

3.3.3 Social infrastructure

	Indicator of social infrastructure
Tulear	• The rate of access to water is 48.8%, but the water is not drinkable by normal standards • On average 63.8% of the population have access to basic health services; the rest rely on traditional medicine • 7.1% of households use latrines • The water in the Tulear does not meet the basic standards of drinking water

	Indicator of social infrastructure
Velondriake MPA	• Two community clinics exist in the commune, in Tampolove and Befandefa. However, there is only one nurse, based in Befandefa. The clinic in Tampolove is closed because there are no qualified personnel to man it. • All villages studied have difficulty accessing drinking water. The only source is wells; in the majority of villages these are brackish. In a number of villages, such as Bevato, Antsatsamoroy, Andranombala and Ankintabagna, villagers are forced to fetch drinking water from inland villages. • There are no public toilets or sanitation in any of the villages studied.
Ambaro Bay	• Villagers have access to a community clinic (Centre de sante de base) in each rural commune; the village of Ambavanankarana is served by a dispensary of the Société LGA. • Latrines are practically inexistent in the entire zone studied. • 40.0% of households use wells as a source of drinking water; however, the water does not meet the basic requirements of « drinking water ». • In Ankazomborona certain households have access to tap water; on the other hand the village of Ambavanakarana, situated in mangroves, has no access to usable water. The villagers must buy water sourced up-river or from Ampampamena and transported to the village by pirogue or Zebu cart.
Madagascar MPAs	• "Sahasoa was the largest village surveyed and had the most amenities available. These consisted of a primary school and a hospital. None of the other villages had roads and there were few public services available. All had primary schools, none sanitation or piped water."

3.3.4 Physical isolation

	Indicator of physical isolation
Tulear South	
Tulear	
Velondriake MPA	• Velondriake is situated in a very isolated part of Madagascar, where services and access to facilities are almost non-existent. 4x4 is the only means of accessing villages in the commune, while a number, can only be reached by pirogue.
Ambaro Bay	
Madagascar MPAs	• "All communities were remote and had almost no access to services and facilities. None of the other villages had roads and there were few public services available."

3.3.5 Reliance on open-access resources

	Indicator of reliance on open-access resources
Tulear South	• 92.4% of the population fish or glean marine products by foot. • Parts of the population developed secondary activities as a strategy to increase their livelihood choices: 21.6% of fishers farmed as a secondary activity
Tulear	• More than 90% of household heads are fishers (fishing by pirogue or gleaning on foot). • 4.6% of household heads are fish traders - a far second to fishing and in keeping with the reliance of the population on marine resources.

	Indicator of reliance on open-access resources
	• 68.7% of respondents saw access to resources as being free.
Velondriake MPA 1	• 86% of the population depend on fishing as its main source of income
Velondriake MPA 2	• The primary income generating activity is fishing; 80% of household heads in the coastal fishing villages, such as Bevato, are fishers. • Fishing is also an important secondary source of income for inland, mainly farming villages, such as Befandefa, where 36% of households fish.
Ambaro Bay	• Fishing was the principal activity for 88.4% of the population across the region • 30.8% of them practised secondary activities, mostly farming • However, in certain villages where fishing is practised by the vast majority of the population, such as Ankazomborona and Ambavanankarana, more than 85% of fishers don't have any secondary activity. • In Ambavanankarana only 2.2% of households did not own a pirogue, while in Ankazomborona and Ampapamena 50% and 30% respectively did not. • 75.7% said that access to resources was open
Masoala MPA	• The mean number of different occupational categories a household was involved in was 2.9; it ranged from a minimum of 2.2 for Sahamalaza to a maximum of 3.2 for Tampola and Nosy Atafana. • 54% of all respondents were engaged in traditional fisheries. • Gleaning at all sites was less important than fishing, but did comprise a significant livelihood activity, with the exception of Tampolo. • Many of those who participated in the fishery considered it their most important occupation, particularly at Cap Masoala, Sahamalaza, and Tanjona. • The highest participation was at Tanjona, where 98% of households were involved in the fishery and 87% considered fishing a primary occupation. • Participation in the fishery was relatively low in Nosy Atafana, where less than 36% of households were involved and only 7% ranked fishing as a primary occupation. • "None of the communities studied had a history of marine tenure or excluding outsiders from fishing. However, in the Masoala marine parks (Cap Masoala, Tampolo, and Tanjona) recent developments in management have resulted in the exclusion of non-residents from fishing within the marine parks."

The province of Tulear is characterised by the importance of traditional fishing: according to Rakotonirina *et al.* 86.9% of households residing on the Tulear coast consist of fishers.[25]

3.3.6 Immigration

Tulear South	
Tulear	
Velondriake MPA 1	• 71% of all respondents in Andavadoaka originated from the village [reside in their village of birth], while for Lamboara and Ampasilava only 24% and 26% originated from the village.

[25]Rakotoririna *et al.* (2000) – Profil côtier de la région de Toliara : 45p.

	• In Andavadoaka, of those who had immigrated, 44% were from Morombe (the closest town, approximately 50 km north of Andavadoaka), and a small percentage originated from the regional capital Tulear. The remaining number came from smaller inland villages within the commune de Befandefa. • Overall, "available fisheries resources" was the most commonly cited reason for migration.
Ambaro Bay	• On average there was a weak tradition of fishing, with only 19.5% of fishers having always been fishers. 80% of respondents had practised other activities before becoming fishers; most (33.3%) had been farmers.
Masoala MPA	• A significant part of the population in all sites comprised immigrants who on averaged had resided 10.5 years in their new community: Masoala (46.6% were immigrants, who on average had resided 9.8 years in the community), Tanjona (73.3%, 11.6 years), Tampola (72.1%, 12.6 years), Nosy Atafana (15.9%, 10.0 years), Sahamalaza (32.9%, 8.4 years). • The villages of Marofototra and Tanjona had the highest percentage of immigrants (88.5 and 84.6%, respectively). Marofototra was unusual in that ANGAP recently established the village to concentrate residents on the edges of the terrestrial park so they would not infringe in to the core of the park.

3.3.7 Natural resource degradation

There is scarce published data on the condition of coral reef ecosystems in Madagascar, particularly since the wide-spread bleaching event that took place in South West Madagascar in 1998. However, the existing literature reports the marine natural resources in certain areas of South West Madagascar to be severely degraded:

- In 1995 Laroche reported that the coastal waters of the Tulear region were heavily fished.[26] Fishermen had reported a progressive decrease in the average size of fish caught over the previous 15 years, as well as a significant decrease in catch per unit effort. The number of fishermen in the province of Tulear had increased by 57% between 1972 and 1988, with this increase being mostly concentrated around the Bay of Tulear and other urban centres.
- A decade ago the coastal ecosystems of the region of Tulear (from Anakao to Ifaty-Mangily) were reported to be highly degraded and endangered with wide-spread collapse.[27] The principle causes of this were: hyper-sedimentation, pollution from urban centres, the over-exploitation of fisheries using destructive methods, the intensive harvesting of marine invertebrates (shells, cephalopods, and holothurians) and the destruction of mangroves for charcoal and firewood. These anthropogenic stresses had resulted in a large decrease in the diversity of fish species, out-breaks of sea urchins and macro-algae dominated habitats replacing hard coral-dominated ones. Moreover Vasseur remarked morphological changes in reef structure occurring, with hard coral reefs being replaced by shingle and sand bars.
- A brief survey undertaken in 2008 reports the condition of Tulear's *Grand Récif* to be unrecognisable from that

[26]Coral Reefs (1995) 14:193-200, A preliminary survey of the artisanal fishery on coral reefs of the Tulear Region (southwest Madagascar), J. Laroche, N. Ramananarivo.

[27]Ecosystemes cotiers en danger dans la region de Tulear: analyse des aggresions humaines et problemes de gestions, Iles et Archipels, numero 23, page 97 – 120; L'evolution des ecosystemes cotiers face aux agressions dans la region de Tulear (Sud-Ouest Madagascar), Pierre Vasseur, Actes des VII^{eme} journee de geographie tropicale, (Brest, 11 – 13 Septembre, 1997), 1998, 708 p.

described in the 1970s.[28] Hard coral cover had decreased substantially over the 5-30 m depth range on the fore-reef slopes, and there has been a loss in particular of the 'architectural species'. Coral has been replaced to great extent by fleshy algae and the fore reef was almost depleted of reef fish.

- Research indicates that coral mortality of up to 100% occurred in many areas of the Velondriake MPA to a depth of 15 m following the 1998 ENSO event, with further bleaching episodes in 2000, 2002 and 2005. Many shallow reef benthic communities have undergone a general phase shift from coral to algal-dominated habitats. Most seaward fringing and barrier reefs in Velondriake and the broader southwest region have undergone a phase shift from coral to algal-dominated communities. Typical seaward reefs in the region exhibit coral cover < 20%, with high or dominant levels (35-80%) of turf and macro-algae. Despite the overall poor health of Velondriake's reefs, several deep lagoonal patch reefs, which experience low fishing effort, have shown strong recovery to coral-dominated communities. Surveying of these reefs between 2004 and 2008 showed a progressive annual increase in coral cover from ~30% to ~70%, with a concurrent decreases in algal coverage.

In addition to widespread degradation of the marine ecosystems that underpin fisher livelihoods in South West Madagascar, many of the key fisheries are depleted or heavily exploited. These include the sea cucumber, shark and octopus fisheries.

3.4 Summary of the socio-economic conditions of fishing communities

In summary these studies show that most fishing communities in Madagascar, but particularly those in South West Madagascar show the characteristics that typify poverty of both poor Malagasy and tropical coastal households: a high birth rate; a large household size; the prevalence of child labour concurrent with low schooling of children; a high level of illiteracy amongst household heads; physical isolation and poor access to social infrastructure; and high dependence on open-access resources that are degraded.

The isolation of many fishing communities, their difficulty of access, lack of communication, aridity - mean that there is little opportunity for earning money besides through the exploitation of certain marine resources. In addition to these physical limitations, villagers do not have the technical know-how, management capacity and financial resources necessary to diversify the local economy.

These same human and financial resources are required to achieve a sustainable management of the marine resources. Moreover, villagers can only manage their marine resources rationally if they have an alternative livelihood to using them. With no other means of surviving, they are constrained to over-exploit these. External market forces and population growth have driven this. The movement from a subsistence- to a cash-economy shifted fishing from subsistence to commercial in order to supply an export market. This created the opportunity to earn significant amounts of money from shark fins and trepang. But the external demand intensified fishing beyond local control, led to the introduction of new technology (such as scuba for sea cucumbers and *jarifa* nets for sharks), the over-exploitation of the target and eventually to the local collapse of the fishery.

Over-exploitation combined with the effects of climate change and sedimentation from up-stream deforestation degrades the ecosystem. It is no longer able to deliver the same ecosystem benefits per capita, forcing villagers into more intensive, destructive extraction in an effort to maintain the flow of benefits. The increase fishing pressure

[28] "Demise of Madagascar's once great barrier reef - inferring change in coral reef condition over 40 years", Alasdair Harris, Charles Sheppard, George Manahira, Anne Sheppard, Raj Roy, Charlotte Gough, Blue Ventures Conservation, 2009.

further degrades the ecosystem. A self-reinforcing negative feedback is created that pushes the people deeper into poverty. This in turn further erodes the human and natural resource capital prerequisite to alternative livelihood development and rational resource use. The villagers are caught in a downward spiral and their sole means of escaping from this is to move to coastal areas that still have productive fishing.

4. Traditional fisher migration routes

This section presents the current migration routes of traditional fisher migration along the West coast of Madagascar. The routes for South West Madagascar and West Madagascar (until the Maintirano region) were established from the key informant and migrant group leader interviews done for this study; while the routes for Mahajunga northwards are based on existing literature descriptions and some key informant interviews (see Appendix 4. for description of the methods used and details of the key informants). Migration tables in Appendix 3 give the details of the origins and destinations of migrant fishers by village.

4.1 Overview

A number of migrations of small-scale fishers take place in Madagascar. An overview of these is presented in Figure 1 and can be summarised as follows:

1. In the North East of Madagascar people migrate in significant numbers to coastal villages of the Ambaro Bay to fish shrimp as "traditional fishers" (route number (1) in Figure 1).
2. There are numerous movements of artisanal fishers along the northern coast of Madagascar; for example: from Mahajunga north-eastwards towards Mahajamba Bay, as well as from Antsiranana to Port Saint Louis, Ampampamena and the Nosy Mitseo Archipelago. These artisanal fishers fish for shark, pelagic fish and free-dive for sea cucumbers or lobster (2).
3. There are illegal dive teams harvesting sea cucumbers with scuba and motorised boats, who are originally from Antsiranana and Nosy Be (Helleville), but move itinerantly the length of the North West and West (though less so) coasts.

The most significant migrations of traditional fishers take place on the West coast of Madagascar. Beginning from the South and working northwards these can be roughly described as follows:

4. Fishers, mostly Sara from Anakao, move southwards to coastal villages as far as Androka and Ambohibola (route number (4) in Figure 1)
5. Mahafale, Tanalana and Tandroy in the South move towards the coast to fish in times of drought (5)
6. Fishers travel as far as the Fort Dauphin area to fish shark (6)
7. Sara and Vezo Sara from Anakao and Tulear move northwards, principally to Morombe and Morondave (7)
8. In the commune of Befandefa fishers migrate seasonally to islands offshore of the commune, as well as undertaking longer migrations northwards to the Belo-sur-mer and Barren and mainland villages North of Morondave (8). Some fishers from villages in Manombe commune also migrate North to the Belo-sur-mer and Barren Isles as well as mainland villages
9. Fishers from Morombe move continuously to fishing sites within close proximity to the town; there is also a seasonal movement of rice farmers from the interior to the coast according to the rains. Similarly, in the area of Manombe there is a local seasonal migration to better fishing villages North of Manombe, as well as a seasonal movement to the farming areas in the immediate interior

10. They likewise migrate to fishing sites in the Mangoky delta, near Andranopasy and to coastal villages North of Andranopasy (10)
11. Vezo from throughout South West Madagascar follow the Mangoky river upstream to the Beroroha area to source *farafatse* trees for constructing pirogues (11)
12. Migrant fishers, chiefly from Morombe and the villages of Befandefa, migrate to Nosy Andriamitaroke, Nosy Be and Nosy Andravoho
13. These same fishers migrate to villages on the coast between Morondave and Maintirano (13)
14. They also migrate to the Barren Isles and further north to Nosy Vao (14)

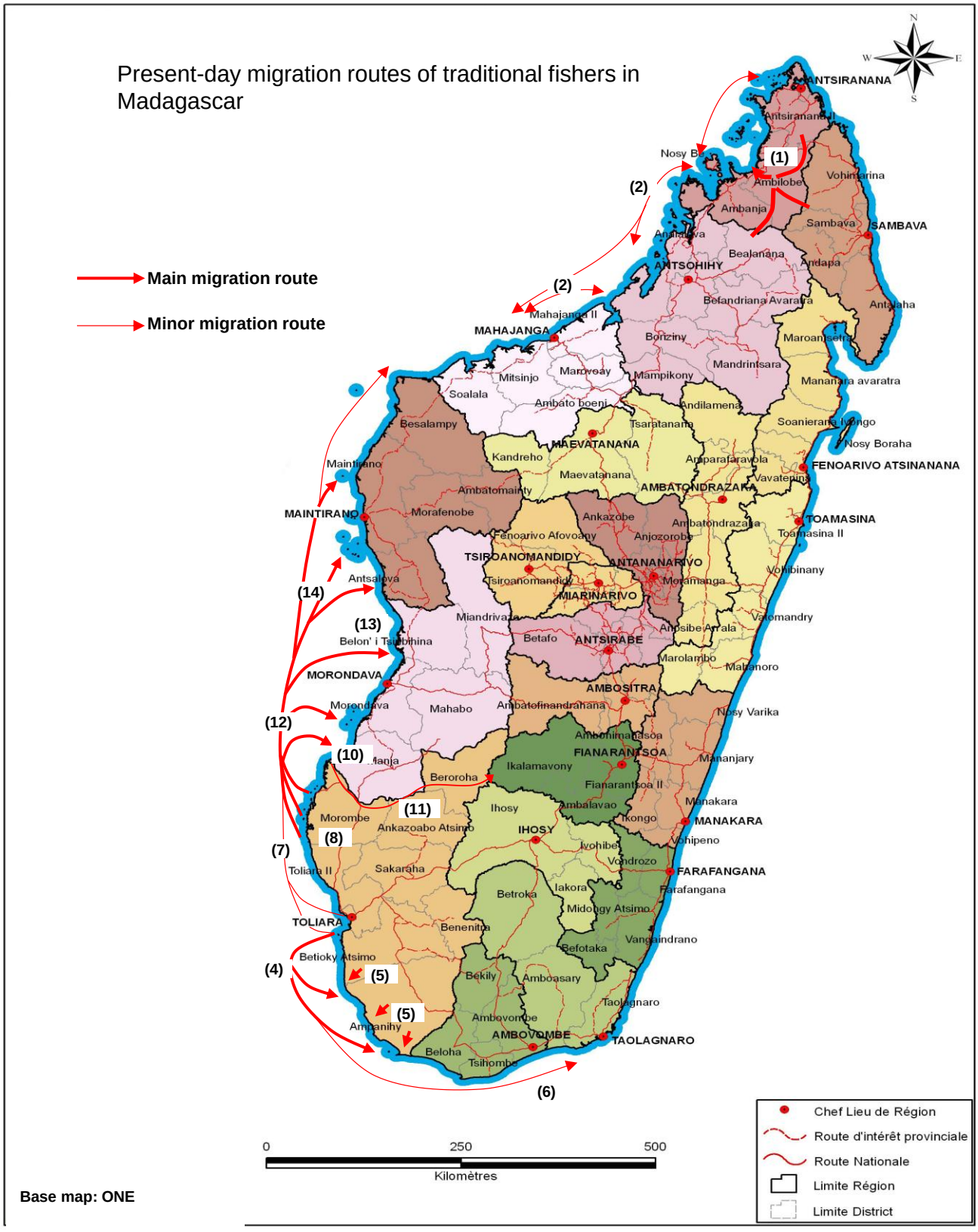

Figure 1. Overview of the principle migration routes traditional fishers follow in Madagascar

The different migration routes that occur on the West coast of Madagascar can be grouped into four migration trends:

1. Traditional shark and sea cucumber fishers Traditionally fishers from the South have always migrated north for better net and line fishing of fish. From the early 1990's they began to migrate in larger numbers to fish specifically for sharks and sea cucumbers and it is the Asian demand for these two commodities that defines this migration. The number of people moving to Andriamitaroky, Nosy Be and Andrevoho became significant enough in the mid-nineties that fishing declined there and increasingly these migrants began moving further North to the Barren Isles. So, though many shark fishers were already going to the Barren Isles in the early 1990's, their numbers increased markedly in the early 2000's.

While Andriamitaroky, Nosy Be and Nosy Andrevoho are important destinations, currently the principal objectives of many fishers are the Barren Isles and Nosy Vao (west of Tambohorano) and the mainland villages between Morondave and Maintirano.

The increase in demand for shark fin and trepang in the early 1990's also led to many fishers from Anakao and the neighbouring villages to increasingly move southwards to shark fish around villages such as Androka, Nosy Manitsa, and as far as Fort Dauphin.

2. Traditional fisher migration Behind the large migration for shark and sea cucumber fishing is a second, smaller migration that is more traditional in nature and continues from South to North. These are Vezo fishers who are no longer able to catch enough fish in their area of origin (particularly Morombe) and who are moving northwards, mostly seasonally but also definitively, to ensure a continued livelihood. This migration is said to becoming increasingly important. From the shark and sea cucumber fishermen these migrants have come to learn of the good fishing grounds around the isles and mainland and are beginning to migrate to them.

3. Local, seasonal traditional fisher migrations Fishers continue to undertake small, local movements. For example, the Sara of Morombe move continuously between the town and temporary fishing camps within 20 km of it; in the Velondriake MPA local fishers move seasonally to Nosy Hao and Andragnombala; in the area of Androka fishers move seasonally to the isle of Nosy Manitsa; in the Maintirano region Vezo Sakalava fishers move seasonally between their home base in Ampasimandroro and the neighbouring coastal villages, such as Maintirano maty and Ampandikoara.

4. Sara traditional fisher migration A migration trend that has a long tradition is the continued movement of Sara and Vezo Sara from Tulear and Anakao northwards to the urban centres of Morombe and Morondave (Betania) and southwards towards Androka. These fishers are seeking out better fishing resources and normally follow a chain migration in that they stay with relatives or fishers who are originally from Anakao along the way.

5. Artisanal fishers The traditional Vezo and Sara fishers of the West coast have a long tradition of migration. In contrast itinerant artisanal fishermen have only recently come into being. Their boats are equipped with outboard motors; they have substantial nets and in some cases are equipped with compressors and scuba gear. They are often employed by wealthy urban bosses and come from urban centres. As money-driven operations they strip-out local resources irresponsibly, targeting particularly sea cucumbers, sharks, lobster and sometimes even turtles. Traditional fishers cannot compete with them and must often stand aside and watch the pillaging of their resources. It is chiefly along the northern stretches of the West coast of Madagascar that artisanal fishers move itinerantly according to the seasonal weather conditions.

The Vezo fishermen say that much of the coastline north of Tambohorano towards Cap Saint Andre is lined by small rocky cliffs with little opportunity to land. For this reason it is rare for traditional fishermen to continue north

along the coast towards Mahajunga and vice versa, though they do on occasion.[29] It is likely that this physical barrier is also the reason that there are not yet many artisanal shark fishers from Mahajunga descending the west coast to Maintirano. It is only the illegal dive teams that harvest sea cucumbers that appear to work both the West and North coasts.

This is by no means an exhaustive list and it is likely that other fisher migrations take place in Madagascar. For example, in their socio-economic surveying of villages within or adjacent to four Malagasy MPAs, Cinner *et al.* found that a significant part of the population in all sites comprised immigrants. On average they had resided 10.5 years in their new community. The percentage that immigrants made up of the population and the average length of residence for each site were as follows: Masaola (46.6% were immigrants, who on average had resided 9.8 years in the community), Tanjona (73.3%, 11.6 years), Tampola (72.1%, 12.6 years), Nosy Atafana (15.9%, 10.0 years), Sahamalaza (32.9%, 8.4 years). These figures indicate that there is a recent influx of immigrants into these fishing communities.

However, the routes presented here are the principle ones described in the literature or by the key informants interviewed for this study. They are presented in more detail below by maps of the following geographical regions (working from South to North): 1. South of Tulear, 2. Tulear and Manombe, 3. Befandefa, 4. Morombe, 5. Andranopasy and Belo-sur-mer, 6. Morondave and Maintirano, 7. Barren Isles and Nosy Vao and 8. Northern Madagascar.

4.2 South West and West Madagascar

4.2.1 South of Tulear

Sara from Anakao have migrated southwards until Androka over the last sixty years; the temporary, seasonal camps that they first formed have become permanent villages (Figure 2). In the last six years the commercial octopus-buyers have extended their collection network to more of these villages. This new market has led to more Sara from Anakao moving to join their relatives in these villages. Destinations of fishers from Anakao include villages the length of the South West coast south of Anakao and include: Ambolomalehe, Ambola, Andomotsa, Andovoke, Antariboly, Befasy, Bevato, Lanivato, Maromena, Tulear, Anakatafa, Ankilibe, Mangoro, Sarodrano, Behinta, Itampolo and Beheloka.[30] Recently several Sara groups have migrated even further southwards to the coastal villages of the Androy region where they have settled permanently.

[29] At the time of the study Sara from Maintirano were fishing from 'Nosy Kely' 40 – 50 km off Cap St. Andre.
[30] Conservation et patrimonialisation de la tortue marine dans le sud-ouest de l'Ocean Indien, Valérie Lilette, these de doctorat, 2007, Université de La Réunion Faculté des Lettres et Sciences Humaines.

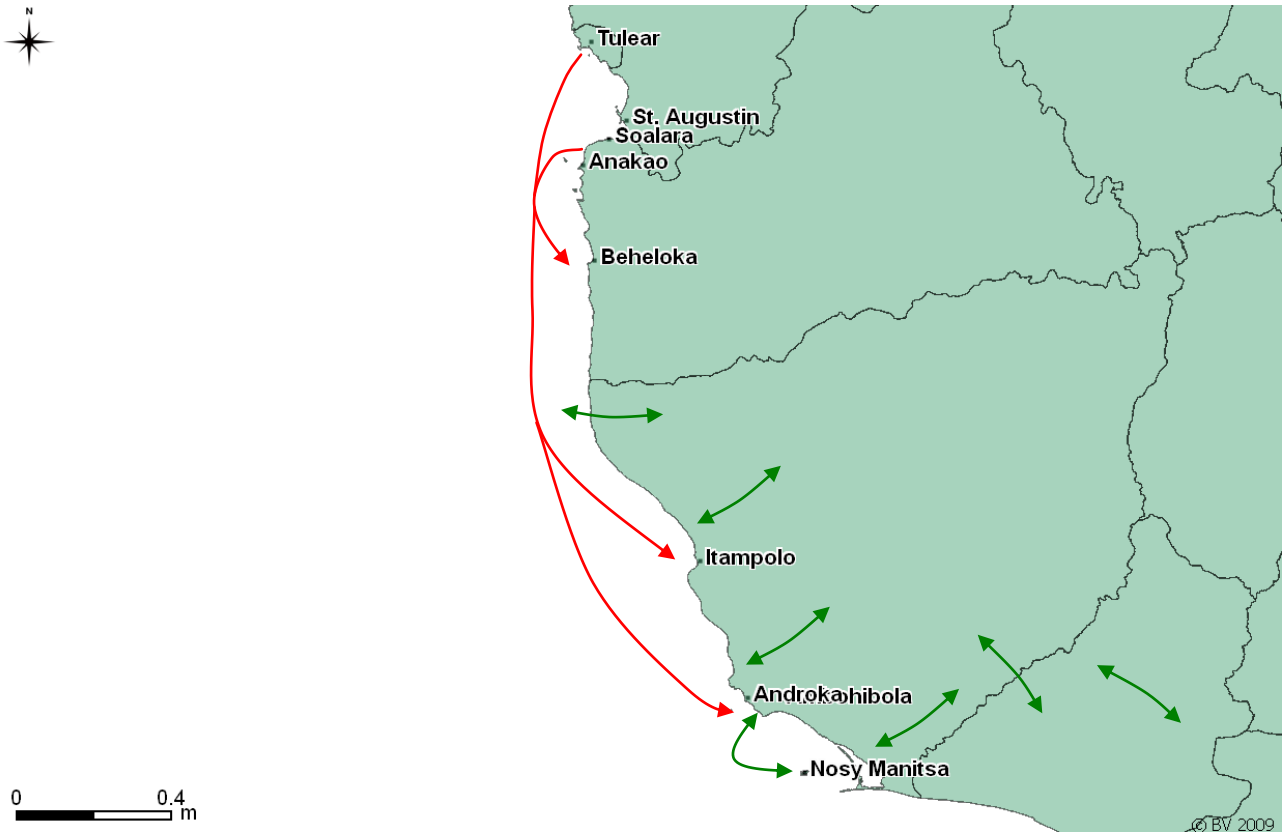

Figure 2. The principal migration routes traditional fishers follow in the region South of Tulear

The biggest driver of fishers moving south has been the search for productive shark fishing. Whereas traditionally the principal Vezo migration is northwards, with increasing demand for shark fins fishermen have also started migrating south in larger numbers.

Vezo fishermen have migrated as far as Fort Dauphin and the Manantenina area in SE Madagascar, putting their pirogues on the top of taxi-brousse. They not only fish for shark, but also dive for lobster.

On a local scale the resident fishers of Ambohibola undertake a number of temporary migrations in the region:[31]

- to Fanambosa specifically to fish for shark when the fishing is reputed to be good there;
- to Nengengy to fish with nylon nets both in the lagoon and open sea; some fishers will also use ZDZD closer to the coast to fish for tuna (thazard) (June - September), particularly during the whale migration;
- to Nosy Manitsa, which is particularly important for shark fishing, but also net fishing of fin-fish, gleaning, diving for lobster and fishing turtle with *jarifa*.

In addition to the movement of traditional fishers up and down the coast, there has been a history of exodus of rural, farming people towards the South West coast from the interior. This is one of the primary reasons that the population of fishers in this area increased five-fold between 1975 and 1992.[32] In 1985 – 1986 drought and famine - "*kere*" - forced many Mahafale, Tanalana and Antandroy from the interior to move to the coast and to try to survive

[31]"De la "terre des ancetres" aux territoires des vivants. Les enjeux locaux de la gouvernance sur le littoral sud-ouest de Madagascar." Benjamin Pascal, these de doctorat, Muséum National d'Histoire Naturelle, 2008
[32]Pêche et aquaculture à Madagascar, 1992, Rapport DRH/UNDP/FAO.

from the sea (gleaning for sea cucumbers and octopus). Drought and degraded lands continue to drive these people to the coast; they return to the interior to cultivate when the rains return; following this pattern temporary coastal villages grow and disappear. Likewise in the South there is a transhumanance by the Tandroy and Tanalana from their inland farming and grazing areas to the coastal areas where they glean. Most of the Mahafale in coastal villages own and cultivate a parcel of land close to the village and practise a seasonal transhumance eastwards to the Mahafale plateau.

Large numbers of Mahafale from the entire coastal plain exploit the reef flats of Androka, accessible by foot. Many Mahafale further south of Androka glean and beach seine and use *laro* (common to all fishers in the area).

There has also been an increase in the number of Tandroy fishers migrating more or less definitively south to the coastal villages of the Androy region – to settlements such as Lavanono, Bevazoa. Occasionally they also migrate northwards to Anjahava, where the Tandroy have family who settled there a long time ago.

4.2.2 Tulear and Manombe

Sara fishers are historically very mobile, perhaps even more so than the Vezo. They can move long distances in search of good fishing and are notorious for traditionally using beach seine nets (though this was seen to be a generalisation). They seem to be very much itinerant fishers with their movements being determined by the presence of still productive fishing sites as well as communities which already have existing Sara migrants in them. Often this means that they are able to beach seine without the residents expelling them. As such Sara migrations follow the existing network of Sara migrants.

KIs reported that in the 1940's Sara from St. Augustin and Anakao migrated up the entire West coast to fish large pelagics far offshore, on the most westerly reefs of the North West coast.

Groups of Sara families migrated definitively to Morombe and Maintirano (the Barren Isles) in the early 1960's and subsequently built up Sara communities in these towns (Tsinjorano and Ampasimanjoro respectively).

From the mid-1980's onwards they have migrated north from Tulear and Anakao, where fishing resources have long been severely depleted, to Morombe and Morondave, and sometimes onto Mahajunga (Figure 3).

Figure 3. Principal migration routes traditional fishers from the region of Tulear, Ambolimailake and Manombe follow

The Sara migrants from Anakao and St. Augustin and the Vezo Sara from Tulear, are notorious for using large beach seine nets. Most of the smaller fishing villages won't let them settle and use this technique, so they choose destinations where there already are Sara kin (migrants who went before them), and where they will be accepted.

Vezo fishermen from certain villages of Manombe commune, such as Fianamaharasay, Tsiandamba and Salary, have a tradition of migrating north to the Belo-sur-mer and Barren Isles for shark fishing (Figure 3).

On a local scale fishers from Manombe have a tradition of migrating seasonally to better fishing grounds approximately 50 km north of the town (Figure 3).

There is also a seasonal movement between rice cultivation in the interior (the basin Ankililoaka-Ranozaza) and fishing on the coast; these Vezo fish during the dry season then return inland during the rainy season to farm. Likewise the Vezo of Morombe return inland to the Mangoky delta (Sosa) to cultivate rice during the rainy season. This enables them to sell their fish in the Masikoro hinterland and rice to the Vezo.

Similarly many Masikoro living between the Mikea forest and the coast will also opportunistically become fishers during the dry season; according to the season they will concentrate on planting, weeding and harvesting their crops or fishing. Fishing constitutes an important secondary source of income for the inland Masikoro villages of Velondriake, such as Befandefa, where 36% of households fish.

4.2.3 Befandefa

Befandefa, together with certain villages of the commune of Manombe and the town Morombe, is one of the principal origins of migrants who move northwards to the islands off the coast of Andranopasy, Belo-sur-Mer and Maintirano (Figure 4 and Figure 5). Large numbers of fishers from these areas also migrate north to coastal villages situated along the stretch of coastline between Morombe and Maintirano.

Locally fishers from the coastal villages of Velondriake and the southerly villages of Befandefa migrate annually to the islands of Nosy Hao and Andragnombala to fish (Figure 4 and Figure 5). Insecurity caused by armed bandits (Malaso) in the area of Befandefa has also forced inland villagers to move to the large coastal villages to take refuge. Many of the coastal villagers also habitually take refuge from the Malaso on the neighbouring isles of Nosy Hao, Nosy Ve, Andambatihy and Andragnombala.

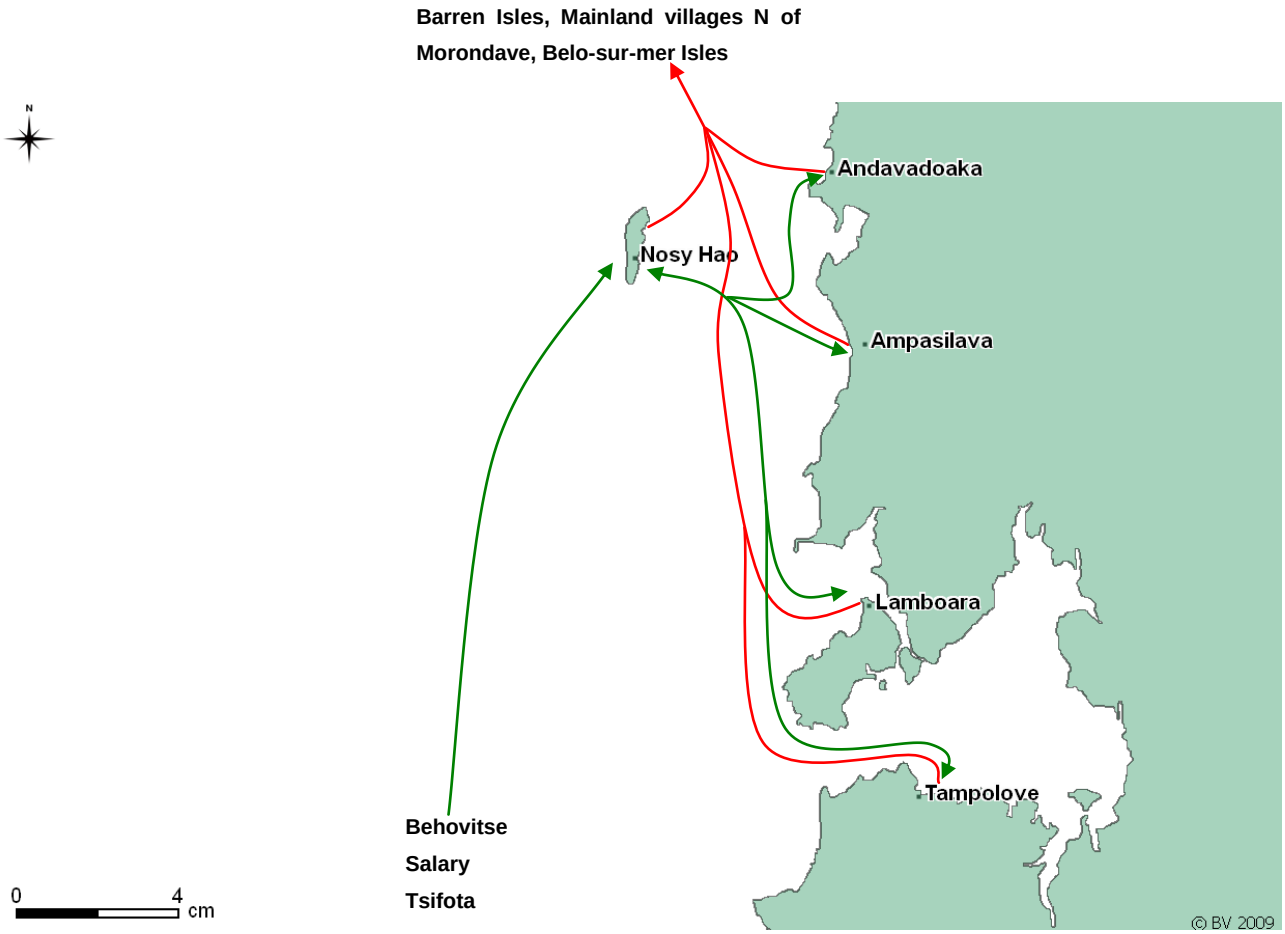

Figure 4. Principal migration routes fishers from the southern part of Befandefa commune follow

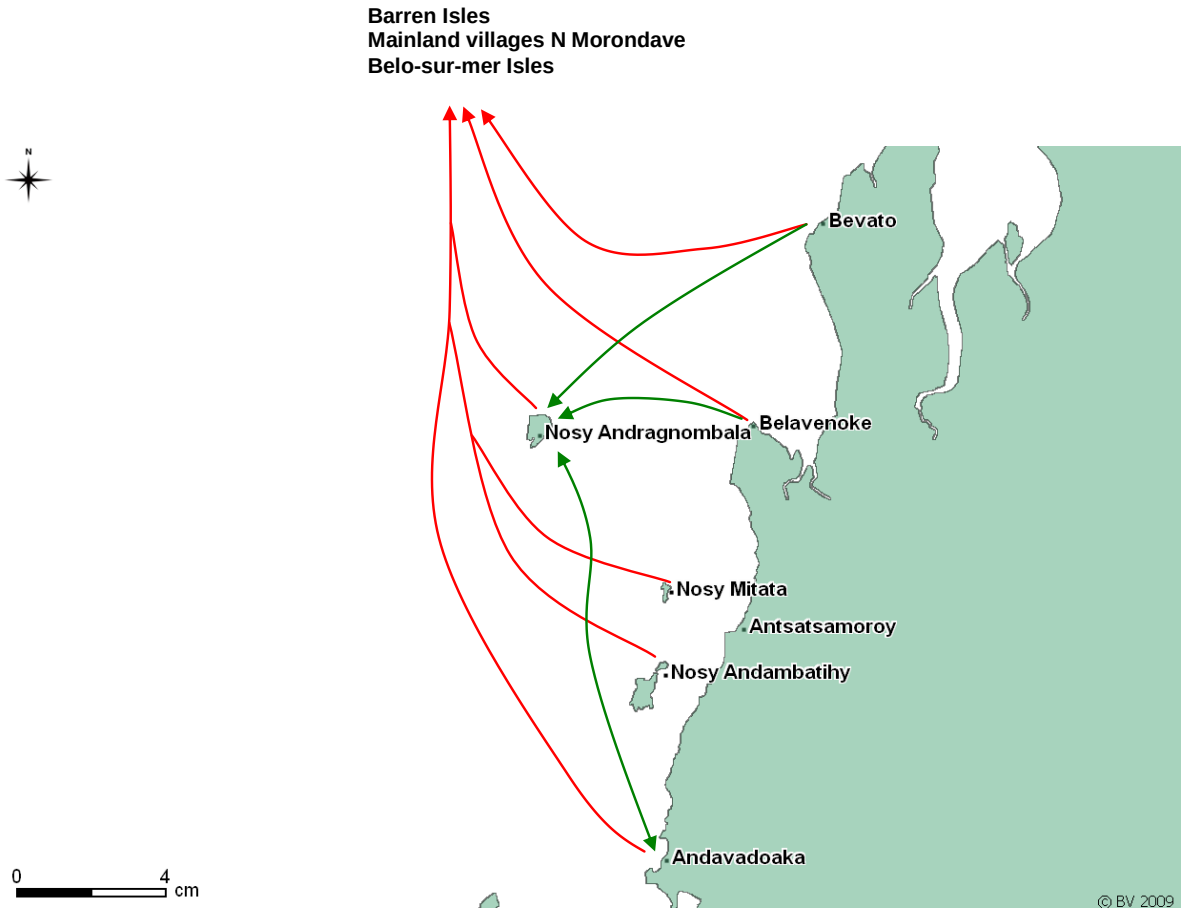

Figure 5. Principal migration routes fishers from the northern part of Befandefa commune follow

4.2.4 Morombe

Many of the fishers in Morombe are originally from the coastal villages of Befandefa, or are first generation migrant fishers from elsewhere. In the 1980's Morombe had been a busy commercial centre (pois de Cap) and many Vezo went there to work for Karani businesses, not necessarily to fish. There is now little local economy, the fishing resources are heavily depleted and Morombe is a significant source of migrants. Mostly Sara migrants from Tulear and Anakao continue to arrive as there is a strong Sara community in the Tsinjorano quarter of Morombe (Figure 7).

Many of the migrants on the Belo-sur-mer Isles, the mainland villages north of Morondave, and the Barren Isles are from Morombe.

There is a seasonal migration of fishers from mainly Morombe, but also villages further south, to virtually all of the mainland villages North of Andranopasy; resident fishers in these villages say that the number of migrants arriving is now significant (Figure 7).

On a local scale many fishers from Morombe move to-and-fro between fishing camps north and south of the town, as well as on the isles just offshore. Many of these fishers are from the Sara quarter of Tsinjorano and use beach seine nets. This has brought deep conflict in the most northern village of Velondriake, Bevato, where the fishers periodically come to fish and where they have family ties (Figure 6).

Vezo fishermen from the South West coast traditionally follow the Mangoky River upstream to search for large *farafatse* (givotia madagascariensis) from which to make their pirogue hulls (Figure 7). This movement increased with large *farafatse* becoming rare, particularly in the coastal regions South of Tulear, and the subsequent prohibition of cutting *farafatse*. This movement continues to this day and the region of Beroroha is a common destination, as well as Ankazoabo. Vezo fishermen who are specialize in hewing out pirogue hulls will search the forests close to the river for large enough trees; they fell appropriate trees, leave them to dry for three to four weeks and then return to hew a rough hull from them. If the tree cracks on falling they will abandon it. The fishermen will hew several pirogues, strap them together over two hulls, then punt and sail downstream. They will often time their trip to Beroroha so that they are able to catch the first rains flooding the Mangoky to aid their return downstream. Sailing back to their home villages they will sell the rough pirogue hulls to individual fishermen or fulfil an order made beforehand. This journey means the absence of one or several groups of fishers for three to six months and has consequences on the family who stay in the village without any support for what can be a significant length of time.

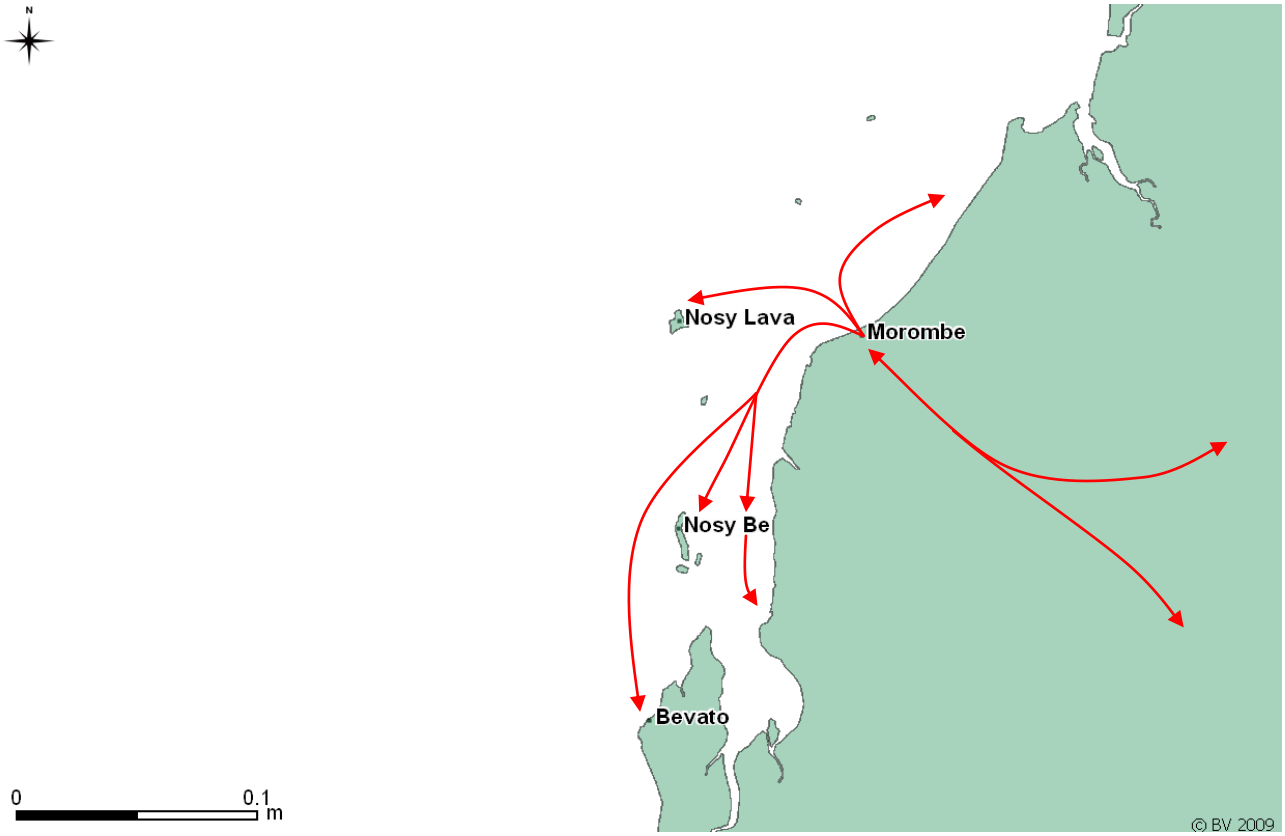

Figure 6. Local migration routes traditional fishers from Morombe follow

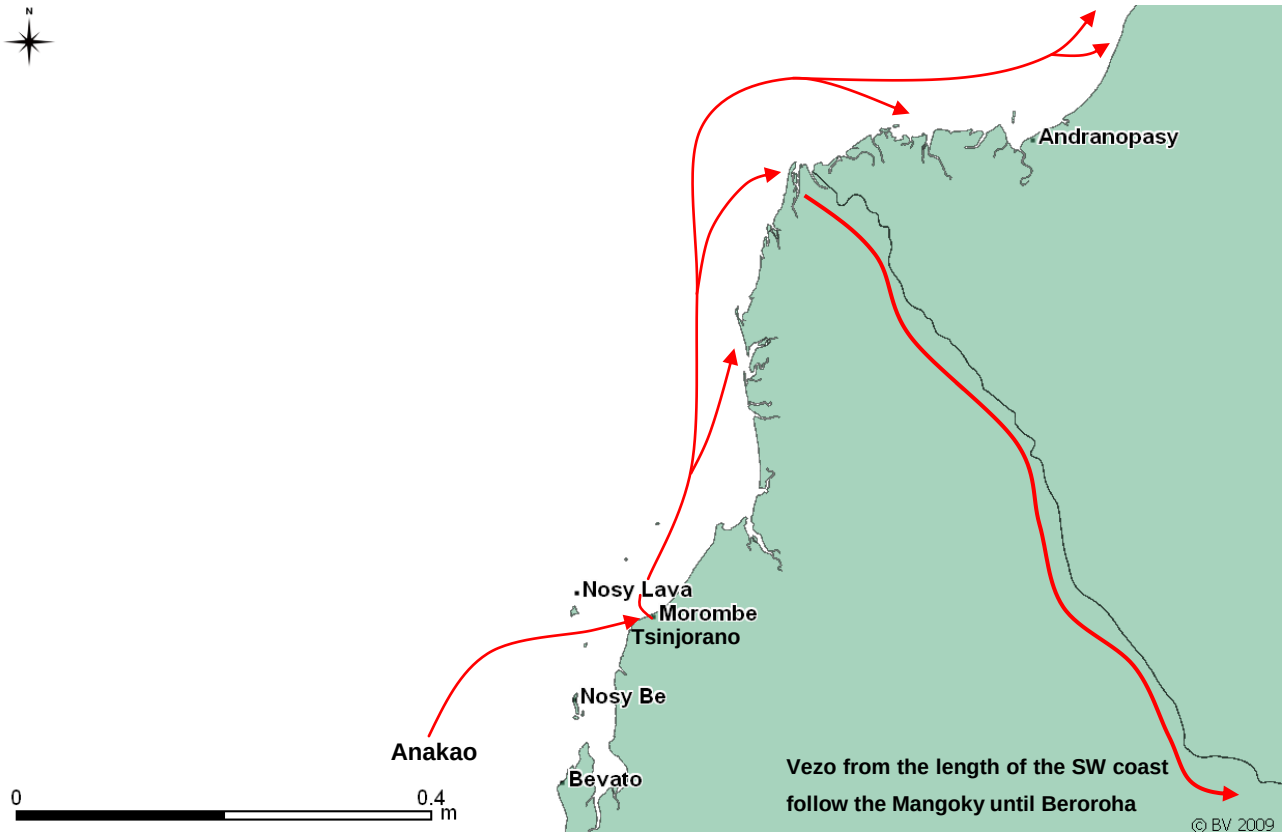

Figure 7. Distant migration routes traditional fishers follow in the region of Morombe and Andranopasy

Vezo families from the Befandefa and the Morombe will also sail and punt up the Mangoky, fishing along the way, to find suitable *farafatse*. This is an old tradition of the Vezo of the Befandefa area, who would trade and buy provisions at Ambohibe (and subsequently Andranopasy) before going up the Mangoky. On their return they would fish around the Mangoky delta and Andranopasy, returning to their village after two months or so. In following this route some migrants also began fishing around Andriamitaroke, which was a rich fishing ground seldom fished by the residents of Andranopasy. This occasional migration to go up the Mangoky and to fish in the Andranopasy area morphed into fishing more and more on Andriamitaroke with the increased price for sea cucumbers and shark fins at the beginning of the 1990's.

4.2.5 Andranopasy and Belo-sur-mer

There are several isles and sand cays off the coast of Belo-sur-mer (Nosy Andravoho, Nosy Tania, Nosy Andragory, Nosy Angarahoka, Nosy Be) and Andranopasy (Nosy Maheloholo, Nosy Andriamitaroke). Of these only Andriamitaroke, Nosy Be and Andrevoho are currently settled; the other isles are effectively uninhabitable sand cays that are submerged by tides (Figure 8).

The settlement of migrant fishers on the isles is a relatively recent phenomenon. Traditionally the Vezo migrated north to new fishing sites on the mainland; they would not go to the islands of Andriamitaroke, Nosy Be and Andravoho because all of them were *faly*. Boutres would sometimes anchor close to the islands to take shelter in storms, but nobody would go onto the islands. French marine biologists carried out surveys of the islands in the late 1970s and reported that the largest island of Nosy Andriamitoraka was rarely visited by Vezo fishers. Since this is

the southernmost island in the Belo-sur-Mer region, and so the most accessible to migrant Vezo fishers originating from the southwest of Madagascar, it is likely that the recorded scarcity of fishers at Nosy Andriamitoraka was true of the other Belo-sur-mer and Barren isles at the time.

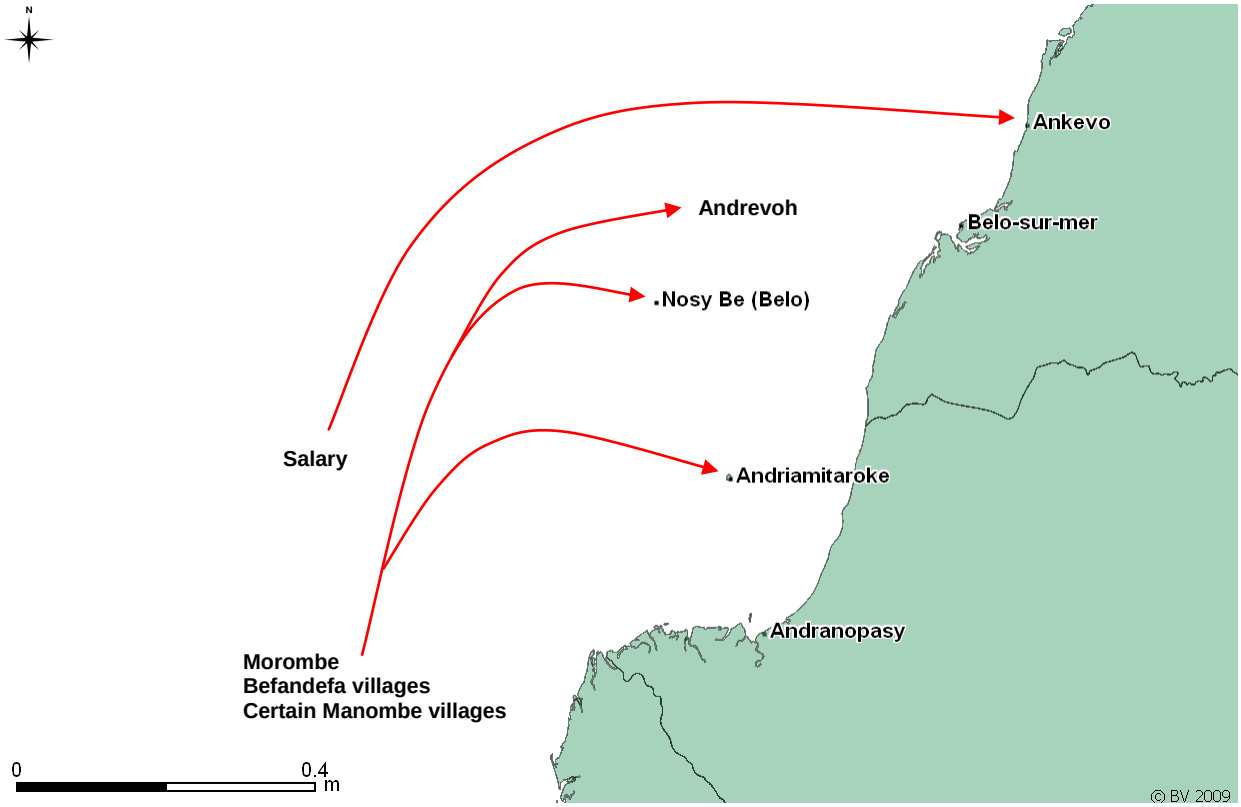

Figure 8. Principal migration routes traditional fishers follow to the Belo-sur-mer isles

Fishers from villages of Befandefa commune – Ampasilava, Andavadoaka, Lamboara, Bevato, Belavenoke and Tampolove – and villages further South, such as Tsifota and Fianamaharasay, used to go up the Mangoky to cut *farafatse* (Givotia Madagascarensis) and make pirogues; they would also stop at Ambohibe (before Morombe was founded) or Andranopasy to buy provisions. These trips would take them one to four months and they would fish along the way for subsistence.

However, by the early 1980's fishers from the South began to camp for two or three nights on the islands before returning to Belo-sur-mer.

At the beginning of the 1990's Asian demand for shark fin and trepang increased in Madagascar; *Jarifa* shark nets also became available. It was at this time that the principal goal of seasonal migrant fishers from Befandefa changed from mounting the Mangoky to source *farafatse* to one of fishing. In particular they would fish near Nosy Andriamitaroke, which the residents of Andranopasy did not fish. The migrants fished all species but particularly sea cucumbers.

In the early 1990's fishers from villages such as Andavadoaka, Lamboara, Tampolove, Bevohitse and Ambatamilo would stay on the island from May until October/November. They would sell dried fish, octopus, sea shells and trepang to buyers in Morondave and Morombe or to a buyer who visited the island.

At this same time these fishers begin going further north for the good shark and sea cucumber fishing around the islands offshore of Belo-sur-mer and Maintirano.

In the later 1990's the numbers of fishers migrating to the Belo-sur-mer and Barren Isles began to increase. Prior to 1997 there had been very good shark fishing in the Befandefa area; by this year fishermen saw it as fished-out. And so fishermen from Ambatamilo, Bevohitse, Salary and Andavadoaka – villages with a tradition of shark fishing with *jarifa* – migrated north.

In 2004–2006 the largest numbers of fishers ever camped on the Belo-sur-mer isles during the dry season; it was during this era that conflict between the migrants and residents of Belo-sur-mer became a real issue. Both shark and sea cucumber fishing around Belo-sur-mer and the islands diminishes markedly in 2006.

4.2.6 Morondave and Maintirano

Increasingly migrants are choosing to go north to mainland villages along the entire length of the coast from Andranopasy north, but particularly villages between Morondave and Maintirano. These destinations are favoured for the good shark fishing that exists in their proximity. They include villages such as Ampatike, Bemakoba, Benjavily, and Mozambika. Once again the migrants are Vezo from Morombe, the Befandefa villages and some Manombe villages, such as Fianamaharasay (Figure 9).

This part of the coast is not protected by reefs and so it is not possible for the Vezo to beach their pirogues for long stretches. They must find a river inlet where there are often sheltering sand banks or estuaries where they are able to land (though navigating into these in a sailing pirogue can be difficult and dangerous in itself). The presence of sheltered landing beaches seems to be determinant in the migrants' choice of mainland village.

The story of how Bemakoba became a destination for migrants is revealing in how present day migration works. An important shark fin buyer spent 2006 testing the fishing grounds between Morondave and Benjavily for shark fishing; he had a very clear idea of what kind of habitat shark species can be readily caught in and found that there was good shark fishing near Bemakoba and Benjavily. He then sponsored teams from Andavadoaka and Morombe, particularly fishermen who were too poor to buy the necessary gear themselves, to come to these areas on the condition that they would sell to him.

Migrants say that both shark and sea cucumber fishing around the Belo-sur-mer and Barren islands diminished markedly in 2005 and 2006, but the new mainland fishing villages are still productive and so are becoming popular destinations for migrants. For example, about 50 migrant shark fishermen, mostly young fishermen from Bevato, arrived for the first time in Ampatike in 2007 to fish shark. They have since returned every year. Presently a shark fin buyer operating the length of the coast considers South of Morondave as fished-out, while between Morondave and Maintirano there are still productive sites. For example between Morombe and Morondave he buys 20–30 kg of fins/week; between Bemakoba and Borengengna alone he gets 80 kg/week.

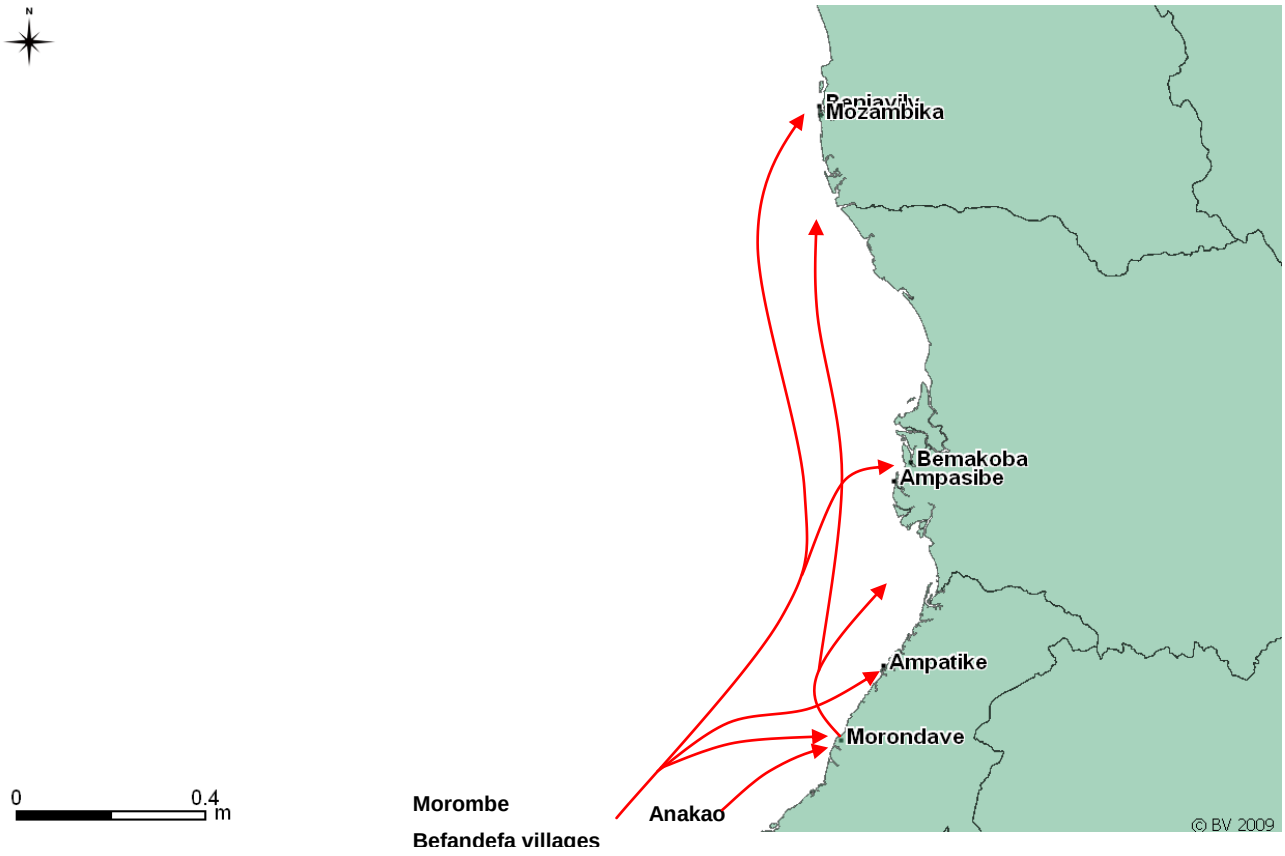

Figure 9. Principal migration routes traditional fishers follow in the region of Morondave

4.2.7 Barren Isles and Nosy Vao

The Barren Isles are an archipelago between 15 and 65 km offshore of Maintirano; seven of the isles are vegetated, though most are less than a kilometre in length. There are also a number of sand cays that are submerged during spring tides and storms. Despite this two of the sand cays are settled by migrant fishers. In total migrant fishermen recognize 12 isles and sand cays in the archipelago.

Currently the isles are lived on by seasonal migrants, mostly from Morombe and the communes of Befandefa and Manombe, as well as local fishers from Maintirano (Figure 10). Migrants also travel to Nosy Vao, approximately 80 km north of Maintirano.

The Barren Isles have a long history of habitation. Henry Douliot describes in his voyage that he made up the West coast in 1892 seeing people living on one of the Barren Isles. Nosy Lava has the remnants of an airstrip and a concrete reservoir (recently rebuilt by the Barren Isles turtle conservation project and the mayor of Maintirano for the benefit of the fishers); the isles were also exploited for guano in the 1990's.

In the 1940's Sara fishers from St. Augustin had a tradition of migrating up the entire West coast to fish large pelagic fish off the most westerly reefs in the North West. Most Vezo did not migrate such long distances; however, some Vezo from the Befandefa area are said to have accompanied them. This probably was one of the precursors to the Vezo migrating to the Barren Isles and is perhaps why many of today's migrants come from this area.

Figure 10. Principal migration routes traditional fishers follow to the Barren Isles and the Maintirano region

In the 1960's several families left Anakao in search of new fishing grounds; they stopped over in Belo-sur-mer and Morondave, continuing until Maintirano. Some families also passed by Morombe, where they had relatives from Anakao staying at Tsinjorano. One group of Sara migrants lived on the isles (Nosy Lava, Nosy Drano, Mboro, Maroantaly, Dondozy, Abohazo), at first permanently, then from April / May until the end of November. Other Sara lived in Maintirano and fished around the isles for 2/3 days before returning. At this time the Vezo Sakalava residents went to the islands to hunt turtles; but infrequently and they never stayed there as there were many *faly* on the islands. The Vezo Sakalavas' pirogues were also crudely made; the Sara showed them how to make more seaworthy pirogues and guided them to the islands.

In the early 1980's the resident Sara did not see migrants from the South on the islands, but by 1984 fishers from the South (Andavadoaka, Antsatsamoroy, Belavenoke, Bevohitse) camped on the islands (Nosy Lava, Nosy Mangily). In the late 1980's they also camped on Nosy Abohazo, Nosy Dondozy and Nosy Mboro. But they were still only few in number; an insignificant and temporary presence on the isles.

In the mid 1980's the Sara groups who lived in Maintirano began to live seasonally on Maroantaly, from March to November; the reason for this was that, though the fishing was good, they were no longer able to catch enough during a short period to justify frequent return trips to Maintirano.

Figure 11. Local migration routes fishers from Maintirano follow

In the late 1980's migrants from the South (Befandefa villages and Morombe) were already fishing shark and sea cucumbers in the Barren Isles, though they outnumbered by the resident fishermen. From 1990 to 1992 they began to come in larger numbers to the islands. By 1996 there was a definite increase in the number of migrants from the South. In the late 1990's, along with the Sara fishers from Maintirano, they lived on Nosy Lava, Anbohazo, Dondosy, Maroantaly and Nosy Mboro (Figure 11).

In about 1998 to 2000 migrants from the South started to live on the islands in significant numbers; and there numbers have increased continuously every year since, with the most arriving in 2008.

In 2000 Japanese development agency introduced the *ZDZD kirara* technique to Maintirano fishermen, particularly the Sara. Between 2003 and 2004 a number of these families, who had been resident in Maintirano, started living on Maroantaly during the fishing season as this is a well situated base from which to practise *ZDZD kirara*.

2006 was a turning point, with the number of migrant fishers settling on all of the islands becoming much larger; conflicts with the residents began at this time. These became more marked in 2007 and 2008, with still more migrants from the South arriving who did not respect the *faly* of the isles.

All five species of turtle known to occur in the Mozambique Channel are found in the Barren Isles. With many kilometres of uninhabited beaches it is also a favoured nesting site for Green and Hawksbill turtles.

When females lay their eggs they are the most vulnerable; exhausted by their weight and easily traced, they make easy pickings for fishers, who will also collect all of the eggs. These can be bought in the Maintirano market, reportedly for less than the price of chicken eggs.[33]

4.3 North West Madagascar

A significant migration of people who are traditionally farmers from the inland regions of the North East, but from far away as the South of Madagascar, has taken place to the coastal villages of Ambaro Bay (Figure 12). They are attracted mostly by the shrimp fishing, but also by sea cucumber fishing. This migration has massively increased the population of some of these villages – a 100-fold in the case of Ankazomborona. Socio-economic surveying in villages of Ambaro Bay – Ambavanankarana, Ankazomborona and Ampapamena – showed that there was a weak tradition of fishing in these villages. Only 19.5% of fishers had always been fishers; 80% of respondents had practised other activities before becoming fishers; most (33.3%) had been farmers.

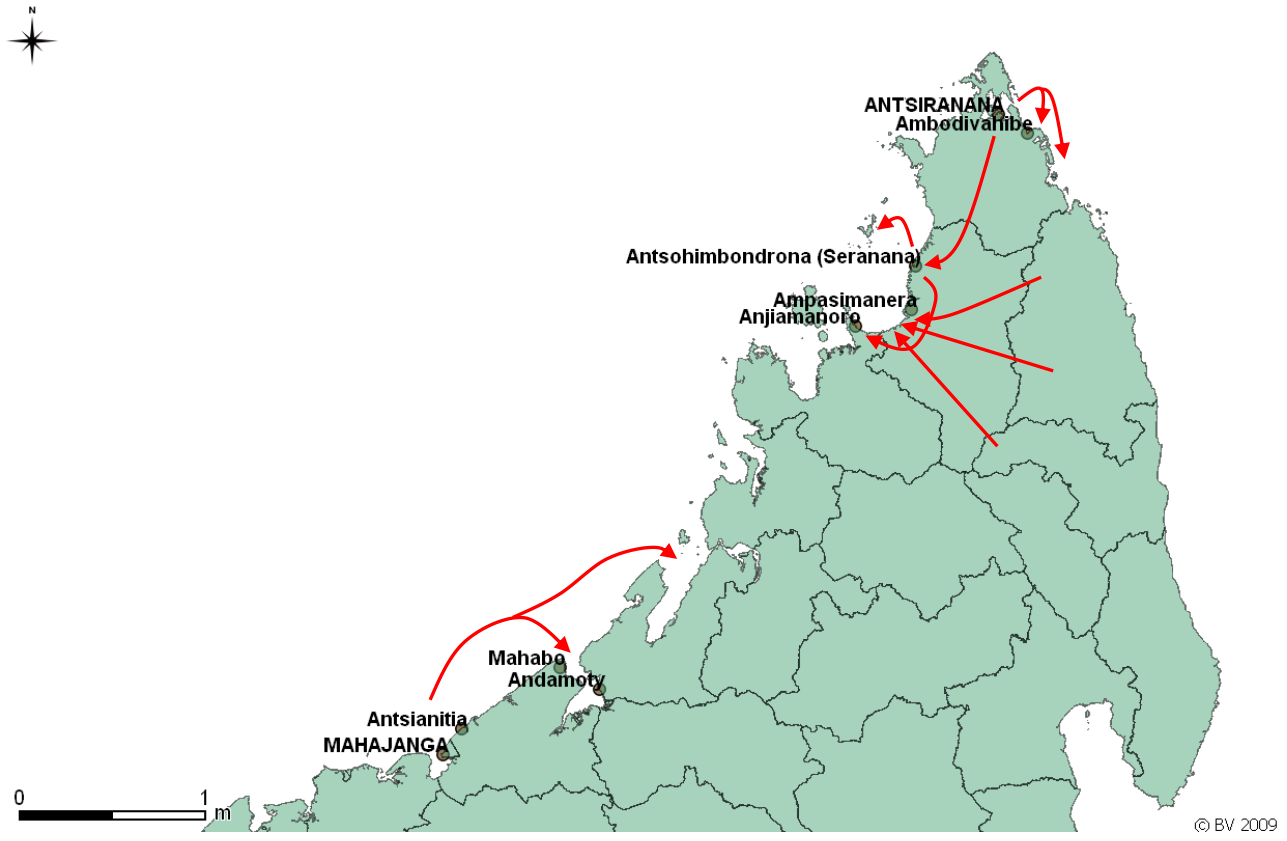

Figure 12. Migratory movements of traditional fishers in the North of Madagascar

There are numerous movements of artisanal fishers, who are highly mobile, along the north coast (Figure 12), some of which are presented here:

- In the North East of Madagascar about 200 to 300 fishers who dive for sea cucumbers move seasonally between Port St. Louis, Ampampamena (Ambanja), the Nosy Mitsio archipelago and Antsiranana (where they dive for lobster). There movements are dictated by the seasons, the weather determining which of these sites is suitable

[33] Geraud Leroux, Project Coordinator, Barren Isles Turtle Conservation Project, personal communication.

for diving.

- During the dry season artisanal fishers, based in the mainland villages such as Port Saint Louis, move to the Nosy Mitseo Archipelago, which they use as a base to fish large pelagics and shark. They return to the mainland every 10 – 14 days to restock on petrol and food, and to transfer the catch.
- Artisanal shark fishers move around the far north east of Madagascar according to the prevailing winds: From December through to April the *talu*, or westerly trade winds, blow. At this time many of the shark fishers migrate to Ramena and are based there from January through March. They set their nets outside the bay on the north-east coast. The *varatraza*, or easterly trade winds, are strong from May through November. Once the *varatraza* trade winds begin most migrate around the northern most point of Madagascar, Cap d'Ambre, to Ampasindava. Using Ampasindava as a base, many fishers establish temporary fishing camps on the islands of the Nosy Hara archipelago. Most trips to the isles last from seven to ten days. La Dordogne is an enclave within the regional capital of Antsiranana. Fishers from Ampasindava will occasionally fish from la Dordogne for short periods of time during the months of December through March.[34] (This was observed in 2002; since the establishment of the Nosy Hara MPA the Malagasy national Parks have stopped fishermen camping in the archipelago. Have to verify what is happening now.)
- There is a small scale migration of fishers from Mahajanga-Antsanitia / Mahajanga area, who travel north to the Mahajamba Bay for two to six weeks. The fishers camp in uninhabited parts of the coastline, fishing for pelagic fish using *palangre*. They salt the catch and sell it in Mahajanga.

[34]A Preliminary Assessment of the Artisanal Shark Fishery in Northern Madagascar: Implications for Management, Lyn Robinson and W. Sauer. To be published. Personal communication.

5. Traditional fisher migration in South West Madagascar

The time and resources available for this study meant that it was only possible to survey a limited area and number of villages. The literature survey and initial key informant interviews indicated that the migration of traditional fishers from the Befandefa area and Morombe in South West Madagascar was the largest, was of critical socioeconomic importance and was causing the most conflicts. Therefore the surveying was limited to geographical zone that includes most of this particular migration, beginning in Befendefa in the south and continuing north until Maintirano town. Quantitative and qualitative (key informant and focus group interviews) were carried out in most of the isles and villages along this length of coastline that are known to be origins and destinations of traditional migrant fishers.[35] Details of the surveys and the sites surveyed are presented in Appendix 4. A category-type analysis of the interviews where the data is synthesised under themes, was used to analyse the data. The synthesised data, presented under the themes of migration chronology, drivers, conflicts and characteristics, are given in Appendix 2.

The results of the surveying on this particular migration are presented below under the following sections: broad characteristics; demographics; temporal trends; fishing targets and gear; drivers of migration (push and pull factors), conflicts; and management measures taken to date.

5.1 Characteristics

Fishers migrate north at the end of the cyclone season (end of March, beginning of April) and return just before the cyclone season starts (December). In addition to the first wave of migrants moving north at the end of the cyclone season, there is a second wave with a large number of fishers only sailing north after Independence Day celebrations on the 26 June. The fishers prefer to celebrate with their families (some migrants will return to their villages from the north just to do this), but more importantly this marks the beginning of a period of better weather.

Only fishers of a certain wealth migrate. Fishers need large pirogues to sail northwards as much of the sailing is open-ocean, in seas unprotected by reefs. Shark nets (*jarifa* and *ZDZD*) are expensive and not all fishermen can afford to buy them. In addition migrants need a reserve of cash for provisions along the way and poorer fishers cannot do this. Poor fishers generally only migrate if they are recruited as a team member or sponsored by shark fin buyers who provide them with nets and food.

Fishers migrate either as a family unit (men who fish as a team together with their wives and children) or as a fishing team with one or two women to cook for the fishermen. Here a “chef d'equipe” owns the pirogues and nets and will take on members of his family or those close to him who he can trust to work for him. He is responsible for looking after the team (food etc.) and at the end of the season pays each of them a part of the profits. For younger fishers who don't have the means to migrate joining a chef d'equipe is the only way for them to do so.

[35] Note: due to time constraints, surveying was not carried out (or was limited to qualitative surveying) in a number of mainland villages that are all known to have migrant communities from the South West (namely Tampolo, Andranopasy, Antseranandaka, Eleo, Belo sur Mer, Ankevo, Belalanda and Morondave). The fact that most of the quantitative surveying was carried out on the isles and in mainland villages favoured for shark fishing could very well have introduced a bias in the study towards shark fishers, while not giving enough coverage of migrants who stay on the mainland and target nearshore fisheries only.

Fishers who have the means to pay for their provisions will sail directly to the Maintirano area; those who don't work their way up the coast, stopping on Andriamitaroky, Nosy Be and Andrevoho for the time necessary to catch enough shark, sea cucumbers and fish to continue northwards.

5.2 Basic demographics

There are a number of difficulties (presented in detail in Survey methods) in establishing reliable numbers of fishers who migrate: most fishing villages have no system of recording immigration / emigration; many Vezo fishers don't pay heed to the existing passport system; and there are so many different kinds of migration, with fishers in constant flux, that it is difficult for the leaders of all but the smallest villages to reliably estimate numbers.

For this study a clear indication of the basic demographics of migration to the Belo-sur-mer Isles, some of the mainland shark fishing villages and the Barren Isles was gained by interviewing all of the heads of the migrant groups present in these villages (Ampatike, Andravoho, Andriamitaroke, Bemakoba, Benjavily, Mananja, Maroantaly, Nosy Be (Belo), Nosy Lava and Nosy Mangily). A summary of the numbers of fishers, their village of origin and destination is presented in Table 11.

Table 3 presents the number of migrants counted in these villages by their village of origin. The town of Morombe (with 132 persons) and the commune of Befandefa (with 248 persons from the villages of Ampasilava, Andavadoaka, Belavenoke, Bevato, Bevohitse and Lamboara) accounted for the vast majority of migrants in the villages surveyed. Together they comprised 96% of migrants from the south (that is excluding the 96 Maintirano fishers based on the Barren Isles). A minority of migrants came from Belo-sur-Mer, Morondave and Tulear.

Table 4 presents the number of migrants recorded in each of the destinations surveyed. Mananja and Nosy Be harboured the largest number of migrants, with 97 (19% of the total number of migrants) and 83 (17%) respectively. The number of persons on the islands has little to do with the size or carrying capacity of the island; but rather it reflects the fishing opportunities in proximity. Mananja is one of the northerly Barren Isles, a sand cay approximately 200 m by 80 m that is inundated during large spring tides and one of the smallest "isles" surveyed. It is the reputedly good fishing accessible from these sites that makes them popular destinations. Within a season migrant fishermen will move between the isles depending on the fishing conditions at any given time.

Table 2. Migration table, based on actual surveys done in this research, summarizing the numbers of fishers as well as their villages of origin and destination

	Destination village										
Village of origin	Ampatike	Andravoho	Andriamitaroke	Bemakoba	Benjavily	Mananja	Maroantaly	Nosy Be (Belo)	Nosy Lava	Nosy Mangily	**Total**
Ampasilava			15		16	26					**57**
Andavadoaka		1	6			11		13	10	30	**71**
Belavenoke	4	29	8								**41**
Belo-sur-mer					12						**12**
Bevato	14	12						21			**47**
Bevohitse	7										**7**
Lamboara			7	18							**25**
Maintirano						18	50		28		**96**
Morombe		4	16	19		42		49	2		**132**
Morondave							6				**6**
Nosy Be (Hellville)									1		**1**
Tulear				4							**4**
Total	**25**	**46**	**52**	**41**	**28**	**97**	**56**	**83**	**41**	**30**	**499**

Table 3. The number of migrants counted during the survey presented by their village of origin

Village of origin	Persons	Men	Women	Children
Ampasilava	57	38	10	9
Andavadoaka	71	38	15	18
Belavenoke	41	18	9	14
Belo-sur-mer	12	12	0	0
Bevato	47	29	10	8
Bevohitse	7	4	2	1
Lamboara	25	16	4	5
Maintirano	96	54	18	24
Morombe	132	71	28	33
Morondave	6	4	2	0
Nosy Be (Hellville)	1	1	0	0
Tulear	4	3	1	0
Total	**499**	**288**	**91**	**112**

Table 4. The number of migrants counted during the survey presented by their village of destination

Village of destination	Persons	Men	Women	Children
Ampatike	25	15	5	5
Andravoho	46	19	10	17
Andriamitaroke	52	32	9	11
Bemakoba	41	25	9	7
Benjavily	28	17	4	7
Mananja	97	71	16	10
Maroantaly	56	34	12	10
Nosy Be (Belo)	83	43	18	22
Nosy Lava	41	16	9	16
Nosy Mangily	30	16	7	7
Total	**499**	**288**	**91**	**112**

It must be noted that this survey was carried out during May 2009; most of the KIs in the places of destination said that the majority of migrants arrive after the Madagascar's Independence Day celebrations on the 26 June. Many fishers like to celebrate Independence Day in their village (some migrants already on the islands said they would return to their home villages just for this); in addition the weather is consistently better after this date.

KIs from each location gave estimations of the peak number of people who were on the islands in 2008; these are presented in Table 5. The numbers they estimate are significantly more than what we observed during May 2009 but were corroborated by a rough census carried out by BV during the last week of July 2009. This showed that the number of migrants had dramatically increased from May: there were about 250 fishers on Andriamitaroke, 200 on Nosy Be and 150 on Andrevoho.

Table 5. The maximum and minimum number of migrants normally found in a particular destination

Village of destination	Reported number of persons	
	Maximum	**Minimum**
Anabahazo	30	20
Ampatike	210	160
Andravoho	150	100
Andriamitaroke	400	250
Bemakoba		
Benjavily		
Mananja	275	50
Marifa	75	20
Maroantaly	200	200
Nosy Mboro		
Nosy Be (Belo)	200	200
Nosy Lava	360	200
Nosy Mangily	30	15
Nosy Vao	100	100
Total	**2030**	**1315**

These estimates would put the number of migrant fishers choosing these particular destinations to between 1320 and 2030 persons. The local government authorities estimated the number of migrants to be 400 (Andriamitaroke), 200 (Nosy Be) and 150 (Andravoho) during 2007. In the Barren islands in 2008 they counted a total of 264 pirogues, with 4-5 passengers in each, meaning a total of between 1064 and 1320 persons in the Barren

Isles alone. One KI (a migrant fisherman on Mananja) reported that in 2008 there were 86 pirogues of migrant fishermen and a further 80 pirogues of Maintirano fishermen on Mananja alone. It is difficult to believe that so many people could fit on what is but a small sand cay, but other migrants interviewed described the over-crowding, how difficult it was to find a free space to land your pirogue, and concurred with this count. It is therefore quite possible that the real number of migrants going to these destinations is greater than 2030.

Table 6 shows the number of migrants recorded in the destinations surveyed in this study as a percentage of the population of their home village. For the better part they form 10% or less of the village of origin's population, with only Ampasilava forming 18%. If the 2.5- to 5-fold increase in the number of migrants on Nosy Be, Andravoho and Andriamitaroke between May and late June is used to estimate the percentage of villagers migrating, a much larger proportion of these village populations would be expected to migrate. Based on a three-fold increase in migrant numbers between May and late June, it would be anticipated that a minimum of 15% (Lamboara) and a maximum of 60% (Ampasilava) of these villages' populations migrate. (As only certain destinations were surveyed the real values could be higher.) This would be in agreement with what Iida reported in 1998: that the majority of adult fishermen (55.5%) of Ampasilava migrated north.

Table 6. The percentage that the migrants represent of their home village population for selected villages

Village of origin	Migrants	Population	% Migrants
Ampasilava	57	321	18
Andavadoaka	71	1220	6
Belavenoke	41	435	9
Bevato	47	472	10
Lamboara	25	526	5

Increasingly fishers are staying permanently in the Maintirano area, particularly those who are based in the mainland villages rather than on the islands. Many key informants say that at least two-thirds of young migrants do not return to their villages of origin in the South.

5.3 Temporal trends

What is striking about the migrants surveyed is how many of them only began migrating recently. Many fishers note a decrease in catch in the northern destinations during the last three years. Despite this the overall the number of migrants is increasing and the majority of the fishers interviewed only began migrating in the last five years. Previously they had been sedentary. Furthermore, more than two-thirds of the migrants had parents who were sedentary, contrary to what would be anticipated from the Vezo being widely seen as a semi-nomadic people.

Table 7 presents the average year that the migrants first began to migrate, as well as the maximum and minimum of the first year migrated. Evidently many fishers only started migrating recently: for the 56 groups interviewed the median of the first year that they migrated was 2003, the mode (the most frequently cited response) was 2009 and the average, 2001 (see Table 8). Nearly 80% of the migrants surveyed began migrating after 2000 (see Table 9). And closer examination of the frequency distribution of the first year migrated shows that the present migration is

even younger than that: 68% of the total groups only migrated for the first time in 2004 or after; and 38% began in 2005 or after. However groups from Andavadoaka and Morombe began migrating in 1983 and 1992 respectively. There were no clear relation between the first year of migration and the village origin.

Table 7. Average, minimum and maximum of the year that migrants first migrated presented by the migrant's village of origin

Village of origin	Average of first year migrated	Max of first year migrated	Min of first year migrated
Ampasilava	2004	2008	2000
Andavadoaka	1996	2006	1983
Belavenoke	2001	2004	1998
Belo-sur-mer	2000	2000	2000
Bevato	2002	2009	1995
Bevohitse	2000	2000	2000
Lamboara	2005	2009	1998
Morombe	2002	2009	1992
Morondave	2003	2003	2003
Nosy Be (Hellville)	2005	2005	2005
Tulear	1997	1997	1997
Overall	**2001**	**2009**	**1983**

Table 8. Descriptive statistics of the first year that the fishers surveyed migrated

Mean	2002
Standard Error	0.8
Median	2003
Mode	2009
Standard Deviation	5.5
Sample Variance	30.1
Kurtosis	1.96
Skewness	-1.205
Range	26
Minimum	1983

Maximum	2009
Confidence Level (95.0%)	1.6

Table 9. Frequency distribution of the first year that fishers migrated

Year first migrated	% of respondents
1990 – 1994	4
1995 – 1999	18
2000 – 2004	40
2005 – 2009	38

That the surveying shows the migration to be a recent activity for the majority of fishers could be explained by this survey questioning a new generation of migrants. However, only 36% of the migrant groups had parents who had a tradition of migrating (Table 10). A high proportion of migrants from Belavenoke and Bevato had parents who had migrated, indicating a strong tradition of this in these villages. This was less marked for migrants from Ampasilava, Andavadoaka, Lamboara and Morombe.

Table 10. Percentage of migrants whose parents migrated as well presented by the migrant's village of origin

Origin of group leader	Number whose parents migrated	Number of group leaders interviewed	% Whose parents migrated
Ampasilava	3	8	38
Andavadoaka	2	6	33
Belavenoke	4	5	80
Belo-sur-mer	0	1	0
Bevato	3	5	60
Bevohitse	1	1	100
Lamboara	1	4	25
Morombe	4	17	24
Morondave	0	1	0
Nosy Be (Hellville)	0	1	0
Tulear	0	1	0
Total	**18**	**50**	**36**

Table 11 shows the principle migration destinations, the average of the first year that migrants first went there, as well as the maximum and minimum of the first year of migration to that destination. For the migrants interviewed, most of the key sites only became destinations in the early 2000's. Examination of the minimum of the first year that respondents migrated to these destinations shows that the principal island destinations (Andriamitaroke, and the Belo-sur-Mer and Barren islands) were targeted before the more recent mainland village destinations (Ampatike and Bemakoba). 38% of migrants named the Barren islands as the destination of their first migration; this was followed by the Belo-sur-Mer islands (23%) and Andrimitaroke (18%).

Table 11. Average, minimum and maximum of the year that fishers first migrated to a particular destination, as well as the percentage of migrants who chose that destination

	Average of first year migrated	Max. of first year migrated	Min. of first year migrated	Count of first destination	%
Andriamitaroke	1999	2005	1992	10	18
Belo-sur-mer isles	2002	2009	1983	13	23
Barren isles	2001	2009	1992	21	38
Ampatike	2000	2002	1998	4	7
Bemakoba	2006	2009	1997	6	11
Nosy Vao	2001	2001	2001	1	2
Total	**2002**	**2009**	**1983**	**55**	**100**

Of the migrants whose parents had migrated and named a clear destination, the majority migrated to the Barren islands, followed by 33% to the Belo-sur-Mer islands and 14% Andriamitaroke (Table 12). This data is based on only 21 respondents and so is limited, but it indicates that the present-day migration trend (wherein the majority migrate to the Barren islands) is not new.

Table 12. The principle destinations chosen by migrants' parents

Destination	% of migrants
Andriamitaroke	14
Belo-sur-mer islands	33
Barren islands	52

This analysis only considers fishers who migrate significant distances from the South and are not considered residents; it does not include fishers from Maintirano who live on the Barren islands during the fishing season as this is a local migration apart. The values presented in Table 7 and Table 10 take into account only those fishers from the South and not Maintirano. Notably of the thirteen groups of fishers of Maintirano origin, six had parents who migrated to the Barren islands.

5.4 Fishing targets and gear of migrants

This section firstly describes the fishing techniques and gear the migrant fishermen use; secondly it presents which fishing activities are practised the most and the species targeted. The diagrams presented in this section are taken from "An Introduction to Vezo Fishing Methods", C. Gough, Blue Ventures Conservation, 2008.

5.4.1 Vessels

Without exception the migrant traditional fishermen use monoaxyle out-rigger sailing pirogues to fish and as a means of transport. None of these were equipped with an outboard motor. The hulls, made from '*farafatse*' (*Givotia madagascariensis*), were mostly 7 - 8 m long – considered to be larger than average and necessary to undertake long trips at sea. Though some pirogues of 6 m or smaller in length were observed they were deep-hulled and more seaworthy than equivalent-sized pirogues seen in the villages of origin.

The vessels that artisanal fishers mostly use are single hull, seven meter long wooden boats equipped with a 25 hp outboard motor. In addition to the motor, vessels are equipped with a sail. Some of the sea cucumber scuba dive teams have fibreglass boats with twin 50 to 65 hp outboards, or motorised out-rigger pirogues.

5.4.2 Shark

5.4.2.1 Palangre

Palangre is a form of long-lining used by the migrants to fish shark. It uses high-strength nylon fishing line, and 8 cm hooks with trace made from steel cable; the hooks are often hung together in pairs with ca. 20 cm of trace separating them. The Vezo use two types of palangre: In the first the long line is anchored at either end, with the hooks held in mid-water, and floats marking both ends and the centre. In the second the long line is anchored only at one end and is free to rotate with the current. This latter method was the one that the migrants favour, particularly in the mainland villages where they place it in turbid water 30 m deep. Their variant only has a couple of hooks on the long line, though palangre can be 100 m long. Palangre is an increasingly popular technique amongst migrant fishermen who have mastered it, both for fishing in shallow (ca. 30 m) and deep (ca. 100 m plus) water. Some shark fin buyers are supplying migrant fishermen with the material to make palangre.

5.4.2.2 Jarifa

A large gill net used in deep water and baited to target sharks. It is generally around 100 to 200 m long with a fall length of around 5 m and a mesh size between 12 and 25 cm. It was introduced in the 1990's, and many fishermen believe it has its origins in Morombe. Many fishermen make their own *jarifa*.

5.4.2.3 ZDZD

A gill net migrant fishermen use for shark fishing. It is up to 150m long with a fall length of 6 – 8 m and mesh size of 8 – 10 cm. Its name comes from GTZ - the German development enterprise that introduced it in North Madagascar in 1992 with the objective of reducing fishing pressure on near shore reefs through the development of offshore fishing (Langley, 2006). This net is regarded as being more effective than *jarifa*, particularly as it also enables a shark fisherman to capture a larger variety of pelagics. It is also more expensive than *jarifa* and difficult to fabricate; as such it is less popular than *jarifa*. The use of *ZDZD* results in more by-catch than *jarifa*.

To target shark the fishermen set *jarifa* or *ZDZD* beyond the barrier reef in water normally 120 – 300 m deep. Often fishermen will choose deep sites in proximity to sea mounts and deep reefs where they know that sharks congregate. They bait *jarifa* usually using baitfish netted the night before or with ray or moray eel. *ZDZD* are not baited as these will quickly catch large pelagic fish that bait shark. One end of the net is anchored by a line that is greater than the depth of the seabed. (This is established using a weighted line.) The long length of this anchor line allows the net to move around with the prevailing current. The anchor line forks approximately 10m from the net so that it is attached to both the top and bottom of it. From the top of this end of the net is a second rope (250-300 m), which comes to the surface where it is marked with two buoys and a flag. The net is weighted so that it sinks, but has floats along the top of the net to ensure that is stays vertical in the water. The far end of the net has another small weight (ca. 5 kg) and is also attached to buoys at the surface by a third line (250 – 300 m), which also helps the net to stay vertical in the water. The buoys also mark the position of the net, and having two buoyed lines reduces the risk of losing the net.

Shark fishers in the extreme northwest also use predominantly *jarifa*. "The *jarifa* are usually from 7-8 meters deep and vary from 400 m to 700 m in length. Gillnets are bottom-set and are often baited. The gillnet mesh size is not standard, and mesh sizes ranging from 18 cm to 57 cm are commonly mixed within one net. Crew consists of six to eight fishers per boat. Typically, nets are set in the morning and checked and reset the following morning."[36]

The Sara of Maintirano living on Nosy Maroantaly and Nosy Lava practised *ZDZD* kirara – a technique that they use to target tuna and other pelagic fish. Here they attached a number of *ZDZD* together to form one net of 700 – 1000 m long. The fishermen set this on the surface in deep water, well-offshore at sunset. The net is attached by one end to the fisherman's pirogue and sits on the surface. The fishermen drift in the currents the entire night, periodically checking the net for catch. At dawn the retrieve the net and return to the islands. The technique is effective and the Sara frequently catch 40 tuna in an outing.

Table 13. List of species of sharks commonly caught on the West Coast of Madagascar by traditional fishermen (Source: KI interviews, The traditional shark fisheries of southwest Madagascar: A study in the Toliara region, Fisheries Research 82 (2006) 280–289, Angus R. McVean, Ryan C.J. Walker, Eibleis Fanning and references sited therein.)

Species	Malagasy name
Alopidae (Thresher Sharks)	
Alopias vulipnus (Thresher)	Santira / Meso
A. superciliosus (Bigeye Thresher)	Tomanimanente/ Meso
Carcharhinidae (Requiem Sharks)	Maintilambosy, Fesotse, Kivirovola
C. albimarginatus (Silvertip)	Fotyrambo
C. amblyrhynchos (Grey Reef)	Tomanimanente
C. brachyurus (Copper)	Mbato
C. brevipinna (Spinner)	Maintepate

[36] A Preliminary Assessment of the Artisanal Shark Fishery in Northern Madagascar: Implications for Management, Lyn Robinson and W. Sauer. To be published. Personal communication.

Species	Malagasy name
C. falciformis (Silky)	Gofo / Tomango / Fotirambo
C. leucas (Bull)	Boriloha
C. limbatus (Blacktail)	Maintepate / Foty/ Mbelosony
C. longimanus (Oceanic White-tip)	Meso / Kasioky
C. melanopterus (Blacktip Reef)	Maintepate / Bevombotsy / Besofy / Fesotse
C. obscurus (Dusky)	Foty
C. plumbeus (Sandbar)	Bevombotse
C. sorrah (Spot-tail)	Maintepate / Meso / Fesoke / Maintipaty / Maintilambosy
C. sealei (Blackspot)	Fotivonto
G. cuvier (Tiger)	Vorotse/Bemaso /Tsaka / Razankiahia / Farao
Loxodon macrorhinus (Sliteye)	Meso
Negaprion acutidens (Sicklefin lemon)	Valovombotsy / Foty
Prionace glauca (Blue)	Fesotse
Triaenodon obesus (Whitetip Reef)	Kivirovola / Vorotse / Valovombotsy
Ginglymostomatidae (Nurse Sharks)	
Ginglymostoma brevicaudatum (Short-tail nurse)	Voritse
Nebrius ferrugineus (Nurse)	Valovombotse / Hiahia
Hemigaleidae (Weasel Sharks)	
Hemipristis elongatus (Snaggletooth)	Fotirambo
Hexanchidae	
Hexanchus griseus (Bluntnose six gill)	Belidaka / Linta
Lamnidae (Mackerel Sharks)	
Carcharodon carcharias (Great White)	Farao / Masiake
Isurus spp. (Mako)	Jinganify / Mintseka / Sabonto / Bevombotse
Odontaspidae	
Odontaspis ferox (Small-tooth Sand Tiger)	Foty
Sphyrnidae (Hammerhead Sharks)	
Sphyrna lewini (Scalloped Hammerhead)	Viko / Viko Palapalandoha
S. mokarran (Great Hammerhead)	Viko / Viko Palapalandoha

Species	Malagasy name
S. zygaena (Smooth Hammerhead)	Viko
Stegastomatidae (Zebra Sharks)	
Stegastoma fasciatum (Zebra)	Miroro / Ntsaka / Kary/ Linta / Bemaso
Hemiscyllidae	
Chiloscyllium griseum (Grey Bamboo)	Hiahia
Chilosyllium caerulopunctatum (Bluespotted bambooshark)	Linta
Rhinobatidae (Guitarfishes)	
Rhynchobatus djiddensis (Giant Guitarfish)	Sorobois / Sorobaoy
Identifications to family level only	
Hexanchidae (Cowsharks)	Belidake (three types)
Dasyatidae (Whiptail Stingrays)	Fay foty
Taeniura lymna (Bluespotted Stingray)	Faimbalany
Myliobatidae (Eaglerays)	Fay tomily
Mobulidae (Devilrays)	Fay Miangetse
Pristidae (Sawfishes)	Vava
Torpedinidae (Torpedo Rays)	Leja
Unknown	Garanoro / Keleterake
Unknown	Fesostsy / Mainte Voho

5.4.3 Sea cucumber

The Vezo use different methods according to the species of sea cucumber they are targeting. In *mila zanga* women and children will glean reef flats, mudflats or seagrass beds at spring low tide to harvest sea cucumbers on foot. They will also do this at night during the spring low tide - *mila zanga haly*.

Where ever the conditions are suitable migrants free-dive for sea cucumber - *manirike zanga* - targeting more valuable species and adults that are found in deeper water. The Vezo will use a 5 – 6 m long spear with a slightly serrated edge (*voloso zanga*) to free-dive to within 5 metres of the reef (up to 30m). Once they have located the sea cucumber they will stick the spear into it and leave the spear to start their ascent. The spear is attached to floats which bring the spear, along with the sea cucumber, to the surface. This technique was not often observed being used by migrant fishermen during the surveying.

Table 14. Species of sea cucumber fished by Vezo on the West Coast of Madagascar. (Source: KI interviews and "An Introduction to Vezo Fishing Methods", C. Gough, Blue Ventures Conservation, 2008.)

Species	Malagasy name
Actinopyga mauritiana	Fotsitsetsake
Thelenota ananas	Zanga brosse
Holothuria scabra	Zanga foty or Benono'mpase
Holothuria nobilis	Benono mainty
Holothuria fuscogilva	Benono foty
Stichopus chloronotus	Zanga sogno
Bohadschia subrubra, Bohadschia vitiensis	Mangery foty, Kalalijake
Actinopyga echinites	Rorohan-kena (Tronkena)
Sichopus horrens	Manmonfo
Holothuria edulis	Zanga mainty
Holothuria atra	Zanga sitilo
Holothuria cinerascens	Zanga fleura
Actinopyga miliaris	Rorohan-kena mainty
Thelenota anax	Somalypapa
Stichopus hermanni	Zanga trachytera
	Berosy
	Goaika be
	Jobrango
	Krampo
	Losoloso
	Nintsy / Tangisy

Note: Not all of the species listed by fishers were observed and identified scientifically nor cited in other studies.

5.4.4 Fish

5.4.4.1 Spear guns (basi)

Spear guns are used mostly for fishing by free-diving (*manirike*), but also for lobster (*manirike tsitsike*). The fish speared are only for food on the islands. If a fisherman happens on a turtle while diving for sea cucumbers or fish they will hunt it with a spear gun. Most spear guns are home-made made from wood, iron reinforcing-bar and car tyre rubber, though a few manufactured spear guns were seen. The fabrication of a spear gun and fishing with it are

techniques that migrants from the South introduced to the areas of destination; it is them who are still the principle users.

5.4.4.2 Small, mono-filament nylon nets

The Vezo categorise these nets according to the mesh size, measure by the number fingers or *tondro*. The **"**electronique" or *talirano* nets are made by the fishermen using nylon fishing line. The mesh is usually two or three fingers wide and each net has a cord running along the top and bottom. The ballast is either heavy sea shells or cement blocks, spaced roughly at 30cm intervals along the foot rope, and the floats are often light wooden blocks roughly spaced every 40cm along the top rope. *Janoky* is a type of gill net that similarly to *l'electronique* is made from nylon line (*talirano*) within the village or brought ready-made; it usually has a mesh between 2 and 4 fingers wide. The migrants mostly used nets to catch baitfish for their *jarifa* and for fish to eat.

5.4.4.3 Beach seining (tarikake)

Beangato or *jaoto* nets are used to beach seine (*tarikake*). These nets are between 300 – 800 m in length and have a fall length of 1 – 2 m; they are made from thicker nylon than most other nets (force #3) and have a small mesh size of around one finger (frequently this netting is from old shrimp trawling nets discarded by industrial trawlers). Most beach seine nets have a large mosquito netting (*makarakara*) pocket in the middle as they are designed to catch small shoaling fish close to shore. Between 5 and 15 people deploy the net close to shore in the shallows or on reef flats, those in the pirogue lay the net whilst the others make sure that it does not snag on the reef. Ropes are attached to both ends of the net and the team pull the net in towards the beach. This makes *tarikake* a physically intensive technique requiring a number of people. *Jaoto* nets are used close to mangroves and on seagrass beds in order to target fish such as "*tampininy*" Mojarra. The small mesh size of tarikake nets makes it an indiscriminate fishing technique; it also damages habitat as it is pulled along the seabed.

5.4.5 Sea Turtle

"If those who outlaw the capture of sea turtles can stop eating the meat of pigs, the Vezo won't eat more of that of turtles." ("*Laha vitan-droze mandrara fihazà fano io gny tsy mihina kosoa, tsy mihina fano koa gny vezo*".) These words of a chef de fokontany reflect well the Vezo's feeling towards killing turtles.[37] Five turtle species occur in West Madagascar: *Chelonia mydas* (*fano zaty*), *Eretmochelys imbricata* (*fano hara*), *Caretta caretta* (*apombo*), *Dermochelys coriacea* (*valozoro*), and *Lepidochelys olivacea* (*tsipioke*). The Vezo will capture all of these species.

Migrants as well as residents in the villages surveyed here prize turtle meat. Migrants will mostly capture turtles opportunistically while spear gun fishing or as by-catch in *ZDZD* and *jarifa*. However there are incidents of targeted fishing by migrants between Andranopasy and Belo-sur-mer. This is done by placing a *jarifa* or *ZDZD* closer to turtle habitat and can be devastating. Gough describes in more detail how the Vezo do this "*mihaza fano"*: At high tide the fishermen will lay the *jarifa* seaward of the reef flat, outside the breakers, and then paddle around so the turtle are between the pirogue and net. They then drive the turtle towards the net by hitting a wooden staff against the water. Once the turtle are netted, the fishermen place large (25 cm or bigger) hooks into the soft parts of the turtle (around the shoulders) to prevent it swimming away as they release it from the net.

[37]Desire Armand Raharison, personal communication

Traditionally the Vezo use purpose-made harpoons (*nato* or *teza*), which have a detachable spearhead, and specialised pirogues to hunt turtle. This method required much more skill than using a net and normally resulted in fewer turtles being captured. None of the migrant fishermen interviewed reported using it.

5.4.6 Lobster

Though this was not commonly observed during the surveying and was not regarded as important by the migrants interviewed, the presence of collection boats has previously motivated migrants to fish lobster on the islands. Men and boys fish lobster by free-diving (usually to 5 – 20 m) and using a small spear gun (manirike tsitsike).

Figure 13. Lobster species that Vezo fishers target. (Source: KI interviews and "An Introduction to Vezo Fishing Methods", C. Gough, Blue Ventures Conservation, 2008.)

Species	Malagasy name
Panulinus homanus	Tsitsike apombo
Panulirus versicolor	Tsitsi bola
Panulirus longipes longipes	Tsitsi mena or mena mahazo
Panulirus ornatus	Gant
Parribacus antarticus	Tsitsi bato

5.4.7 Octopus

Where there are reef flats exposed at low tide in proximity to migrants villages the women and children glean for octopus, sea cucumbers and shells (*mihake*). In gleaning for octopus (*horita*), the fishers use a *voloso* – a single pointed, un-barbed spear - to work-out octopus hiding in niches on the reef flat. In South West Madagascar local fishers sell octopus to commercial buyers and it is one of the main commodities of the local economy (Humber *et al.* 2006). The buying network of the principal export companies, such as Copefrito and Murex, does not extend significantly further North of Morombe. As such, octopus fishing does not take on the same importance as it does South of Morombe. However, there is a commercial buyer based in Morondave who does collect from the islands; fishers also dry octopus for later sale. There are 3 species of octopus found in this region *Octopus cyanea* (horitambato), *Octopus aegina* (horitanakora), and *Octopus macropus* (horitandolo). *Octopus cyanea* is what the commercial buyers want and is the most commonly fished (Langley, 2006).

5.4.8 Note on fishing gear and methods

No traditional migrants had motorised pirogues or the means to dive with scuba. However, during the research two dive teams from outside the region were encountered. One team was based in Benjavily had three fibre-glass boats, each equipped with two outboard motors. There were about 15 divers in this team and they said that on an average day they collected 300 adult sea cucumbers. Moored in the shelter of the estuary was a boutre to transport out the haul. One questions how much damage the migrant fishers do relative to such illegal commercial operations that operate with impunity. The other team worked with a large motorised pirogue.

5.5 Migrant fishing activities

The leaders of migrant groups were asked firstly to list the fishing methods they used and what species they were targeting with these methods. They then put these methods in order of which they practised the most. The results are presented in Table 15. Within the context of the migration, *jarifa*, palangre and *ZDZD* are used to shark fish; these methods are synonymous with shark fishing as an activity.

Table 15. Principle fishing activities of the migrant fishermen

Method	First choice (% of respondents)	Second choice (% of respondents)	Third choice (% of respondents)
Jarifa	62	13	
Sea cucumber diving	11	56	19
Palangre	6	8	3
ZDZD kirara	19		
ZDZD		10	
Spear gun		4	16
Hand-line	2	6	19
Shrimp net		2	
Net – tondro roa			16
Gleaning			26

Shark and sea cucumber fishing are by far the most important activities of the migrants. The exceptions to this are the Sara from Maintirano who live on the Barren islands and are the sole fishers to use *ZDZD kirara* to target large pelagic fish. The distinction between shark and sea cucumber fishing as a primary or secondary activity is a false one as migrants will fish both shark and sea cucumbers where the conditions of a site permit this. (They will first place and verify their *jarifa*, then wait for the low tide until they are able to free-dive for sea cucumbers on nearby sea mounts or far-offshore reefs.) This needs to be borne in mind in interpreting the results.

Putting *ZDZD kirara* aside, 90% of migrant groups from the South used *jarifa* to fish for shark either as a primary or secondary activity; likewise a further 15% used palangre to target sharks; as a secondary activity 10% use *ZDZD* to fish sharks. 70% of the migrant groups fished for sea cucumbers as a primary of secondary activity. The smaller proportion of fishers targeting sea cucumbers can be explained by the fact that certain of the shark fishing sites are not suitable for free-diving for sea cucumber. The primary targets of most migrants are sharks and sea cucumbers.

Spear fishing and the use of small nylon nets were tertiary activities for the migrants and were principally done to catch fish for eating and baiting *jarifa*. Gleaning is also a tertiary activity and made up 26% of the fishing activities migrants listed as a third choice. 19% of the migrant groups practised hand-line fishing for large reef species or trolling for large pelagic fish as a tertiary activity. Fish caught by these methods would be for eating by the migrants or for salting.

Figure 14 presents the fishing method migrants favour by site. It shows the predominance of sea cucumber free-diving and shark fishing (particularly using *jarifa*) as the most important activities of the migrants. The exceptions to this are Nosy Lava and Maroantaly, where a strong presence of Sara from Maintirano meant that *ZDZD kirara* was an important activity.

By comparison quantitative surveying in Velondriake, an important area of migrant origin, showed that the most popular choices of fishing method are net (*mihaza*) and gleaning (*mihake*), with respectively 43% and 38% of fishers stating these as their most commonly used fishing method.[38] This study included female fishers, the majority of whom use gleaning methods (*mihake*). The surveying carried out in this study only questioned male migrant group leaders, so the results are biased. (Women made up 20 percent of the migrants surveyed.) However, the majority of male fishers in Velondriake use nets, with the small nylon net "*l'electronique*" making up 50% of the net types used within. *Jahoto, feripe, makarakara* and *janoko* - net systems that are used close to shore, within the lagoon and on reef flats – made up most of the other net methods used within Velondriake. *Jarifa* and *ZDZD* only constitute about 20% of the net methods used.

[38] "An Introduction to Vezo Fishing Methods", C. Gough, Blue Ventures Conservation, 2008.

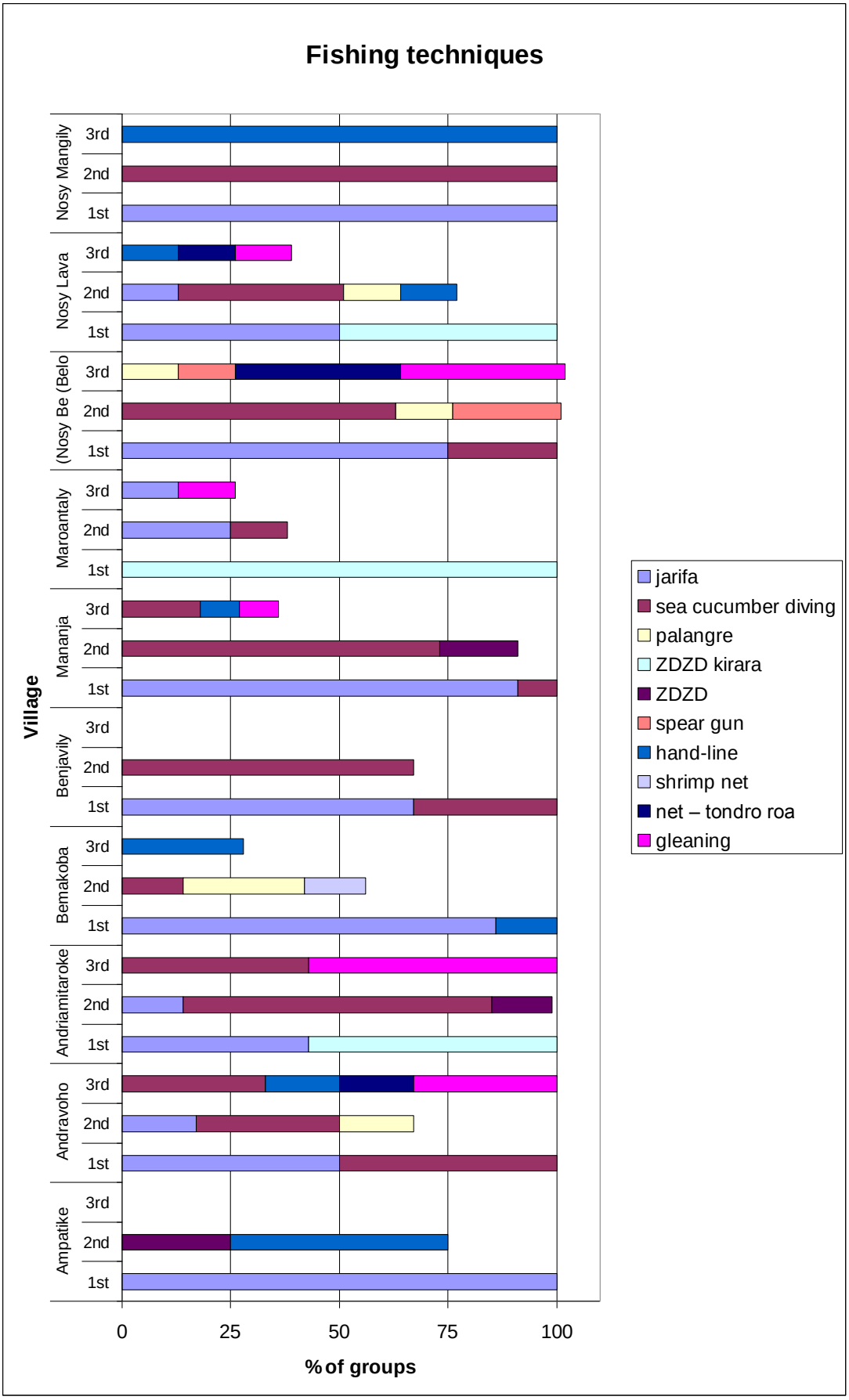

Figure 14. Primary, secondary and tertiary fishing methods used by migrant fishermen presented by location

5.6 Drivers of migration

The drivers behind traditional fisher migration are summarised in the conceptual framework presented in Figure 15. Drivers are divided into push and pull factors; the direct drivers are listed, as well as the underlying causes of these – the indirect drivers. The potential negative and positive impacts of migration are presented – threats and opportunities – as well as the possible consequences of management interventions.

The model accounts for both seasonal and itinerant migrants by looking at how their actions feedback to resource and socio-economic conditions. Threats would create a situation where push factors would dominate; a positive feedback would lead to a "pull" one. Itinerant migrants may be moving from one push situation to another. Seasonal migrants may have a mixture of push and pull in their origin that allows them to return; deterioration to a push domination may mean that they stay away longer or permanently. Management interventions would aim to move from a negative to a positive feedback scenario.

On a macro-level the principal migration routes simply reflect a livelihood strategy of poor, resource-dependent people who are moving from areas of high poverty, high dependency on fishing as a livelihood and depleted coastal fisheries to areas of lower poverty, low dependency on fishing and still-productive fisheries. This is illustrated in Figure 16 and 17, which compare the migration routes on the West coast of Madagascar with the distribution of extreme poverty and the importance of fishing as a livelihood respectively. This overarching driver is founded in a number of interlinked drivers of migration. Principal among these are:

- the strong demand for shark fins and trepang;
- the widespread degradation of coastal ecosystems underpinning fisheries in South West Madagascar because of climate change, hyper-sedimentation and over-fishing;
- poverty engendered by over-population, resource degradation and the lack of alternative livelihoods to fishing.

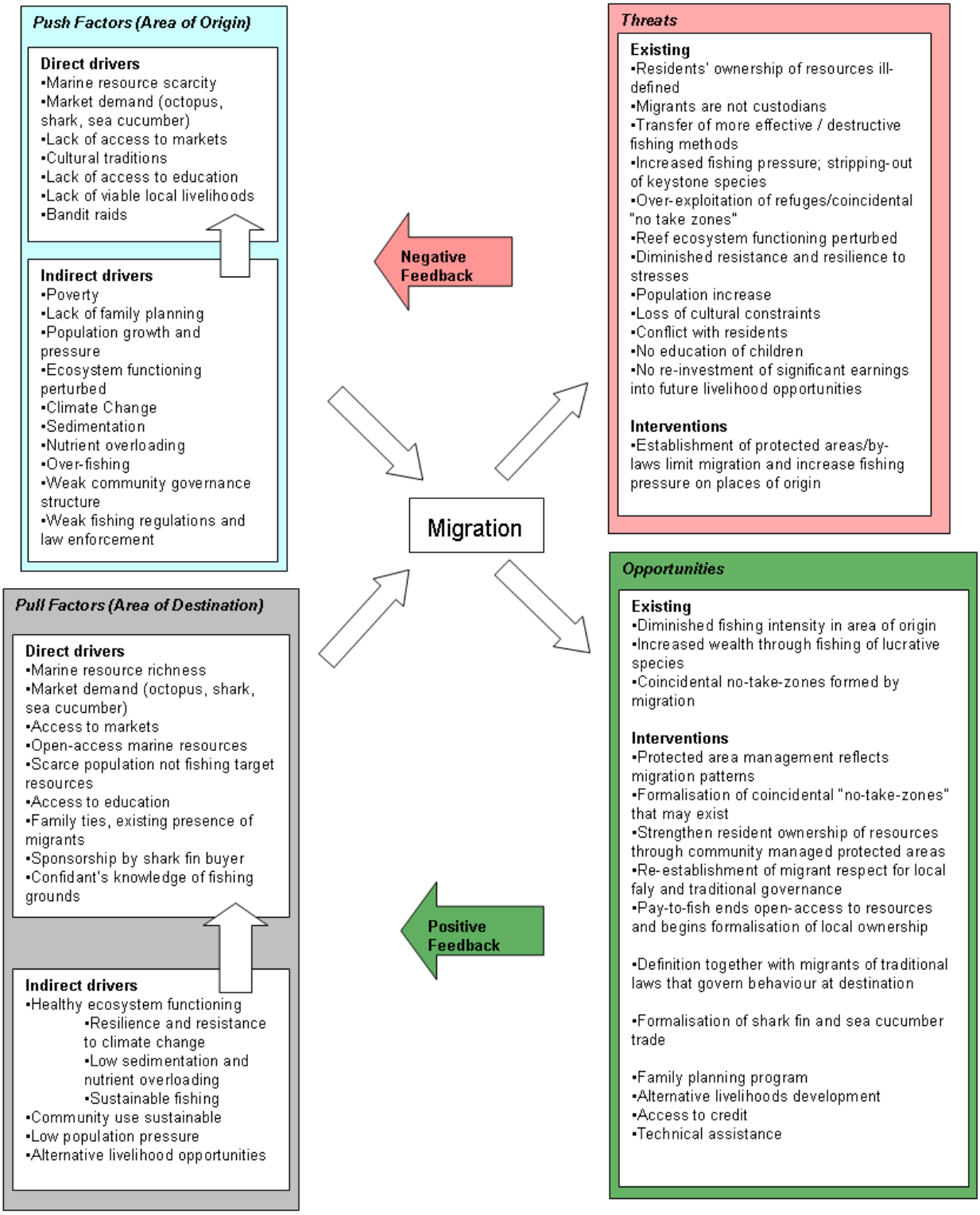

Figure 15. Conceptual framework of fisher migration

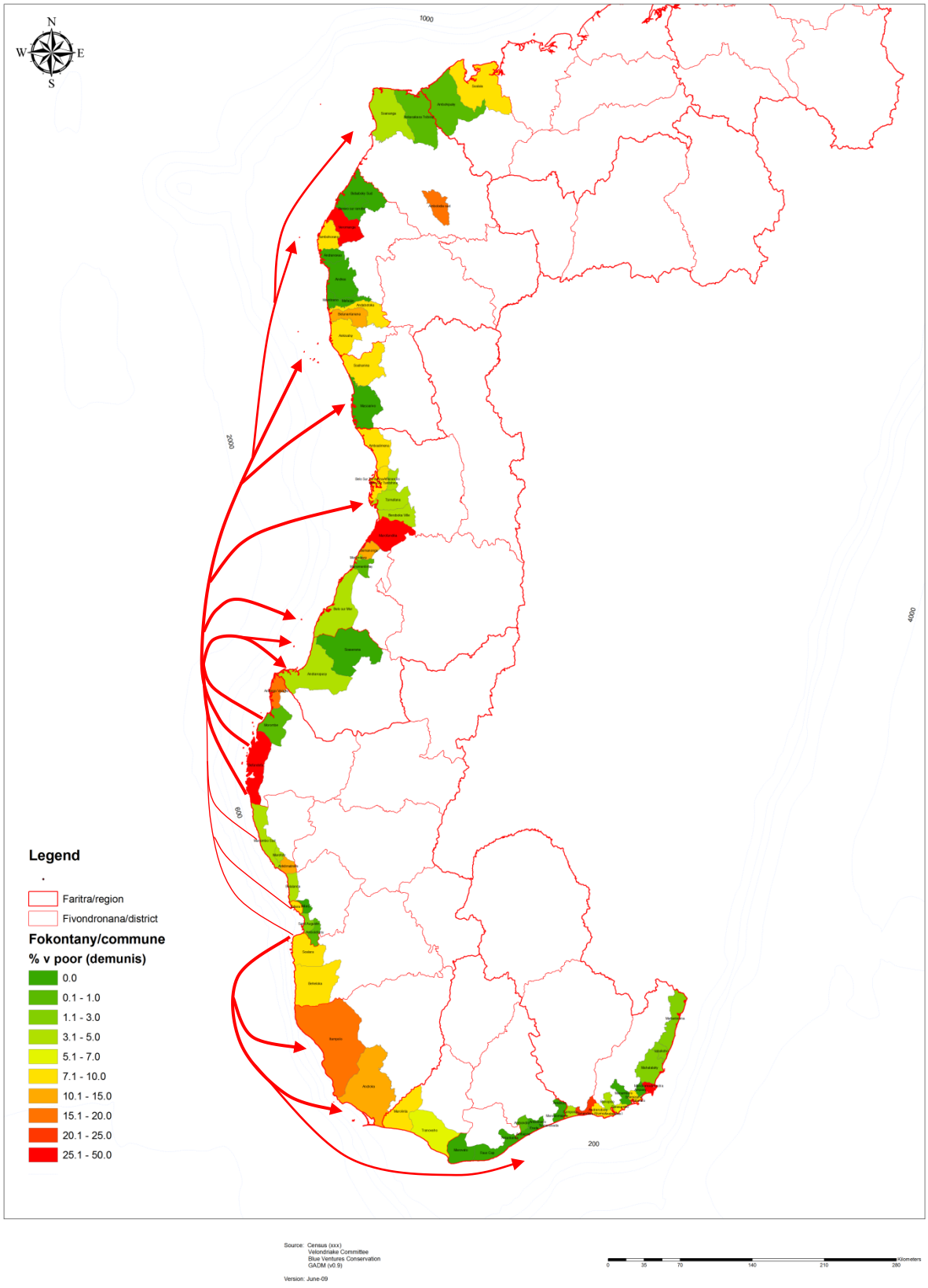

Figure 16. Comparison of the principal migration routes along the West coast of Madagascar with the distribution of poverty in coastal communes

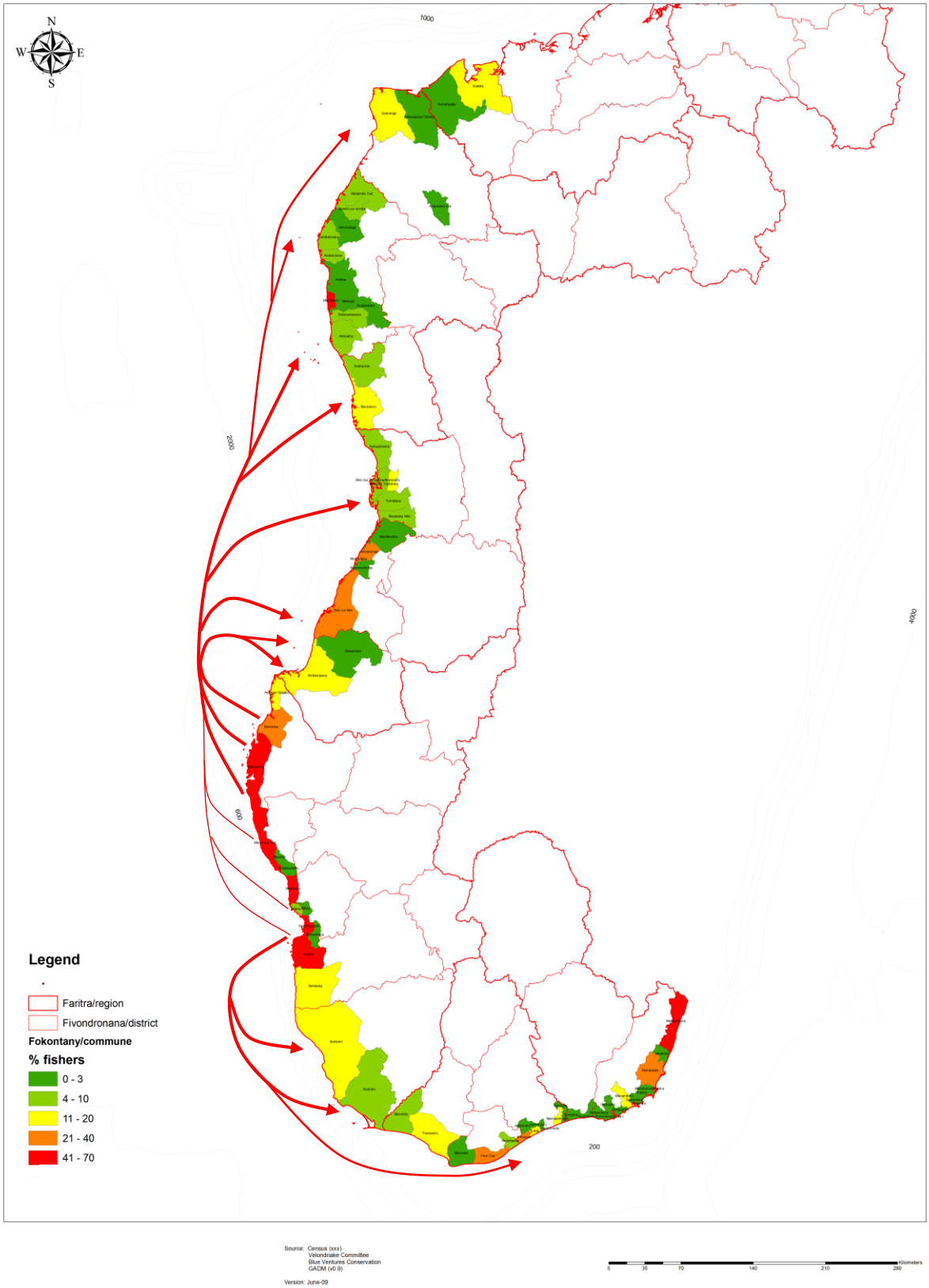

Figure 17. Comparison of the principal migration routes of the West coast of Madagascar with the distribution of the importance of fishing as a livelihood in coastal communes

5.6.1 Push Factors

5.6.1.1 Scarcity of resources

In the past, when the coast was still only sparsely populated, the Vezo would migrate when local fishing resources became insufficient to support a growing village population. The surplus population would move to new fishing grounds, allowing recovery of the fishing resources and so the establishment of an equilibrium between the population of a village and the state of their resources.

Vezo KIs stated that if the Vezo have enough they prefer to become sedentary; they only move if fishing resources are over-exploited locally. The Vezo migration is simply a search for fishing resources when these are locally exhausted.

There is scant existing literature on the health of ecosystems in the South West, but it does show that the natural resources near the urban centres of Tulear (from Anakao to Ifaty-Mangily) and Morombe are heavily degraded, while the shallow coral reef habitats of the Befandefa area are also heavily degraded. These are key origins of today's migrant fishers. The health of the ecosystems in these areas has already been described in "

Natural resource degradation", but a review of the literature shows several examples that are particularly relevant to the current migrants:

- From the early 1990's there have been signs of overfishing of sea cucumber species in Madagascar, with declining size and weight, increasing prices and the increasing use of illegal harvesting equipment.[39] Species that previously had little market-value are now sought-after because of the virtual disappearance of commercially valuable ones. The playing out of this scenario on a broad-scale is reflected in the annual bêche-de-mer production of Madagascar: Between 1994 and 1997 it produced 5 400 tonnes annually. In 1998 production fell to 1 446 tonnes; in 2004 it was 400 tonnes.
- Much of this collapse is taking places in villages that are the origins of migration: A studied carried out in Ampasipoty and Anakao in 2002 showed that the harvesting of sea cucumbers constituted the principle source of revenue for an important part of the population. However, the fishers reported a decrease in the size of individuals as well as the global catch.[40]
- The history of sea cucumber fishing in Velondriake exemplifies this. It is an externally driven reef fishery that supplies a lucrative export for the Asian market. Research done by Blue Ventures shows the chronology of its depletion:[41]
    - 1970s: first commercial buyers arrive;
    - 1980: historical records of a collection company, SecOcean, show that sea cucumbers had become an important commodity for the people of Velondriake;
    - 1985: villagers begin gleaning reef flats at night using torches, inter-tidal fishing becomes un-productive;

[39]Commercial sea cucumbers:a review for the Western Indian Ocean WIOMSA Book Series, 2007, Conand C, Muthiga NAE, 66pp

[40]La pêche traditionnelle de l'holothurie dans le sud-ouest de Madagascar: une étude de cas réalisée sur deux villages en 2002, La bêche-de-mer - Bulletin de la CPS n° 21 — Juin 2005, A.R. McVean, G. Hemery, R.C.J.Walker, Ralisaona B.L.R. et E. Fanning.

[41] Langley, J. (2006). Vezo Knowledge: Traditional Ecological Knowledge in Andavadoaka, southwest Madagascar.

- 2000: villagers no longer glean reef flats for sea cucumbers as an important income source; illegal scuba diving on deep patch reefs, first noted as early as 1980, becomes the only means of obtaining adults;
- early 2007: even this practice has died out because of the low yields. By no coincidence many fishers migrated in the 1990's to harvest sea cucumber in richer sites to the north.

- Laroche *et al.* reported in 1997 that the fin-fish and elasmobranches fisheries of three towns – Morondave, Morombe and Tulear were over-exploited. There were several reasons for this: the increased fishing effort made possible by the use of collective fishing techniques (large nets), exploding population in these urban areas and competition from the commercial shrimp-trawling industry.[42] He attributes decreasing catches to be one of the factors contributing to the declining standard of living of the Vezo.
- A study in the region just south of Tulear showed the shark fisheries to be declining, as evidenced by the decrease in number and size of sharks being landed, as well as the decrease in catch per unit effort. Such a decline could have significant consequences for the local communities given the considerable social and economic importance of shark fishing.[43]

Fisher migration reflects the chronology of ecosystem degradation and resource depletion in the South West. It is a barometer of local resource conditions as the following examples show:

- Sara of Anakao migrating to the Barren Isles in 1960 to harvest "coquillage rouge", which had been locally exhausted;
- Vezo and Sara of Tulear migrating north to Morombe in the 1980's as the local reef fisheries were depleted;
- Fishers from Morombe began migrating in increasing numbers from the beginning of the 1990's as the local catch was no longer sufficient for them to live properly;
- Between 1994 and 1997 Vezo Sakalava from Morondave migrated North as shrimp trawling depleted the fishing resources accessible to traditional fishers from their home bases;
- and more recently the shark fishers of Befandefa moving north as the local fishery became depleted in the mid 1990's.

In addition to the search for fishing resources, voyages to find large *farafatse* (the tree used to make pirogue hulls) are also at the heart of Vezo migration. Its scarcity, and the consequent outlawing of its cutting, has led to the Vezo travelling the length of the South West Malagasy coast to the Mangoky river; where they travel long distances upstream, until Bereroha, to source large *farafatse*.

For the majority of fishers interviewed local resource shortages were what pushed fishers to migrate. "Fishers who stay in their villages of origin face real difficulties because there are too many of them and not enough fishing resources; to force these people to stay in the same place would have damaging consequences for them."

Quantitative research would be required to determine just how crucial migration is to fishers from areas where resources are depleted. While some migrant KIs said that they would have difficulty feeding their families if they

[42]Laroche, J., Razanoelisoa, J., Fauroux, E. & Rabenevanana, M. W. (1997). The reef fisheries surrounding the south-west coastal cities of Madagascar. *Fisheries Management and Ecology*, **4**, 285-299.
[43]The traditional shark fisheries of southwest Madagascar: A study in the Toliara region, Fisheries Research 82 (2006) 280–289, Angus R. McVean, Ryan C.J. Walker, Eibleis Fanning.

were not able to migrate, others said that they could live if they were forced to stay in their home villages, but would spend all of their money on food; they would not be able to save any money. Telling in this regard is a reason some KIs gave for migrating: "It is difficult to feed your family during the rainy season because rice becomes expensive and weather prevents effective fishing. Migration allows us to save enough money to get through this difficult period; if we stay here we cannot catch enough to be able to save money to do this."

While migration is a solution to local resource over-exploitation it is also part of the problem. Migrants have no tenure of the resources `and historically had an escape route in being able to move to new fishing grounds. Some migrants even stated that the good shark fishing in the area of the mainland villages north of Morondave would be exhausted by 2015 and that they planned to move to new fishing areas.

5.6.1.2 Culture / Tradition

Koechlin described the Vezo as "semi-nomadic seafarers".[44] While there is a long tradition of migration among certain Vezo groups, Pascal shows that there are others who are sedentary, sometimes since several centuries, and who constitute well established communities with farm land.[45] For example, in the Androka region the Vezo have long farmed alluvial floodplains and raised animals as well as fishing. A number of Vezo KIs stated that the Vezo prefer to be settled and the fishers who can afford to will build permanent houses and settle. Migration is likely to be a tradition born out of necessity rather than choice. "It is an old tradition of the Vezo to move from the South, not to stay in their natal village. Here they are too many, if they move they can earn more money relative to their village." For some Vezo groups the tradition of seasonal migration certainly exists, but more than culture or tradition, it is the current socio-economic conditions that now make many Vezo migrate. "It is the ambition to escape poverty and make their fortune that pushes the Vezo to migrate."

5.6.1.3 Markets

With the depletion of the sea cucumber and shark fisheries recounted above, the main commercial commodity most of the villages of Velondriake rely on is octopus. It is a particularly important resource for women and the elderly, who glean the reef flats for it: 98% of women surveyed named octopus as their principal source of revenue.

Fishers in areas such as, Befandefa earn approximately 1000 Ar/kg for fresh fish and octopus. Given that a healthy coral reef can sustain a take-off of approximately 5 tonne/km^2/year and that fishers earn 0.38US$/kg, the area of healthy reef needed for a village of 600 fishers to earn enough per annum to be above the national poverty line would be 116 km^2. This simply does not exist.

With the current market-value for fish and octopus, the fishing resources are insufficient to sustain the fishing population and they are constrained to migrate.

In 1996 Iida quantified the inability of families from the village of Ampasilava to meet their basic needs by only fishing in their home village.[46] He compared the fortnightly cost of staples that families consumed with the value of the families catch over the same period. Actual consumption for two weeks reached around 150,000 to 200,000

[44] "Les Vezo du Sud-Ouest de Madagascar : contribution à l'étude de l'éco-système de semi-nomades marins." Koechlin, B., 1975. ed. Mouton, cahier de l'Homme, Paris-La Haye, 243p.

[45] "De la "terre des ancetres" aux territoires des vivants. Les enjeux locaux de la gouvernance sur le littoral sud-ouest de Madagascar." Benjamin Pascal, these de doctorat, Muséum National d'Histoire Naturelle, 2008.

[46] "The Past and Present of the Coral Reef Fishing Economy in Madagascar: Implications for Self-Determination in Resource Use", Taku Iida, Indigenous Use and Management of Marine Resources, Edited by Nobuhiro Kishigami and James M. Savelle, SENRI ETHNOLOGICAL STUDIES 67: 237-258, 2005.

FMG ; whereas the total catch near the Ampasilava village was lower, no more than 100,000 to 150,000 FMG. This value is almost the same as the estimated minimum consumption. In reality the actual family expenditure is greater if they buy other daily necessities. Their actual cash income is much less than what they earn from their total catch. In general, regular fishing near the village cannot bring in enough catch for the family to live on.

5.6.1.4 Establishment of marine protected areas or natural resource regulations

There has been some conjecture by development NGOs that the establishment of marine protected areas or no-take-zones in the South West would be a reason for Vezo from the South to migrate. Of all the migrants interviewed none stated this as a reason for migrating and it is clearly groundless.

5.6.1.5 Banditry

Insecurity caused by armed bandits (Malaso) in the area of Befandefa has forced inland villagers to move to large coastal villages as well as coastal villagers to take refuge on the neighbouring islands. There is a net decrease in the number of inland villages and a net increase in the populations of the coastal villages; some small inland villages are abandoned.[47] In 2006 banditry was the main reason that the populations on the isles of Nosy Hao, Nosy Ve, Andambatihy and Andragnombala increased by 100 – 200%. The entire population of 90 of the coastal village Antsatsamory left the village to go to the isles after two bandit attacks in 2006. For the same reason the population of Belavenoke decreased from 600 in 2005 to 435 in 2006.[48] Many of the villages exposed to banditry are also important origins of migrants.

5.6.2 Pull Factors

5.6.2.1 Resources

While much of the coastal and marine habitats that underpin fisheries in South West Madagascar are heavily degraded this is not true of the areas that migrants choose. Nor do the residents of the destinations chosen by migrants have a long history of exploiting species that migrants target. As Figures 20 and 21 show migrants normally move to areas with a lower prevalence of fishing households. Furthermore, many Vezo Sakalava north of Morombe do not have a tradition of fishing sharks and free-diving for sea cucumbers. These two factors combined would make for healthier fisheries.

While there is not any published data on the health of the ecosystems of the areas of destination, that which exists shows them to be in a far better state than those of the areas of origin. Some examples include:

Studies of the coral reefs of Belo-sur-Mer from the late 1970's described thriving reef habitats with abundant 'spectacular' coral growth and no observed occurrences of coral or reef mortality.[49] The outer reef flat of Nosy Andriamitaroke was characterised by prolific, unbroken growth of *Acropora* colonies. The vitality and condition of Belo-sur-Mer's reefs in the 1970s was attributed to the lack of disturbance from fishing, the lack of commercial refrigerated fisheries collection companies operating on the coast, and the remote offshore location of the reefs; in particular their considerable distance from more turbid inshore waters and the delta of the Mangoky river. Though

[47] "A Socioeconomic Baseline Assessment: Implementing the socioeconomic monitoring guidelines in southwest Madagascar", Epps, M. 2008, Blue Ventures Conservation Report.
[48] La demographie et les infrastructures dans les villages littoraux de la commune de Befandefa (Mai – Juin 2006, Norbert, WCS, 2006.
[49] Salomon J-N (1980) Les Recifs Coralliens de Belo sur Mer: Etude Geomorphologique (Sud-Ouest de Madagascar). Madagascar Revue de Geologie 37: 87–109.

there was 30% coral bleaching at Belo-sur-Mer in 1998, the majority of the corals recovered aided by clean water and few human impacts. The presence of abundant groupers and other predators, including the rare Napoleon wrasse (*Cheilinus undulatus*), indicates lower fishing pressures.[50]

There is no data published on the state of the shark and sea cucumber fisheries that attract many of the migrants to the destinations. But clearly these are less exploited than in the places of origin.

5.6.2.2 Family networks

Ecological factors are not overriding in the Sara's migration strategy; but rather the presence of a network of relatives and family alliances determines strongly the choice of migration. The migration paths that Sara undertake reflect historical patterns of settlement of migrants' kith and kin. This family network will ensure that they will be readily welcomed, assisted in daily life and with the transformation of the catch. Pascal observed this in the Ambohibola region and it was echoed by the Sara migrants in Morombe.

5.6.2.3 Knowledge of destination

Normally a migrant will have gained information about a destination before targeting it. Migrants mostly have family and relatives who have fished near the destination or who live there. Frequently a migrant will go to a particular area based on information from a confident who has previously fished there. The older migrants came to know of the isles and more remote fishing sites by a number of ways, for example:

- a confidant worked on a transport boutre knew of the fishing grounds from his passage through the area;
- an elder of the village had worked for a commercial sea cucumber collector who had taken them there in a motorboat; likewise some had worked as free-divers for a French lobster collector who had taken them to the isles. On returning to their villages (for example, Bevato) these fishermen had packed their pirogues and sailed back to the isles;
- or that the residents had hinted at there being isles out there and the Vezo had gone to explore.

Some migrants will make exploratory trips northwards without prior, in-depth knowledge of the area. From their experience as fishermen they have a very clear idea of what kind of habitat shark or sea cucumber can be readily found in. These migrants will experimentally fish in areas that are potentially good, moving on until they find a productive fishing site. An example of this is how an important shark fin buyer spent 2006 testing the fishing grounds between Morondave and Benjavily for shark fishing. He then recruited and encouraged teams from Andavadoaka and Morombe to come those areas he knew to be productive on the condition that they would sell to him.

5.6.2.4 Markets

The omnipresent and high demand for shark fins and sea cucumbers is a significant driver of migration, both for Vezo fishers migrating long distances to still productive fishing grounds, but also for Tanalana farmers moving to the coast south of Tulear to earn money through gleaning for sea cucumbers.

[50] Ahamada S, Bigot L, Bijoux J, Maharavo J, Meunier S, Moyne-Picard M, Paupiah N (2002) Status of coral reefs in the south west Indian Ocean island node: Comoros, Madagascar, Mauritius, Reunion and Seychelles. In: Wilkinson C (ed) Status of the coral reefs of the world 2002

Between 1989 and 1995 the price paid to fishers for dry shark fin increased from 6 to 45–67US$/kg for highest quality fins.[51] By many accounts, this is the period when many fishers began migrating to search for productive shark fishing sites. By 2004 the value of shark fin had further increased by over 100% since 1995. Currently the migrant fishermen surveyed here sold shark fins of the "first quality" for between 94 and 105 US$/kg. By comparison fishers in the villages of Befandefa sell fresh fish and octopus for 0.5 US$/kg. The prices for which migrants sold sea cucumbers varied from species to species; but the sought-after *benono fasy* earns them 13US$/individual or 17US$/kg.

Buyers for shark fins and sea cucumbers exist in every village, and will also travel to the isles to buy from the migrants. Fishers salt and dry the fins and sea cucumbers themselves and so can transport them to distant markets themselves. As such the existence of the market for these products in a specific location is not a driver for migrants to choose a particular destination.

Since the commercial octopus buyers have extended their buying network to more remote villages (and so creating a market in them), more Sara from Anakao have moved South to join their relatives in these villages.

Commercial buyers from Morondave are said to sometimes send a boat out to Andriamitaroke to buy lobster and octopus from the migrants. Similarly a commercial seafood buyer (SOPEMO) from Morondave sometimes buys octopus, lobster and fish on Andravoho, Nosy Be and Andriamitaroke as well as Manahy and Andranopasy (for crab). As these buyers don't pay any duties to the communes of Belo-sur-mer and Andranopasy, the local communes don't benefit from this in anyway. Furthermore, fishers on the isles do not normally fish for these species; but the presence of the collection boat motivates them to do so.

Vezo migrate to be closer to higher paying markets – urban centres (such as Tulear and Morombe), but also tourist centres (such as Mangily) where hotels pay a premium for seafood. At these centres of consumption they can sell their catch directly to the public rather to middlemen and earn a better price. Pascal remarks that urban centres are very attractive for the Vezo – they are able to find work and a market for their catch. They will often work in tourism, transport and while continuing to fish. Represent a significant part of the Tulear population.[52]

5.6.2.5 Education

Schooling, particularly secondary, is limited in the rural areas of SW Madagascar; fishers migrate to urban centres (or closer to them) so that their children can attend school. The parents continue their fishing activities, as do the children on the weekends. Some migrants also choose rural destinations that had good fishing grounds but that are also in proximity to urban areas and so had accessible schooling for their children, for example, Bemakoba and Maintirano.

5.7 Migration conflicts

The conflicts that have arisen between migrants and residents are presented under the following themes: *faly* (respect of traditional taboo) and traditional governance, numbers, social behaviour, fishing and conservation. These conflicts were described by the KIs and are presented in detail in Appendix 1.

[51]Cooke, A.J., 1997. Survey of elasmobranch fisheries and trade in Madagascar.In: Marshall, N.T., Barnett, R. (Eds.), The Trade in Sharks and Shark Products in theWestern Indian and Southern Indian and South East Atlantic Oceans. TRAFFIC East/Southern Africa, Nairobi, pp. 101–130.

[52] "De la "terre des ancetres" aux territoires des vivants. Les enjeux locaux de la gouvernance sur le littoral sud-ouest de Madagascar." Benjamin Pascal, these de doctorat, Muséum National d'Histoire Naturelle, 2008.

5.7.1 *Faly* and traditional governance

A *faly* (or *fady* in official Malagasy) is a taboo or an ancestral belief that makes a certain area sacred and certain acts taboo. *Faly* are a means of traditional governance dictated by the elders – *olobe* – and are based on ancestral laws and beliefs.

For many residents the migrants' disrespect of *faly* is the single, most important problem with migration. Residents of Belo-sur-mer and Maintirano consistently stated that the migrants did do not respect the *faly* of the islands.

For the people of the communes of Andranopasy and Belo-sur-mer the islands are a place of refuge for the local people; a place to be nurtured where they are sure to find food if a catastrophe (eg. cyclone) happens on the mainland. Moreover the islands are a favoured home, place of dwelling, for the spirits around which the beliefs and ceremonies of many local lineages take place. These benevolent spirits will only manifest themselves there; the desecration of these sacred places risks the departure of these good spirits.

The residents of Maintirano held similar views of the Barren Isles. Their descriptions of the isles reflected a deep respect: these are "a sacred place that is different from here [the mainland]", "a place that is not of our world", "a sacred place that we inherited from our ancestors".

From this belief in the isles being sacred a number of *faly* exist that were widely stated by residents as well as many migrants.

Table 16. Present-day taboo of the Belo-sur-mer and Andranopasy isles

***faly* of Andriamitaroke, Nosy Be and Andravoho**
• the islands are sacred places with many areas and trees that are *faly*
• you can only relieve yourself in specific places on the islands; it is a deep offence to relieve yourself elsewhere
• you cannot live on the islands; it is acceptable to fish there, to rest on the islands but not to live there; it is very rare for the residents to stay longer than a night
• to take women and infants to the islands, for them to stay on the islands
• women cannot give birth on the islands
• cannot bury dead on the islands
• it is *faly* to kill or mistreat the rats on the islands (Andriamitaroke is infested with rats; Nosy Be used to be but they were eradicated by *vazaha*)
• drinking alcohol on the islands is forbidden

Table 17. Traditional taboo of the Barren Isles

***faly* of the Barren islands**
• to take animals onto the islands
• to take plants there and to cultivate them
• before no women were allowed on the islands because they would take infants onto the islands who would not be able to respect the *faly* (three other KIs, who were Sara, said that this was not true)
• no whistling or talking loudly; on the islands you must be calm

- the islands were a sacred place where one came to fish and then return, staying only a week
- the islands were a different world that we inherited from our ancestors; we must respect and protect them
- on Abohazo you cannot kill or disrespect the rats
- cannot relieve oneself on the islands (above the high tide mark)

Residents stated that the migrants had broken many of the *faly*. For example, on the Barren Isles the migrants: live on them for months; cultivate on the islands and keep chickens, cats and rats; and are said to have buried their dead children on the islands. On the Belo-sur-mer isles the migrants: live on the islands for most of the year (it is very rare for the residents to stay longer than a night); they take women and infants to the islands; women give birth on the islands; children have died on the islands and been buried there; and migrants have cut down sacred trees on the islands.

For a Vezo fisher to disrespect a *faly* is unthinkable. That they have done this is a serious problem for themselves. Every fisherman interviewed stated that they knew of the *faly* of the isles; virtually all said that they respected these. A few admitted that, because of the crowded conditions on the isles, they were not always able to do so.

Clearly the key *faly* is that the isles should not be settled, that they serve only as a temporary camping site in case of need. Older KIs who were Vezo migrants from the south said that previously the islands were never or only rarely fished because of this *faly*. Two KIs, who were Sakalava residents of Maintirano, stated that there was conflict with the first Sara who settled on the Barren Isles in the 1960's because the isles are *faly*. However, the Vezo migrants (and Sara in Maintirano) commonly state that when they arrived in these areas the local Vezo Sakalava did not have the seafaring skills to make regular trips to the isles and this was the main reason they are not fished by the locals. Obviously this is moot point.

It seems that in the mid to late 1980's migrants began fishing the isles. Even so, before doing so they first performed ceremonies and gave sacrifices with two spiritual elders, one from Belo-sur-mer and the other from Manahy. These sacrifices enabled them to go to the isles; still they did not stay for extended periods. (Many of the present day migrants from the Befandefa villages still pass by Belo-sur-mer to have the blessing of a Vezo elder before going to the isles.)

During the 1990's the *faly* of settling on the isles was eroded by the lucrative markets for trepang and shark fin that drove increasing numbers of migrants to exploit the still rich fishing grounds of the isles. The sacredness of the isles was also diminished by a number of outsiders who lived on the isles at this time and who would not have respected the *faly*. These include scuba teams harvesting sea cucumber that came from Diego and were made up of urban Malagasy, a South African trawler that anchored near the isles and was used as a base for sea cucumber harvesting (1996 – 98) and the building of a hotel on Nosy Be. On the Barren Isles there was also commercial guano collection, the building of an airstrip on Nosy Lava and probably a number of other commercial activities driven by foreigners.

The isles make the ideal migrant destination: they were uninhabited, rarely visited by the resident communities and remote enough from the mainland so that the migrants live there unhindered by the residents. The emphasis residents put on the migrants' disrespect of *faly* probably reflects the lack of other means for residents to assert their control of the isles. Despite the isles being "theirs", the residents have no formal ownership or right to them; *faly* are an instrument by which they can do this.

The *faly* of not living on the isles is clearly an effective natural resource management and conservation measure. A key outcome of the meeting of authorities to deal with the migration problem on the islands (see Local government management actions) was that the respect of *faly* had to be re-established. The local regulation consequent to this meeting prohibits fishers from camping on the isles. The alignment of local government regulations and conservation objectives with traditional beliefs and natural resource governance measures could be effective in resolving the migration conflict.

In addition to the *faly* of not living on the islands residents have a number of traditions and customs that are a form of governance (though not called *faly*) that the migrants have not respected. This resident KI's statement reflects that of many other KIs': "Here the migrants want to behave like they do in their home villages; but their behaviour is not in keeping with our traditions or custom and they don't respect this."

An example of this is that there was a local tradition of protecting nesting colonies of seabirds, both on the Belo-sur-mer and Barren Isles. Historically very large seabird nesting colonies existed on Andriamitaroke, Andravoho and Nosy Mboro (Barren Isles); and possibly on many of the other isles. The arrival of the migrants mostly destroyed these, though the prohibition of migrants living on Nosy Mboro has allowed the re-establishment of a population and Andravoho is still nested on when the migrants are absent.

Traditional local governance ensured that the nesting colonies were conserved. In addition to the *faly* of not settling on the isles, harvesting of seabird eggs from the Belo-sur-mer islands was a luxury, a ceremony done with elders only on certain occasions.

The local leaders were strongly against the use of beach seine nets and laro poison to fish and in their villages, such as Belo-sur-mer, migrants practising these had been chased away. (Though the Vezo migrants fishing on the isles used neither of these techniques). A KI of Maintirano said: "The migrants have degraded their own resources; because of this they are no longer able to adequately fish and now are coming here to do the same to our resources. They should ask themselves why they have problems in their home villages."

A commonly expressed view was: "If the migrants respected the local laws and customs then they would be welcomed; but they do not want to do this."

5.7.2 Numbers

The steady increase in the numbers of migrants arriving is another source of conflict. Whereas before they came in smaller numbers and were ostensibly welcomed, they are now said to largely outnumber the resident fishers.

The local authorities of Andranopasy, Belo-sur-mer and Maintirano only started to take management measures to control the migration in 2008. The large numbers of migrants arriving in 2005 – 2006 in Belo-sur-mer and in 2006 in Maintirano is largely seen as the tipping-point that pushed the local authorities to act and the time when residents' discontent with the migrants began to be manifested.

In addition to competing for increasingly scarce fishing resources the large numbers of migrants crowded on the islands makes it difficult for them to respect the *faly*. It creates insalubrious conditions, particularly as many fishermen previously had a habit of keeping shark heads next to their camps as trophies and the remains of shark carcasses were left rotting on land or thrown into the sea near the beach.

5.7.3 Social behaviour

Many of the migrants fishing on the isles are young men and when they go to the nearest “civilisation”, such as Belo-sur-mer or Maintirano, their revelry has caused offence. This is truer of Belo-sur-mer than Maintirano. Migrants fight in bars, disturb the peace and quiet, and when drunk act in ways that are offensive to residents. Migrant fishermen spend a lot of money in epi-bars and on prostitutes, paying very young girls to sleep with them. The girls frequenting the epi-bars in Maintirano are said to be 12 years old and often younger.

During 2006 and 2007 many migrants lived next to Belo-sur-mer as the mayor, not wanting them to live permanently on the islands, invited them to live next to Belo. However, the hotel owners to the South of Belo complained that the migrants were disturbing their guests dirtying the beach.

Tourism brings in significant money for the residents of Belo-sur-mer; through their behaviour in the village and their presence on the islands, the leaders of the village see them as a negative force on tourism.

While the migrant fishers earn significant amounts of money (and much more than resident fishers) from the residents' natural resources little of this returns into the host community, except what is spent in the bars and Karani shops. The migrant fishers often don't make any contribution to the social life of the host communities.

5.7.4 Fishing resources

As described in Section 4 (Traditional fisher migration routes), there are different types of migrations taking place on the West coast of Madagascar: a migration of Vezo fishers that is driven by the strong demand for sea cucumbers and shark fins and is more recent; a more traditional distant migration of Vezo and Sara fishers in search of better fishing resources; and localised seasonal migrations of fishers seeking better fishing resources. Each of these migrations has different conflicts over fishing resources.

Migrants from the south who stay on the mainland and fish for crab, shrimp and fin-fish just offshore would be competing with local fishers for the same fishing resources. This kind of migration was not studied in detail here. However, socio-economic surveying carried out in the coastal villages of the Kirindy-Mitea area (from Andranopasy north to Belo-sur-mer), villagers consistently cited two major problems with fishing: industrial trawlers (shrimp) and migrant fishermen from the south.

In addition to competing for resources, migrants in the mainland villages sometimes use destructive techniques, such as beach seine nets and laro poison. This has caused conflict with resident communities the length of the West coast. In particular the Sara and Vezo Sara are notorious for using beach seine nets (called *beangata / jaoto / tarikake*) with mosquito-netting pockets; this has brought these migrants into many conflicts with residents.

The fishermen who target sea cucumbers and sharks (the case for the vast majority of migrants surveyed here) would generally not be competing with local fishers, who don’t have a long tradition of shark fishing or diving for sea cucumbers. The exception to this is the Barren Isles, where there are a number of shark fishermen from Maintirano who live on Mananja and Marifa. However, the majority of the Sara from Maintirano presently practise *ZDZD kirara* as their principal fishing activity and therefore are targeting different species.

Though these migrants are not competing for the same fishing resources as the residents, there is a strong perception amongst residents that “migrants harvest all of the residents' marine resources”. “If they carry on like this there will not be any left for the residents' children”; “migrants come here to over-exploit our fishing resources so that their own are able to recover in their absence.” Furthermore the local communes of Andranopasy, Belo-sur-

mer and Maintirano do not benefit from the wealth of resources that the migrants harvest as these are bought by outside buyers from Morombe and Morondave.

Many residents say that the migrants have more effective fishing techniques: “they know how to sail far into the Mozambique Channel, how to use *jarifa* and how to dive deeper for sea cucumbers. Thanks to this they are able to earn a lot more money than us.”

Migrants introduced *jarifa* and spear guns to the northern areas more recently; historically they also brought nets to areas that had only used hand lines to fish. One of the ways that migrants have become better accepted into resident communities has been for them to teach the local fishermen new techniques. In doing so they have effectively spread the use of these techniques.

In the 1990's Vezo Sara migrants came into conflict with local fishermen in the Faut Dauphin region who used basket-traps to fish lobster. The migrants free-dived for lobster, were able to collect larger amounts and were accused of stealing from local fishermen's traps. The Antanosy residents forced the Vezo to leave from some areas.

In the North East of Madagascar migrant shrimp fishers have caused conflict over resources in villages of the Ambaro Bay: In Ambavanankarana, where migrants are a minority, the residents have forbidden them to fish in the traditionally more productive sites. In Ankazomborona the migrants are dominant; the residents hold them responsible for the decrease in fishing because they don't respect the local traditional rites / taboos.[53]

5.7.5 Conservation

5.7.5.1 Belo-sur-mer and Barren Isles

The Belo-sur-mer and Barren Isles and the ecosystems in their proximity are high conservation priorities. Their coral reef ecosystems and neighbouring sea mounts and far-offshore reefs are well removed from much of the stresses that have caused widespread degradation of coral habitats in South West Madagascar:

- They are relatively remote from large rivers bringing in sediment;
- It is only relatively recently that they have been fished; even now the principal fishing activities target shark and sea cucumber only;
- The hydrodynamics that would surround these islands, their exposure to deep ocean water, would make them less prone to localised water temperature increases and so bleaching. (The Barren Isles are notorious for the strong currents passing around them.)

There is scientific data as well as substantial anecdotal evidence to show that the coral reefs of the Belo-sur-mer isles are still healthy. For example, divers (a tourist dive operator and sea cucumber divers) operating from Belo-sur-mer relate seeing wide-spread bleaching on reefs near the isles in 1998; these same reefs have largely regained their health today.

This resilience of the surrounding coral reef habitats gives the two archipelagos very high conservation value in its self. Much of the “riva” far-offshore reefs and sea mounts remain unexplored by scientists; the only people knowledgeable about these are the Vezo migrants and illegal sea cucumber diving teams.

[53] « Gestion equitable de la pecherie: allegement de la pauvrete et environment marin », Rasolonjatovo Harimandimby, Rabearisoa Ando, WWF, 2005.

The isles also attract a number of charismatic species that make them not only a conservation priority but also give them high eco-tourism potential. For example: the Barren isles are a key nesting site for green and hawksbill turtles; five species of turtles are observable there; dolphins are frequently sited near the isles, which is no longer the case in much of South West Madagascar; a humpback whale annual migration route from the Antarctic to the north of Madagascar passes right by the isles.

Extensive estuarine and mangrove ecosystems exist in the areas of the West coast that fishers are increasingly migrating to, such as Bemakoba and Benjavily. These areas are sparsely populated and, if the current richness of the shark fishing is an indicator, relatively unexploited.

Besides depleting the ecosystem of keystones species (shark and sea cucumber), the migrants have had a number of other negative impacts on biodiversity conservation, particularly of the isles, which include:

- The presence of migrants has decimated nesting colonies of seabirds on a number of islands (Andriamitaroke, Nosy Be, Andravoho, Nosy Mboro).
- Migrants actively hunt turtles and harvest their eggs; this is a particular problem in Barren islands, which form a key regional nesting ground for green and hawksbill turtles.
- Migrants from Morombe who deliberately hunt turtles and have killed large numbers along the coast between Andranopasy and Belo-sur-mer; they build temporary camps here where they dry the meat to supply the market in Morombe.
- Migrant fishermen have cut down many of the trees that are reported to have once existed on certain islands.
- Recently migrant fishermen have cut down a lot of *farafatse* in the Kirindy-Mitea to make pirogues; Belo-sur-mer has become a known source for new hulls.
- On isles such as Andriamitaroke and Anabahazo the migrants believe that it is *faly* to kill rats; these islands (as was Nosy Be) are infested with rats and this must have decimated a lot of the island fauna, particularly nesting seabirds. Likewise Maroantaly is completely infested with feral cats introduced by fishers living there.
- A number of the Barren Isles are overgrown in parts by alien plant species, eg. “lamotra” on Nosy Lava and Maroantaly and lantana(check) on Anabahazo.

MNP, local government authorities and the inter-communal association Hahitamani have been working together to create and manage the Kirindy-Mitea National Park. The present-day migration, particularly to the isles, is incompatible with a number of conservation actions that they are enacting in order to protect the local biodiversity:

- In October 2008 the Kirindy-Mitea National Park was afforded legal 'temporary protection' by the Malagasy government as a protected area; many of the Vezo migrants do not know this.
- Migrants stop over at Mitea (a source of water and a landmark easily distinguish from the sea); this is a core conservation area, an off-limits reserve of the Kirindy-Mitea national park.
- Similarly Nosy Be and Andrevoho will form a core conservation area of the new MPA and will be off-bounds to exploitation.
- To achieve the conservation objectives of the Kirindy-Mitea National Park, Malagasy National Parks needs to strictly prevent any fishers from staying on the islands. One of the islands, Andriamitaroke, could be set aside for the migrant fishermen; but this would be a compromise and not ideal for MNP.

MNP plans a full public consultation with the migrant fishers, which should begin in June 2009, to try to address the problems that migration to the islands poses. In addition MNP will widely publicize the inter-communal regulation governing the islands through local radio and communication with communal authorities and village presidents.

MNP management is not against the migration if the migrants meaningfully respect the resident's traditions and their efforts to conserve their biodiversity.

The Barren Isles Turtle Conservation Project (Natural History Museum of Geneva, WWF, IHSM) and leaders of the local community who have formed an association for the protection of local marine and coastal resources - "Melaky Miaro ny Tontolo an-Driakany". They are working together with the local government authorities of Maintirano to protect the biodiversity of the Barren Isles. Their long term vision is to establish a Barren Isles MPA.

The local regulations enacted to better manage the influx of migrants to the Barren Isles as well as to afford protection to the sea bird and turtle nesting populations are the first steps towards achieving this vision. The MPA project is nascent and a number of actions by the local leaders show a pragmatic approach towards the migrant problem:

- The Barren Isles Turtle Conservation Project has worked with both local and migrant fishers to raise awareness of turtle conservation since its inception; a number of migrants are employed by the project. While there was a strong call by local fishers to limit the number of migrant pirogues going to the isles the authorities decided to delay enforcing this until they had a better idea of the "carrying capacity" of the isles.
- Unlike the Belo-sur-mer isles the Barren Isles are frequented by local fishers and the leaders have to acknowledge the local fishers' part in the conservation challenges of the isles.

5.7.5.2 South of Tulear

Anakao is an important trading point for turtles from the region south of Tulear. There is a strong correlation between the destinations of migrant fishers from Anakao and the provenance of turtles traded in Anakao. The trade in turtles in the area is essentially built on the network migrant fishers.[54]

5.7.6 Mainland villages and urban areas

Many of the conflicts that are described above are not as prevalent in the mainland villages and urban areas as they are on the isles. In the urban areas migrants often have relatives who will protect the migrants and welcome them into the community. In these places it is possible for the migrants to respect the *faly* and their lack of social graces is not so obvious.

In the smaller villages on the mainland the place where the migrant community lives is often quite separate from the resident village, for example, in both Bamakoba and Benjavily it is a five minute walk to the original resident's village. In many of the mainland villages the migrants pay a "pirogue tax" and seem to be well accepted by the resident community.

[54] Conservation et patrimonialisation de la tortue marine dans le sud-ouest de l'Ocean Indien, Valérie Lilette, these de doctorat, 2007, Université de La Réunion Faculté des Lettres et Sciences Humaines.

5.8 Migration management measures

5.8.1 National government policy towards migration

The Malagasy government has no present national policy or laws regulating migration. All Malagasy citizens are free to circulate within the country and there are a significant number who do migrate internally, both seasonally and long-term, to seek work. The only legal requisite is that they have had their passport signed by president of the village that they are leaving; and that they present their passport to the president of the village of their destination. This is more a measure to control the movement of criminals than of migrant people; and until recently has little affected migrant fishermen who often go to remote, sparsely populated destinations.

A search through current coastal conservation and development projects as well as the "monographies" of all of the coastal districts within Madagascar showed no policy or planning that took migration of fishermen into account. This was confirmed and reiterated by all of the government authorities and NGOs interviewed for this study.

The lack of national policy on migration reflected the sentiment of many KIs interviewed, from government authorities to local fishers, which is expressed well by: "No one can forbid the Malagasy to go where they want to; this is Madagascar and we are all free to move in our country, to earn our livelihood and to let others do so."

5.8.2 Local government management actions

Full details of the KI interviews describing local government and community action over migration is presented in Appendix 1.

With the number of migrants going to the Belo-sur-mer and Barren Isles increasing dramatically in 2005 – 2006 the local government authorities of the communes of Maintirano, Belo-sur-mer and Andranopasy took measures to better control the influx of migrants onto the isles off their coasts. These measures are described in more detail below. They are isolated responses to the pressures that these particular migrant fishermen have caused on the islands rather than part of the logic of a government policy towards migration.

Some resident KI's stated that the local politicians earn a lot of money from migrants through trading trepang and shark fins, as well as migrants spending in their stores and epi-bars; therefore they don't necessarily want to protect locals / take measures to control the problem.

5.8.2.1 Andranopasy and Belo-sur-mer

From February 2008 migrants have needed three documents if they wanted to fish in the isles of Andranopasy, Belo-sur-mer and Maintirano:

1. a certificate of residence from the chef de Fokontany of the fisher's village of origin;

2. a passport signed by the chef de fokontany of the migrants village;

3. a 'bilan numero trois' from the Morombe court, which states whether the person is wanted for a crime or has a criminal record

In 2008 migrants were turned back for not having these papers; this was the first time this had happened. However, many migrants still go north without these papers because the enforcement is normally infrequent and for many of the illiterate migrants getting the 'bilan numero trois' from the Morombe court is a time consuming inconvenience.

On the 25 – 27 April 2008, a meeting took place between the authorities of Menabe and those of the South West in Morombe over:

- the utilisation of the islands off Belo-sur-mer and Andranopasy by traditional fishers from the South West and plans to manage these islands as a conservation area;
- and the presence of industrial trawlers from Tulear and Morondave and the damage they are causing to the sensitive benthic habitat.

The main outcome of this meeting was that the authorities agreed that there was a need to:

- re-establish respect for local customs and beliefs;
- respect the maritime fishing regulations;
- and support the protection of the islands as a MPA.

To achieve this the authorities decided that all fishers without exception must live within the village of Belo-sur-mer, but they have the right to use the isles as a temporary camp and fish around the isles for a maximum of a week.

On the 12 May 2008, the "Chef de Region" of Menabe prohibited fishers from settling on the islands of Belo-sur-mer and Andranopasy so as to:

- ensure the respect of local customs and beliefs;
- and to protect the biodiversity of the isles from further degradation with a view to creating a MPA.

The pertinent articles of the regulation are:

- Due to the continued degradation of the biodiversity by the fishers, principally migrant, it is now prohibited to settle on the islands in the Menabe Region.
- The isles proscribed are: in the rural commune of Belo-sur-mer (Nosy Andravoho, Nosy Tania, Nosy Andragory, Nosy Angarahoka, Nosy Be); in the rural commune of Andranopasy (Nosy Maheloholo, Nosy Andriamitaroke). [Note: only Nosy Andriamitaroke, Be and Andrevoho are currently settled; the other isles are effectively uninhabitable sand cays.]
- Traditional fishing within the national regulations is permitted.
- The department of fisheries, the gendarme, the prefectorial police, the mayors of the rural communes of Belo-sur-mer and Andrnopasy, and the district heads of Manja and Morondave will be responsible for enforcing the regulation.
- The regulation is effective as soon as it has been sufficiently publicised (local radio, posters and village meetings).

According to many migrants in 2008 this regulation was not rigorously enforced and the three isles were settled during the fishing season. However, the local authorities with the gendarme have gone to the isles and forced the migrants to move on three occasions. Hahitamani (the Kirindy-Mitea co-management association), the local gendarme and communal authorities plan to work together to better enforce the regulations.

The local authorities with Hahitamani, have cleaned the isles three times – in 2006, 2007 and 2008.

5.8.2.2 Maintirano

In Maintirano the mayor, together with PTM (the fishers' federation), the PSDR and MAEP, the Barren Isles Turtle Conservation Project and "Melaky Miaro ny Tontolo an-Driakany" (the local association for the protection of marine and coastal resources) have established a number of regulations regarding the migrants and fishing on the Barren Isles:

- In addition to having a signed and valid passport, all fishermen must pay a pirogue tax to the authorities in Maintirano, on doing so they will have their pirogue numbered and will be given a fisherman's card with their fishing activities listed on it.
- The pirogue tax of 15 000 Ar will be used to pay the salaries of two eco-guards who will be responsible for enforcing the regulations.
- The total number of pirogues allowed to fish in the Barren Isles is limited to 150. (This was not enforced in 2009 with a view to studying the carrying capacity of the isles and setting a reasonable limit.)
- The presence of fishers on Nosy Abohazo is strictly prohibited during the rainy season (1 November to 1 April). (This the turtle nesting period.)
- The capture of turtles is strictly prohibited outside of the period of 1 June to the 1 September.
- The sale of turtle is strictly prohibited the entire year.
- The harvesting of turtle and bird eggs is strictly prohibited the entire year.
- Infants (children beneath the age of five) are not allowed on the islands except during the school holidays (a major problem with the migrants is that the children do not attend school).
- Fishermen cannot throw shark carcasses (the head, skin and skeleton that remains after slaughter) into the water; they must be buried under the sand (previously many fishermen kept the heads next their camps as trophies).
- This law was to be applied by the 15 May 2009, but the de facto leader of the Vezo migrants, Valerison, requested that its application be delayed until the 25 May 2009 so that all migrants would have the time to observe it
- Migrants who do not respect these regulations will have to pay a fine of 100 000 Ar / will be sent back

The local fishers from Maintirano proposed giving a single island to the migrants (for example Nosy Andrano); the other isles would be open to the residents. This idea has not been acted on.

The mayor of Maintirano also passed a local law in 2007 strictly prohibiting fishermen from landing on Nosy Mboro the year round in order to protect the colony of nesting seabirds as well as turtles nesting on the island. The majority of fishers have respected this regulation.

All of the above regulations, together with awareness raising on the sustainable management of marine resources, were communicated in early 2009 to the populations of Maintirano and Morombe through local radio broadcasts.

5.8.3 Village management actions

In a number of mainland villages the migrants must first pay a fishing / pirogue tax of 10 000 – 15 000 Ar/ year to the fokontany (village community). These villages include Ampatike (just north of Morondave), Bemakoba and some small hamlets in the Mangoky delta. The migrants respect this and relations between migrants and residents in all of these villages are reported to be good.

A similar suggestion was made in the 2008 general assembly of the Kirindy-Mitea villages regarding the management of the protected area: All fishers must have the permission of the Chef de Fokotany before fishing in the zone of that village. This was not enacted; but the use of a pay-to-fish system would be a step towards formalising fishing rights and ending open access to resources. As has been demonstrated in villages such as Bemakoba, it would also make for less conflict with migrants.

In many fishing villages the communities do not accept migrants who use beach seine nets (often Sara migrants from Tulear). The village will push them out and they will continue north until they can find a place where the residents allow them to use this method. Often this will be where they have family ties.

5.8.4 Fisheries management measures

No specific management measures have been taken by local or regional authorities to address problems that migrants' fishing practices cause. Migrant fishers practise a number of activities are illegal under the Malagasy law; this is equally true of Vezo fishers throughout the region. Laws pertinent to migrant fishers are summarised in Table 18 below.

Table 18. National regulations pertinent to migrants and their treatment of these.

Regulation	Comment
1. Protection of the marine and coastal environment (Décret du 05-06-22, art 15):	
The cutting of mangroves is prohibited	On the islands there are no mangroves; some mainland destinations (eg. Benjavily) have significant mangrove forests but migrants were not observed to be cutting mangroves or using the wood; the cutting of mangroves on a large scale is done to make charcoal for urban areas and supply building timber
Fishing with poison is prohibited (art 18 du Décret du 05-06-22)	The migrants studied here don't use *laro* poison; it isn't useful for the species they target; a practice more associated with Masikoro or Vezo mpotake; some migrants are said to have introduced it to villages South of Tulear
2. Protection of spawning stock and juveniles	
(16 du Décret du 05-06-22):	
Prohibition of harvesting the eggs of fish or crustaceans	
All females with eggs must be released immediately	Fishers don't respect this

Regulation	Comment
Commercial sizes:	
Lobster: 20 cm	Commercial buyers and hotels buy under-size lobster; the Vezo only fish lobster to cater to this market (traditionally they don't eat lobster)
Crab: 100 mm width between the two spines Sea fish: 12 cm (Art 3 du Décret 62 213)	Fishing crab and fish to sell are not activities that the migrant fishers currently pursue
Sea cucumbers: live 11 cm, trépang 8 cm (Arrêté n° 0525 du 05-12-75 art 1er)	Certain sea cucumber species the migrants harvest are less than 11 cm at adult size; the commercial buyers pay a premium for adult-sizes, but will buy any sized sea cucumbers and so the fishers harvest indiscriminately
Octopus: 350 g (Arrêté n° 16 376/2005 du 21 10 2005)	Commercial buyers generally don't buy octopus less than 350 g; but fishers will dry these for local sale if they capture them
Fishery closures:	
Shrimp: 01/12 to February or mid-March on the West coast	
Octopus: 15/12 to 31/01 on the West coast, 01/06 to 15/07 on the East coast (Arrêté n° 16376/2005 du 21 10 2005)	The large commercial buyers respect the national octopus fishing closure; but there are still smaller commercial buyers who collect during the closure; in addition fishers are still able to sell dried octopus locally
Lobster: 01/10 to 31/12 (Décret n° 2003-1119 du 02 12 2003)	Commercial buyers and hotels buy lobster during the national closure of the fishery; the Vezo only fish lobster to cater to this market (traditionally they don't eat lobster)
Clupéidés (sardines): from 01/06 to 15/07 (Arrêté provinciale n° 254 du 01 12 65) During this period barracuda, tuna and karangue must be gutted	Fishing for sardines and anchovies (such as vary lava and tove) once was of importance in SW Madagascar and migrants followed the movements of these species; this fishery is now largely depleted; many fishers are ignorant of the dangers of cigua-toxicity
Net mesh sizes:	
Traditional fishers (Décret du 05-06-022) : Fish ≥ 25 mm (art 8) Shrimp ≥ 15mm lobster pots, basket traps (nasses, casiers, claies) ≥ 30 mm Octopus ≥ 40 mm (arrêté numéro 16376/2005 du 21-10-2005) *Industrial fishing:* Fish ≥ 70 mm Shrimp ≥ 45 mm (corde de dos 69 m)	The Vezo often target species that require the use of nets finer than 25 mm mesh size (for example vary lava) and the use of nets made from mosquito nets (makarakara) is common in along the South West Madagascar; the migrants surveyed here stated that they did not use makarakara and none of these nets were observed

Regulation	Comment
3. Prohibited fishing techniques (Art 18 du décret du 054-06-22):	
Explosives	No current use of explosives; none of the KI's noted this
Toxic products (laro)	See comment in "1. Protection of the marine and coastal environment"
the use of any equipment that enables immersion underwater longer than that possible by natural human respiration (Art 10 de l'ordonnance n 93022 du04-05-93)	None of the traditional migrant fishers were seen or said to use scuba; it is clearly beyond their means; all of the migration destinations had a history of being exploited by outside dive teams comprised of divers from urban centres (Nosy Be, Morondave); two such dive teams were encountered during the surveying
4. Protected mammals All species listed in CITES annexes are protected: dolphins, sea turtles, whales and dugongs.	The Vezo prize sea turtle meat and in all of the villages visited in this research there was evidence of both residents and migrants eating it; residents and migrants alike opportunistically capture turtles; of concern is that one KI reported that some migrants target turtles to supply urban demand (Morombe and Morondave) for the meat; turtle are a by-catch of *ZDZD* and, less frequently, *jarifa* nets; the Barren islands are key turtle nesting sites and migrants have caused significant disturbance to these sites
It is prohibited to capture nesting female turtles with a carapace < 50 cm (décret 23/05/1923); Nosy Anambo (Antsiranana), Nosy Iranja (Nosy Be), Chesterfield (Morondava), Nosy Trozona and Nosy Ve (Tulear), and Europa (France) are turtle nesting reserves (décret 24/10/1932); the hunting and export of turtles is prohibited (décret du 25/02/1980 and 1988 (CITES))	Dolphins are a rare by-catch of *ZDZD* nets and are eaten by the Vezo; the migrants will opportunistically hunt dolphin if, for example, if they are trapped in a shallow lagoon, but this is rare
5. The collection of marine products (Décret n 94 112 du 13 02 94) :	
Mareyage - Traders of marine products must have a « carte mareyeur » delivered by the regional authorities ; this is only valid in a specified sous-préfecture	
Buyers / collectors must have a collection permit delivered by the department of fisheries and marine resources (la direction de la pêche se des ressources halieutiques), after authorisation of the ministry responsible. Able to send their products anywhere, but the can only collect from zones defined in their permit	A point of friction over migrant presence for the local authorities of Andranopasy, Belo-sur-mer and Maintirano is that commercial buyer(s) from Morondave buy produce on-the-black from the migrants, particularly on the islands; because they are remote sites and the authorities do not have the means they cannot police the buyers: there are no local benefits from the exploitation of the marine resources; the demand driven by these buyers motivates the migrants to fish species that normally they would not

In general these fishing regulations are not widely enforced, both in urban but particularly in rural areas. As such there has been little interaction between authorities trying to control fishing methods and the migrants in remote fishing sites.

- Many fishers are ignorant of the national regulations.
- A number of regulations are seen by the Vezo as incoherent as they outlaw practices that fishers have long practised and are important livelihoods, for example, using fine-mesh nets to fish sardines. As these laws don't

reflect the reality of their existence nor are based on traditional governance they are not as respected as dina - traditional laws.

- Many of the fishers' transgressions are driven by an external, commercial market demand for under-sized individuals; commercial buyers also continue to operate during national fishery closures. Furthermore these demands are mostly for species that the Vezo do not traditionally fish or consume. The market for sea cucumbers and lobster, as well as the urban demand for turtle meat, are examples of this.
- The serious ecological problem associated with migrants – over-fishing of shark – is not addressed by current regulations. Nor is the use of beach seine nets, a frequent problem with Sara migrants, explicitly prohibited.
- Often the worst culprits, such as the operators of sea cucumber scuba diving teams or large beach seine nets near urban areas, have the means to bribe officials or the political clout to operate with little regard for the law.

A frequent complaint by authorities (though not resident fishers) about migrants is that migrants on the islands damage coral through the use of nets and also use nets made of mosquito netting. No migrants in this study stated that the use of such nets was a primary or secondary method; as a third choice fishing method 16% of migrants used nets suited to near shore fishing. Even here these nets were of two fingers in mesh size (tondro roa) and no nets of mosquito netting (makarakara) were seen on the islands.

No migrant fishers from the South on the islands and mainland villages surveyed used beach seine nets (tarikake). However, the practice of tarikake has long been a source of conflict between Sara and Vezo Sara, from Anakao, St. Augustin and Tulear, and resident Vezo the length of the West coast. Frequently the village will stop migrants who beach seines themselves with no recourse to the authorities. The migrants then continue up the coast until they find a village where they are not chased out. Often this will be an urban area, such as Morombe and Morondave, where they can dissimulate amongst a much larger population and where they often already have family. In some smaller villages in proximity to urban areas, such as Bevato just South of Morombe, the Sara have developed family ties through marriage. Here villagers cannot prevent fishers, who through marriage are now one of them, from earning a livelihood. Overtime, more migrants will come to this village because they now have family there and know that they will not be accepted in others, further ties will be built up through marriage, and the problem becomes intractable.

5.8.5 Strategy for the management of Madagascar's isles

A strategy for the management of Madagascar's isles had been defined in 'Elaboration d'une proposition de stratégie de gestion des îlots de Madagascar', commissioned by the FAO and ONE in 2002.[55] Certain of the policy actions proposed are pertinent to the current migration, these include:

- The classification of an appropriate number of isles for the exclusive use of local, traditional fishing. Through transferring management of the resources to the local communities this would ensure that their traditional rights to them were maintained, would encourage them to adopt sustainable practices and would limit access to external fishers.
- The classification of an appropriate number of isles for the exclusive use of nomadic, traditional fisher; in order that they can continue their way of living. Priority would be given to recognised communities; measures against

[55]'Elaboration d'une proposition de stratégie de gestion des îlots de Madagascar', FAO/ONE /GTR (Groupe de Travail et de Réflexion de la composante Environnement Marin et Côtier de l'ONE), 2002.

the extension of permanent settlements and permanent terrestrial and marine practices would be proposed and negotiated with the fishers concerned.

- A strict regulation regarding the presence of "modern" [artisanal] migratory fishers on the isles and their exploitation of the neighbouring waters, in order to prevent destructive practices and abusive exploitation of commercial resources. [As local fishers sometimes watch helplessly as such fishers pillage their resources it is important that isles classified for traditional migrant fisher be exclusively for traditional fishers.]

It was suggested that a legal instrument, analogous to the "Gelose" law, be used to allow resident and traditionally migrant communities to manage isles of importance to them without living there permanently. This would apply to isles of traditional migrant fishers or isles of socio-cultural importance. Conditions defined in the management transfer contract that the local community would have to meet could include a maximum number of inhabitants, a period when access is closed.

An isle would not be classified as being accessible to migrant fishers if it encompassed exceptional biodiversity that would be endangered by the fishers.

The traditional Vezo migrants are in a precarious position vis-à-vis isles such as those of Belo-sur-mer and Barren Isles. Access to them is crucial given the considerable socio-economic importance of the fisheries they exploit there, as well as the poor state of the natural resources in their places of origin and the Vezo tradition of migrating. But because of this very tradition of semi-nomadism and migration the Vezo have no recognized or formal right to carry on using the isles. This makes them vulnerable to the acquisition of land for hotel developments etc. as well as to the establishment of protected areas. The above propositions would ensure that they are afforded some recognition of their long-term use of an area and that their rights are formalised.

6. Appendices

Appendix 1. Analysis of poverty within Madagascar

Madagascar is the fourth largest island in the world and is 594.180 km² in area. Its coastline of over 5000 km in length is comprised of the most extensive brackish water, shallow marine and continental shelf habitats of any Indian Ocean country apart from India.[56] It has an estimated 2230 km² of shallow reef areas.[57]

The poverty status of Madagascar is examined in some detail here as this is key to understanding much of what drives the migration of traditional fishers in Madagascar. Table 19 presents selected socio-economic indicators indicative of Madagascar's poverty status (The detailed data from which these statistics are drawn are presented in Appendix 6).

Table 19. Selected socio–economic indicators for Madagascar

Total Population ('000)[a]	19 683.4
Population Age ('000)	
0 – 14	8 520.3
15 – 49	9 196.4
50 – 64	1 341.8
> 65	625.0
Population Growth Rate -Total (%)[a]	2.70
Human Development Index rank[b]	143
Adult literacy rate (% aged 15 and above) 1999—2006[b]	70.7
Life expectancy at birth (years) 2006[b]	58.8
GDP per capita (PPP US$)[b]	878
Population below 1.25 US$ a day (%) 2000 – 2006[b]	67.8
Population below national poverty line, 2000 – 2007[b]	71.3
Total number employed in fisheries & aquaculture[c]	83 310
Coral reef area (km2)[d]	2 230

a. "Gender, Poverty and Environmental Indicators on African Countries", Volume IX, 2008, Statistics Department, African Development Bank, http://www.afdb.org
b. "Human Development Indices: A statistical update 2008", The Human Development Report Office (HDRO), UNDP, http://hdr.undp.org

[56] Cooke, A., (2003) Marine & Coastal Ecosystems. *In*: Goodman, S. & Benstead, J. (eds.) Natural History of Madagascar. University of Chicago Press, Chicago. 1760 pp.
[57] Spalding MD, Ravilious C, Green EP. 2001. World atlas of coral reefs. UNEP World Conservation Monitoring Centre, University of California Press, Berkeley, USA (424).

The population of Madagascar in 2007 was estimated as 19.7 million individuals, with a population density of 33.1 persons/km² a high population growth rate of 2.7%.[58] This high population growth rate gives rise to high pressures on natural resources, has significantly reduced both arable land and forest cover, and limits directly the population's access to essential social services, such as education and health. The high population growth rate and weak agricultural productivity mean that hunger, accompanied by malnutrition and illness is a frequent spectre for many of Madagascar's people.

With a GDP per capita of 878 (PPP US$) in 2006, Madagascar is classified by the World Bank as a low income country and poverty is acute - from 2000 to 2007, 71.3% of the population lived beneath the national poverty line.[59]

The population is young and largely rural: 43% are 14 years or younger while 3% are 65 years and over (see Table 20). 78% of the population is rural; 22% urban.[60]

Table 20. A summary of Madagascar's demographics, 2007

Total Population ('000)	19 683.4
Female Population - Total ('000)	9 896.2
Age 0-14	4 250.0
Age 15-49	4 617.6
Age 50-64	689.0 5
Age 65+	339.6
Male Population - Total ('000)	9 787.2
Age 0-14	4 270.3
Age 15-49	4 578.8
Age 50-64	652.7
Age 65+	285.4
Population Growth Rate -Total (%)	2.70
Female	2.7
Male	2.7

Further insights into the dimensions of Madagascar's human development are given by three composite development indices and the underlying indicators used to derive these:

(i) the Human Development Index (Table 22);

[58] "Gender, Poverty and Environmental Indicators on African Countries", Volume IX, 2008, Statistics Department, African Development Bank, http://www.afdb.org

[59] Human Development Indices: A statistical update 2008, http://hdr.undp.org

[60] Rapport national sur le developpement humain, Madagascar 2006, Madagascar RNDH, 2006 http://www.snu.mg/new/sites/pnud/

(ii) the Human Poverty Index (Table 24);

(iii) and the Gender-related Development Index (Table 25).

Human Development Index

Table 22 shows the human development index (HDI) of Madagascar and selected countries of the Western Indian Ocean, as well as the underlying dimensions used to calculate the HDI.

Each year since 1990 the Human Development Report Office has published the HDI, which looks beyond GDP to a broader definition of well-being. The HDI provides a composite measure of three dimensions of human development:

- living a long and healthy life (measured by life expectancy);
- being educated (measured by adult literacy and enrolment at the primary, secondary and tertiary level);
- and having a decent standard of living (measured by purchasing power parity, PPP, income).

The index is not a comprehensive measure of human development. It does not, for example, include important indicators such as gender or income inequality and more difficult to measure indicators like respect for human rights and political freedoms. What it does provide is a broadened prism for viewing human progress and the complex relationship between income and well-being.

The HDI for Madagascar is 0.533, which gives the country a rank of 143rd out of 179 countries with data.[61] Madagascar's HDI is based on the following quantitative measures:

- a life expectancy at birth of the population estimated to be 58.8 years;
- an adult literacy rate of 70.7%;
- a combined gross enrolment education ratio in primary, secondary and tertiary education of 60.0%;
- and a GDP per capita calculated on purchasing power parity of 878 US$.

Madagascar falls into the group of countries having “medium human development” (HDI of 0.500–0.799), as do the Comoros, Kenya and Tanzania. Mozambique has a HDI of 0.366 and is considered to be of “low human development” (HDI of less than 0.500). The Seychelles and Mauritius have “high human development” (HDI of 0.800 or above).

Human development trends

From 2000 to 2006 Madagascar achieved a 6.8% improvement in its HDI, moving from the group of countries of low human development to the lower levels of those of medium human development (Table 21). This progress resulted essentially from progressive improvements in life expectancy and education. In contrast the GDP per capita measured in US$ PPP has still not attained its 2001 level despite overall progress since 2003.

Improvement in Madagascar's HDI flagged in 2002 because of the post-election political crises that engendered a general paralysis in economic activity and the largest annual decrease in revenue since independence (GDP of -

[61]Human Development Indices: A statistical update 2008, http://hdr.undp.org

12.7% for 2002).[62] This translated into high unemployment, 15.8% inflation and a current account deficit of -6.2% for 2002.[63]

For the period of 1993 to 2007 poverty in Madagascar reached its highest in 2002 with 80.7% of the population beneath the national poverty line (86.4% for the rural population; 61.6 for urban).

In light of this and the global economic recession, the potential impacts of Madagascar's 2009 political crises on the country's human development should be borne in mind. Data cited here comes from a period of largely political and macro-economic stability with an average annual growth rate of 4%.

Table 21. Evolution of urban and rural poverty from 1993 to 2007

	1993	1997	1999	2001	2002	2004	2005	2006*	2007*
Urban	50,1	63,2	52,1	44,1	61,6	53,7	52,0	50,3	48,8
Rural	74,5	76,0	76,7	77,1	86,4	77,3	73,5	72,4	71,4
Overall	70,0	73,3	71,3	69,6	80,7	72,1	68,7	67,5	66,4

Source : INSTAT/DSM/EPM 1993, 1997, 1999, 2001, 2002, 2004, 2005; * Simulations

Human Poverty Index

The HDI measures the average progress of a country in human development. The Human Poverty Index for developing countries (HPI-1) focuses on the proportion of people below a threshold level in the same dimensions of human development as the human development index - living a long and healthy life, having access to education, and a decent standard of living. It endeavours to focus more on the disadvantaged within society by looking directly at deprivations in access to resources rather than being based on more monetary measures of poverty. By looking beyond income deprivation, the HPI-1 represents a multi-dimensional alternative to the $1.25 a day (PPP US$) poverty measure. Table 24 shows the values for these variables for Madagascar and compares them to other countries of the Western Indian Ocean.

The HPI-1 value of 36.6% for Madagascar ranks 107th among 135 developing countries for which the index has been calculated. Madagascar's HPI-1 is composed of the following measures of deprivation:

- 24.4% of people are not expected to survive to the age of 40 (a measure of vulnerability to early death, of health deprivation);
- the adult illiteracy rate is 29.4% (a measure of exclusion from education);
- 53% of people do not have access to an improved water source; and 42% of children under age 5 are underweight for their age (the un-weighted average of the latter two figures are a measure of the lack of a decent standard of living).

Madagascar's HPI-1 shows that sub-sets of people, which make up a significant proportion of the population, suffer

[62] Source: INSTAT/DSY, 2003.

[63] Rapport national sur le developpement humain, Madagascar 2006, Madagascar RNDH, 2006. http://www.snu.mg/new/sites/pnud/

some or all of the forms of human deprivation measured in the index. On the other hand Madagascar's HPI-1 rank minus its income poverty rank (as measured by the share of the population living on less than $1.25 a day) is -19 – its HPI-1 is not as lowly ranked as its income poverty. This would indicate that its human poverty is less marked than what would be expected from a monetary-based measure of poverty.

Gender-related Development Index

The HDI measures average achievements in a country, but it does not incorporate the degree of gender imbalance in these achievements. The gender-related development index (GDI), introduced in Human Development Report 1995, measures achievements in the same dimensions using the same indicators as the HDI but captures inequalities in achievement between women and men. It is simply the HDI adjusted downward for gender inequality. If human development is equitably shared amongst men and women the IDH and GDI will be equal; the greater the gender disparity in human development, the lower is a country's GDI relative to its HDI.

Table 25 shows how Madagascar's ratio of GDI to HDI compares to other countries of the Western Indian Ocean, as well as values for the underlying indicators used to calculate the GDI.

A measure of the impact of gender inequalities on human development achievement in Madagascar is gained by comparing Madagascar's GDI (0.530) to its HDI (0.533). Its GDI value is 99.4% of its HDI value. This 0.6% difference, though small, does mean real differences in development for women in terms of access to education and earnings: 2.7% less women enrol in education; their adult literacy rate is 11.2% lower than men's; and their estimated earned income is 70% of that of men's. Out of the 157 countries with both HDI and GDI values, 41 countries have a better ratio than Madagascar's.

Table 22. Human development indexes for 2006 (and their underlying indicators) for Madagascar and selected countries of the Western Indian Ocean

HDI rank		**Human development index** (HDI) value 2006	**Life expectancy at birth** (years) 2006	**Adult literacy rate** (% aged 15 and above) 1999—2006[a]	**Combined gross enrolment ratio in education** (%) 2006	**GDP per capita** (PPP US$) 2006	**Life expectancy index** 2006	**Education index** 2006	**GDP index** 2006	**GDP per capita rank minus HDI rank[b]** 2006
54	Seychelles	0.836	72.0	91.8	82.2	15,105	0.783	0.886	0.837	-5
74	Mauritius	0.802	72.6	87.0	76.9	10,571	0.793	0.836	0.778	-11
137	Comoros	0.572	64.5	74.2	46.4	1,152	0.659	0.649	0.408	18
143	Madagascar	0.533	58.8	70.7	60.0	878	0.564	0.671	0.363	22
144	Kenya	0.532	52.7	73.6	59.6	1,436	0.462	0.690	0.445	6
152	Tanzania	0.503	51.6	72.0	54.3	1,126	0.443	0.661	0.404	5
175	Mozambique	0.366	42.4	43.8	54.8	739	0.291	0.474	0.334	-7
	Developing countries	0.688	66.3	78.8	63.5	4,572	0.689	0.737	0.638	..
	Least developed	0.480	54.9	56.3	48.8	1,125	0.499	0.538	0.404	..
	Sub-Saharan Africa	0.495	49.9	62.1	50.3	1,873	0.414	0.582	0.489	..
	OECD	0.925	78.5	..	89.1	30,879	0.891	0.927	0.957	..
	High human	0.901	76.2	..	87.6	25,100	0.854	0.926	0.922	..
	Medium human	0.690	67.8	80.3	64.1	3,829	0.713	0.749	0.608	..
	Low human	0.444	48.4	55.9	46.5	1,199	0.391	0.527	0.415	..
	World	0.747	68.3	81.0	67.0	9,316	0.722	0.763	0.757	..

a. Data refer to national literacy estimates from censuses or surveys conducted between 1999 and 2006, unless otherwise specified. Due to differences in methodology and timeliness of underlying data, comparisons across countries and over time should be made with caution. For more details, see http://www.uis.unesco.org/.

b. A positive figure indicates that the HDI rank is higher than the GDP per capita (PPP US$) rank, a negative the opposite.

Table 23. Human development index trends of Madagascar and selected countries of the Western Indian Ocean

HDI rank											Progress		
		1980	1985	1990	1995	2000	2003	2004	2005	2006	Long-term (1980-2006)	Medium- (1990-2006)	Short-term (2000-2006)
54	Seychelles	..	..	..	..	0.843	..	..	0.834	0.836	..	..	-0.007
74	Mauritius	0.4	..	0.717	0.734	0.769	0.783	0.788	0.797	0.802	..	0.085	0.034
137	Comoros	0.445	0.460	0.463	0.509	0.525	0.561	0.563	0.568	0.572	0.127	0.109	0.047
143	Madagascar	..	..	..	..	0.498	0.510	0.521	0.528	0.533	..	..	0.034
144	Kenya	..	..	..	..	0.516	0.517	0.522	0.526	0.532	..	..	0.016
152	Tanzania	..	..	0.436	0.420	0.445	0.472	0.481	0.494	0.503	..	0.066	0.058
175	Mozambique	0.281	0.259	0.274	0.307	0.333	0.344	0.356	0.361	0.366	0.085	0.092	0.033

Table 24. Human and income poverty of Madagascar and selected countries of the Western Indian Ocean

HDI rank		Human poverty index (HPI-1)		Probability of not surviving to age 40[a,†] (% of cohort) 2000-2005	Adult illiteracy rate[b,†] 1999-2006	Population not using an improved water source[†] (%) 2006	Children under weight for age [†] (% aged under 5) 2000-2006[c]	Population below income poverty line (%)			HPI-1 rank minus income poverty rank[d]
		Rank	Value (%)					$1.25 a day 2000-2006[c]	$2 a day 2000-2006[c]	National poverty line 2000-2007[c]	
54	Seychelles	..	..	..	8.2	13	6	..	..	..	..
74	Mauritius	45	9.7	5.1	13.0	0	15	..	..	10.6	..
137	Comoros	77	21.2	15.3	25.8	15	25	46.1	65.0	..	-20
143	Madagascar	107	36.6	24.4	29.3	53	42	67.8	89.6	71.3	-19
144	Kenya	91	31.4	35.1	26.4	43	20	19.7	39.9	52.0	17
152	Tanzania	98	32.9	36.2	28.0	45	22	88.5	96.6	35.7	-33
175	Mozambique	127	48.2	45.0	56.2	58	24	74.7	90.0	54.1	-3

[†] Denotes indicators used to calculate the human poverty index (HPI-1).

a. Data refer to the probability at birth of not surviving to age 40, multiplied by 100.

b. Data refer to national illiteracy estimates from censuses or surveys conducted between 1995 and 2005, unless otherwise specified. Due to differences in methodology and timeliness of underlying data, comparisons across countries and over time should be made with caution. For more details, see http://www.uis.unesco.org/.

c. Data refer to the most recent year available during the period specified.

d. Income poverty refers to the share of the population living on less than $1.25 a day. All countries with an income poverty rate of less than 2% were given equal rank. The rankings are based on countries for which data are available for both indicators. A positive figure indicates that the country performs better in income poverty than in human poverty, a negative the opposite.

Table 25. Gender-related development indexes of Madagascar and selected countries of the Western Indian Ocean

HDI rank		**Gender-related development index** (GDI) 2006			**Life expectancy at birth** (years) 2006		**Adult literacy rate**[a] (% aged 15 and above) 1999 – 2006		**Combined gross enrolment ratio in education**[b] (%)2006		**Estimated earned income**[c] (PPP US$) 2006		**HDI rank minus GDI rank**[d]
		Rank	Value	as a% of HDI value	Female	Male	Female	Male	Female	Male	Female	Male	
54	Seychelles	..	..	..	77.5	67.5	92.3	91.4	83.6	80.9	..	..	..
74	Mauritius	66	0.795	99.1	76.0	69.3	84.1	89.9	75.7	78.0	6,228	14,949	0
137	Comoros	119	0.565	98.8	66.7	62.4	68.8	79.6	42.3	50.4	771	1,530	0
143	Madagascar	124	0.530	99.6	60.6	57.1	65.3	76.5	58.7	61.4	723	1,034	1
144	Kenya	123	0.531	99.9	53.7	51.7	70.2	77.7	58.2	61.0	1,295	1,577	3
152	Tanzania	132	0.500	99.4	52.6	50.5	65.2	78.9	53.1	55.4	947	1,307	0
175	Mozambique	152	0.358	97.8	43.1	41.8	32.0	57.0	50.2	59.4	663	819	1

a. Data refer to national literacy estimates from censuses or surveys conducted between 1999 and 2006, unless otherwise specified. Due to differences in methodology and timeliness of underlying data, comparisons across countries and over time should be made with caution. For more details, see http://www.uis.unesco.org/.

b. Data for some countries may refer to national or UNESCO Institute for Statistics estimates. For details, see http://www.uis.unesco.org/.

c. Because of the lack of gender-disaggregated income data, female and male earned income are crudely estimated on the basis of data on the ratio of the female non-agricultural wage to the male non-agricultural wage, the female and male shares of the economically active population, the total female and male population and GDP per capita in PPP US$ (see Technical note 1). The wage ratios used in this calculation are based on data for the most recent year available between 1997 and 2006.

d. The HDI ranks used in this calculation are recalculated for the countries with a GDI value. A positive figure indicates that the GDI rank is higher than the HDI rank, a negative the opposite.

Geographical distribution of poverty

Overall poverty is more prevalent in rural areas, where 78% of the population and 84% of poor people live.[64] In 2005, 71.4% of the rural population were living below the national poverty line, versus 48.8% of the urban population.[65] The depth of poverty – measure by the incremental increase in income of a poor person necessary for him to rise above poverty – is 11.4% greater in rural than in urban areas.

Examination of poverty distribution by coastal region (Table 26) shows a more diverse picture. Rural poverty is particularly acute in those regions of South West and East Madagascar having coastlines, where the percentage of the rural population beneath the poverty line ranges from 75.6% for Anosy to 86.0% for Antsinanana. All of these regions, with the exception of Antsinanana, also have significant urban poverty that often approaches the level of rural poverty. Urban poverty in these areas is 7.4% (Anosy) to 31.9% (Androy) higher than the national average. The Sofia region (on the North coast) has marked urban (64.4%) and rural (80.7%) poverty.

In only four of the twelve coastal regions is rural poverty less acute than the national average: the north eastern region of Diana (55.9%), the north western region of Boeny (59.9%) and the western regions of Melaky (59.9%) and Menabe (60.7%). The levels of urban poverty in Boeny, Diana and Menabe are significantly lower than the nation average.

As detailed data for Madagascar's coastal populations are not available, this analysis uses data for those regions with a coastline as a surrogate. This is only an approximation to the conditions of coastal people as the data are also of inland populations.

Table 26. Geographical distribution of poverty by region and setting in 2005

Region	Urban	Rural	Overall
Analamanga	34,3	46,0	40,7
Vakinankaratra	46,8	73,9	68,9
Itasy	47,6	69,5	66,8
Bongolava	49,2	63,3	60,5
Mahatsiatra Ambony	63,9	72,5	71,1
Amoron'i Mania	72,5	76,2	75,7
Vatovavy Fitovinany †	70,3	81,8	80,1
Ihorombe	73,3	79,0	76,8
Atsimo Atsinanana†	67,2	83,2	80,9
Atsinanana †	44,6	86,0	76,6

[64] The definition of poverty used in this section is based on consumption data (INSTAT, 2001). Madagascar's poverty level was evaluated to be 197.720 Ariary a person a year (equivalent to 0.42 US$ a day) to prices of the capital. A person is defined as poor if they do not have the means to buy the basic food requirements that are essential to leading an active life.

[65] Source: INSTAT/DSM/EPM 2005

Region	Urban	Rural	Overall
Analanjirofo†	70,3	78,9	77,7
Alaotra Mangoro	56,8	55,9	56,0
Boeny †	20,1	59,9	45,3
Sofia†	64,0	80,7	79,3
Betsiboka	53,0	71,7	66,4
Melaky †	56,7	59,9	58,4
Atsimo Andrefana †	58,7	76,4	73,0
Androy †	80,7	81,8	81,6
Anosy †	56,2	75,6	72,0
Menabe†	39,1	60,7	56,4
DIANA †	19,1	55,9	46,1
SAVA†	50,3	72,8	70,7
Overall	**48,8**	**71,4**	**66,4**

† Denotes a coastal region

Source : INSTAT/DSM/EPM 2005

The distribution of rural, coastal poverty is approximately mirrored by the geographical distribution of Madagascar's population, with those regions less marked by poverty being less densely populated. Diana, Melaky and Menabe are amongst the least densely populated regions of Madagascar, each holding 1 - 2.3% of the population. Antsinanana and Vatovavy Fitovinany are amongst the most densely populated, each holing 6.5 – 14.5% of the population. Sofia, Atsimo Andrefana and Atsimo Antsinanana each hold 5.3 – 6.5%.

Relative to Madagascar's overall IDH of 0.527, there are strong disparities in human development between faritany which bear witness to this pattern.

Table 27. Human Development and Gender-related Development Indices by faritany

Faritany	HDI	GDI
Antananarivo	0.579	0.579
Antsiranana†	0.521	0.518
Mahajanga†	0.460	0.459
Toamasina†	0.455	0.448

Faritany	HDI	GDI
Fianarantsoa	0.416	0.413
Tulear†	0.399	0.395
Overall	**0.527**	**0.524**

† Faritany with a coastline

Three of the four coastal Faritany - Toamasina, Mahajanga and Tulear - have IDHs significantly lower than the national average. This reflects weak performance in all three dimensions of human development - health, education and income. Tulear is particularly penalised by inadequate education and low income; it has the countries lowest performance in human development. Madagascar's Human Development Report 2006 considers the populations of these faritany to be "vulnerable". The IDH of Antsiranana's IDH of 0.521 approaches the 2005 national average of 0.527 thanks to substantial improvement in education, with a combined gross enrolment ratio in education of 79%.

The faritany with low HDIs also show the largest disparities between the GDI and HDI, with inequalities in gender showing the largest impact on human development in Tulear and Toamasina.

Of the 14 different socio-professional categories Madagascar's Human Development report uses to class the household heads, fishers have the second lowest level of spending on education. They spend 14 US$ - less than half of the national average of 34 US$.

Infrastructure

Many Malagasy do not have access to basic infrastructure essential to human development:

- 53% of the population do not use an "improved water source" (household connections, public standpipes, boreholes, protected dug wells, protected springs and rainwater collection).
- 67% of urban households do not have running water in the interior of their homes nor in their immediate neighbourhoods; in rural areas 93% of households do not have this.
- Equally the majority of people do not have access to adequate sanitation: 24% of the population do not have access to toilets; this rate increases to 30% in rural areas.
- 5% of poor people do not have access to electricity; only 14% of the population is connected to the electrical grid, a rate that descends to 5% of the population in rural areas.

Food security

Food insecurity is widespread in Madagascar: 42% of children[66] and 38% of the population are malnourished; the per capita calorie supply was 2070 in 2004. According to the 2001 Communal Census, 8% of the population are

[66] A child is said to be malnourished if his weight is less than two standard deviations below the median of his age group.

chronically malnourished and half of the population, approximately 10 million people, experience temporary or seasonal food insecurity due to natural catastrophes (cyclones and drought).

Food insecurity and consequently poverty both increase in Madagascar during January and February – a lean season when the price movements of up to 50% in the dominant rice crop force a substantial decrease in food consumption.[67] Dostie *et al.* (2002) estimated that this seasonal fluctuation in food consumption pulls a further one million people beneath the poverty line;[68] there they join nine million people who are chronically under-nourished throughout the year. These people consume less than 2133 calories per day, the minimum considered necessary to support a productive and normal life.

The period of food shortage coincides with the rainy season, which itself brings increased prevalence of diarrhoea and other diseases, such as malaria. As such the lean season exacerbates the health deprivation of the poor, increasing malnutrition and as much as tripling child mortality. Given that the amplitude of rural food price movements are three times larger than urban and the higher prevalence of disease in rural areas, Dostie *et al.* (2002) anticipate that the lean season is even more dangerous for the rural poor.

In fishing communities frequent bad weather during the rainy season prevents normal fishing and would further aggravate the vulnerability of fishers during the lean season. Fishers say that this is the most difficult period of the year for them – the "dead period" in Vezo.

[67] "Seasonal poverty in Madagascar: magnitude and solutions", Dostie, S. Haggblade, J. Randriamamonjy. Food Policy 27 (2002) 493–518.
[68] Defined as those whose level of expenditure does not enable them to buy of 2100 calories per person

Population, gender, poverty and environmental indicators of Madagascar since 1970

Table 28. Population and gender indicators of Madagascar since 1970 [69]

Gender	1970	1975	1980	1985	1990	1995	2000	2003	2004	2005	2006	2007
Total Population ('000)	6 930.0	7 905.6	9 059.3	10 438.9	12 033.3	13 947.1	16 186.7	17 635.6	18 134.7	18 642.6	19 159.0	19 683.4
Female Population - Total ('000)	3 492.7	3 981.5	4 559.2	5 250.5	6 049.8	7 011.4	8 138.4	8 866.9	9 117.8	9 373.0	9 632.6	9 896.2
Age 0-14	1 553.8	1 773.9	2 038.2	2 345.7	2 700.3	3 122.2	3 609.8	3 894.4	3 985.9	4 075.7	4 163.9	4 250.0
Age 15-49	1 563.1	1 781.7	2 036.8	2 351.6	2 721.3	3 174.1	3 714.2	4 075.6	4 203.8	4 336.9	4 474.8	4 617.6
Age 50-64	265.0	297.7	336.2	381.7	430.8	485.5	543.1	598.0	619.5	641.9	665.0	689.0 5
Age 65+	110.7	128.2	148.1	171.4	197.4	229.6	271.3	299.0	308.7	318.6	328.9	339.6
Male Population - Total ('000)	3 437.3	3 924.2	4 500.0	5 188.5	5 983.5	6 935.7	8 048.3	8 768.7	9 016.9	9 269.5	9 526.4	9 787.2
Age 0-14	1 565.7	1 783.0	2 046.3	2 355.1	2 712.2	3 133.5	3 618.8	3 905.9	3 999.1	4 091.0	4 181.5	4 270.3
Age 15-49	1 531.4	1 755.2	2 015.7	2 335.1	2 707.3	3 161.5	3 698.7	4 051.8	4 176.4	4 305.7	4 439.9	4 578.8
Age 50-64	247.0	277.8	312.3	352.6	396.7	447	502.5	559.5	581.9	604.9	628.5	652.7
Age 65+	93.2	108.2	125.7	145.6	167.3	193.7	228.4	251.5	259.6	267.9	276.5	285.4
Population Growth Rate -Total (%)	2.60	2.66	2.77	2.84	2.88	2.99	2.93	2.82	2.79	2.76	2.73	2.70
Female	2.57	2.65	2.76	2.83	2.88	2.99	2.94	2.82	2.79	2.76	2.73	2.7

[69] Source: "Gender, Poverty and Environmental Indicators on African Countries", Volume IX, 2008, Statistics Department, African Development Bank, http://www.afdb.org

Gender	1970	1975	1980	1985	1990	1995	2000	2003	2004	2005	2006	2007
Male	2.63	2.68	2.79	2.85	2.89	2.98	2.93	2.82	2.79	2.76	2.73	2.7
Rate of Natural Increase (%)	2.65	2.75	2.82	2.85	2.92	2.97	2.89	2.79	2.76	2.73	2.70	2.7
Sex Ratio (per 100 females)	98.4	98.6	98.7	98.8	98.9	98.9	98.9	98.9	98.9	98.9	98.9	98.9
Dependency Ratio - Total (%)	92.2	92.2	92.7	92.6	92.3	91.9	91.4	89.7	89.1	88.5	87.5	86.6
Age 0-14	86.5	86.5	86.9	86.7	86.5	86.1	85.5	84.0	83.3	82.6	81.8	80.9
Age 65+	5.7	5.7	5.8	5.8	5.8	5.8	5.9	5.6	5.7	5.9	5.8	5.7
Singulate Mean Age at Marriage (years)	...	...	...	...	...	...	...	...	...	...	...	...
Female (years)	...	...	...	...	...	...	...	...	...	...	...	...
Male (years)	...	...	...	...	...	...	...	...	...	...	...	...
Contraceptive Prevalence Rate (%)	...	...	...	...	...	...	18.8	...	21.6	...	...	...
Total Fertility Rate (per woman)	6.7	6.6	6.5	6.3	6.2	5.9	5.5	5.2	5.1	5.0	4.9	4.8
Maternal Mortality Rate (per 100,000)	...	...	300.0	...	507.0	...	550.0	...	469.0	...	...	...
Infant Mortality Rate (per 1,000)	136.8	126.2	115.4	110.3	101.3	89.0	78.7	73.0	71.1	69.2	67.4	65.5
Female (per 1,000)	125.8	119.9	105.7	98.2	84.6	68.3	57.3	51.4	49.4	47.5	45.6	43.6
Male (per 1,000)	147.9	132.6	125.1	122.4	118.1	109.7	100.2	94.6	92.8	91.0	89.2	87.4
Life Expectancy at Birth - Total (years)	44.1	46.1	48.1	49.2	51.1	53.9	56.4	57.7	58.1	58.6	59.0	59.4
Female (years)	44.9	47.1	49.2	50.3	52.3	55.3	57.9	59.4	59.8	60.3	60.8	61.3
Male (years)	43.3	45.1	47.2	48.2	49.9	52.5	54.8	56.1	56.5	56.9	57.3	57.7

Gender	1970	1975	1980	1985	1990	1995	2000	2003	2004	2005	2006	2007
Gender Ratio F/M	1.04	1.04	1.04	1.04	1.05	1.05	1.06	1.06	1.06	1.06	1.06	1.06
Average Size of Households-Overall	...	...	...	...	...	...	...	...	...	...	...	...
Urban	...	...	...	...	...	...	...	...	...	...	...	...
Rural	...	...	...	...	...	...	...	...	...	...	...	...
Households Headed by Women - Total (%)	...	...	...	...	...	...	...	...	...	...	...	...
Urban (%)	...	...	...	...	...	...	...	...	...	...	...	...
Rural (%)	...	...	...	...	...	...	...	...	...	...	...	...
Adult Illiteracy Rate - Total (%)	61.5	57.0	52.5	47.2	42.0	37.7	33.5	31.1	30.3	29.5	29.3	27.8
Female (%)	71.8	66.7	61.5	55.9	50.2	45.2	40.3	37.4	36.5	35.5	34.7	33.5
Male (%)	50.7	46.7	42.8	38.2	33.6	29.9	26.4	24.5	23.9	23.3	23.5	22.0
Primary School Enrolment Ratio (Gross) (%)	81.3	91.8	130.2	116.6	102.9	91.6	99.1	116.9	133.8	139.1	139.5	...
Female (%)	75.0	79.7	129.0	113.2	103.1	91.4	97.2	114.5	131.0	136.1	136.8	...
Male (%)	87.7	111.0	131.3	119.8	103.0	92.0	101.0	119.3	136.6	142.1	142.2	...
Secondary School Enrolment Ratio (Gross) (%)	10.3	13.1	27.7	25.8	18.0	15.6	...	...	...	...	23.8	...
Female (%)	8.2	10.9	22.9	23.6	16.3	12.9	...	...	...	...	...	...
Male (%)	12.4	15.3	32.6	28.0	16.8	13.0	...	...	...	...	24.4	...
School Life Expectancy - Total (%)	...	...	...	...	...	...	...	...	...	...	...	...
Female (%)	...	...	...	...	...	...	...	...	...	...	...	...

Gender	1970	1975	1980	1985	1990	1995	2000	2003	2004	2005	2006	2007
Male (%)	...	...	...	...	...	...	...	...	...	...	...	...
Primary School Enrolment Ratio (Net) (%)	...	...	...	...	...	60.6	64.6	76.8	89.0	92.9	95.9	...
Female (%)	...	...	...	...	...	61.7	64.9	77.0	88.9	92.8	96.0	...
Female School Teachers - Primary (%)	28.5	...	45.0	45.0	53.0	51.4	60.7	59.6	59.6	60.2	...	...
Secondary (%)	...	...	...	...	...	0.9	...	...	...	...	...	...
Economically active population ('000)	3 481.0	3 939.0	4 477.0	5 113.0	5 843.0	6 714.0	7 738.0	8 468.0	8 717.0	8 971.0	...	...
Female (as % of total)	45.2	45.0	44.8	44.8	44.8	44.7	44.6	44.7	44.6	44.6	...	...
Econ. active pop. in agric. (as % of Total)	84.2	82.9	81.6	79.8	78.1	76.3	74.2	72.9	72.5	72.0	...	...
Female (%)	43.1	42.3	41.5	40.5	39.5	38.4	37.1	36.3	36.0	35.7	...	...
Male (%)	41.1	40.6	40.0	39.3	38.7	37.9	37.1	36.7	36.5	36.3	...	...

Table 29. Poverty indicators of Madagascar since 1970

Poverty	1970-74	1975-79	1980-84	1985-89	1990-94	1995	2000	2003	2004	2005	2006	2007
GNI Per Capita (US$)	250	380	310	220	230	230	240	280	290	290	280	...
Public Expenditure - on Health (as% of GDP)	...	...	...	...	5.0	4.3	2.8	...	...	...	...	...
on Education (as% of GNI)	...	...	3.1	1.7	2.2	...	3.2	1.7	3.4	...	...	...
Human Development Index Value (0 to 1)	0.291	0.404	0.440	0.438	0.396	0.459	0.482	0.499	0.509	0.533	...	...
Rank (out of 174)	...	...	...	...	...	...	147	146	143	143	...	...
Human Poverty Index (HPI-1) Value (%)	...	...	...	...	...	47.7	36.7	35.3	36.3	35.8	...	...
Population Below National Poverty Line (%)	...	...	...	...	70.0	...	...	...	...	...	...	...
Below Inter. Poverty Line ($2 /day) (%)	...	...	...	...	...	...	...	...	...	...	...	...
Household Income Spent on Food (%)	...	...	...	...	...	...	...	...	...	...	...	...
Share of Income Held by Richest 10%	...	...	...	...	36.7	...	...	...	...	...	...	...
Share of Income Held by Poorest 10%	...	...	...	...	1.9	...	...	...	...	...	...	...
Share of Agriculture in Total GDP (%)	...	...	35.3	32.9	39.0	32.8	29.3	29.2	28.8	28.3	27.5	27.0
Growth of Value Added in Agriculture (%)	...	...	3.1	5.2	3.2	1.9	1.0	1.3	3.1	2.5	2.1	4.0
Access to Health Care (%)	...	...	...	65.0	...	...	38.0	...	...	...	...	...
Physician per 100,000 People	9.7	9.6	9.9	10.1	11.6	25.9	...	...	28.7	...	...	...

Poverty	1970-74	1975-79	1980-84	1985-89	1990-94	1995	2000	2003	2004	2005	2006	2007
Nurse per 100,000 People	402.2	...	55.8	...	26.0	...	...	...	31.2	...	...	...
Hospital Beds per 100,000 People	279.1	243.1	...	...	87.0	...	...	...	...	...	...	...
Food Aid in Cereals ('000 MT)	...	...	...	...	...	...	...	...	...	...	...	...
Daily per Capita Calorie Supply	2 465.7	2 354.2	2 319.0	2 129.8	1 988	2 020.2	2 131.8	2 054.0	2 070.0	...	...	...
Daily per Capita Protein Supply (grams)	59.1	56.9	54.8	50.8	46.8	47.6	48.7	46.6	...	...	...	...
Daily per Capita Fat Supply (grams)	32.0	34.6	32.6	31.0	29.0	30.4	32.1	29.6	...	...	...	...
Incidence of Tuberculosis (per 100000 inhab.)	...	...	...	...	194.5	197.8	215.1	226.2	230.0	233.9	...	...
Prevalence of undernourishment (% of pop.)	17.0	...	20.0	...	35.0	...	...	38.0	38.0	...	...	...
Underweight Children Under Age 5 (%)	...	...	33.3	...	45.2	34.1	33.1	37.0	41.9	...	...	...
Low Birthweight Babies (% of births)	...	...	11.0	10.0	15.0	...	...	...	...	...	...	...
Under Five Mortality Rate (per 1,000)	...	...	...	...	163.5	156.3	130.6	119.8	116.4	113.0	109.6	106.2
Crude Birth Rate (per 1,000)	46.4	45.7	45.0	44.4	43.2	42.9	40.5	38.7	38.1	37.5	36.9	36.4
Crude Death Rate (per 1,000)	19.1	17.5	16.5	15.5	13.6	13.2	11.6	10.7	10.5	10.2	10.0	9.7

Table 30. Environmental indicators of Madagascar since 1970

Environment	1970-74	1975-79	1980-84	1985-89	1990-94	1995	2000	2003	2004	2005	2006	2007
Land Area ('000 ha)	...	...	58 154.0	58 154.0	58 154	58 154	58 154	58 154	58 154	58 154	...	...
Arable Land (as% of land area)	...	...	4.51	4.66	4.99	4.99	4.99	5.07	5.07	5.07	...	...
Permanent Crops Use (as% land area)	...	...	0.93	1.01	1.00	1.00	1.03	1.03	1.03	1.03	...	...
Irrigated Land (% of land area)	...	...	1.36	1.72	1.87	1.87	1.87	1.87	1.87	1.87	...	...
Permanent Pasture Use (as% of land area)	...	...	...	...	...	...	...	...	...	...	...	...
Other Land Use (as% of land area)	...	...	...	...	14.19	14.30	7.96	7.56	7.63	7.69	...	...
Total Forest Area ('000 ha)	...	...	...	...	13 424.4	13 357.5	13 023.1	12 911.9	12 874.9	12 837.8	...	...
Annual Rate of Deforestation (%)	...	...	...	...	...	...	1.0	...	...	...	...	...
Annual Rate of Reforestation (%)	...	...	...	...	...	...	...	...	...	...	...	...
Natural Forest Cover ('000 ha)	...	...	...	...	...	...	...	...	...	...	...	...
Nationally Protected Areas ('000 Km2)	...	...	...	...	...	...	...	...	...	...	...	...
Access to Safe Water (% of total population)	11.0	25.0	...	31.4	29.0	...	47.0	...	50.0	...	...	...
% Rural	1.0	14.0	...	17.2	10.0	...	31.0	...	35.0	...	...	...
% Urban	...	76.0	...	81.4	83.0	...	85.0	...	77.0	...	...	...
Access to Sanitation (% of population)	...	...	...	...	15.0	...	42.0	...	34.0	...	...	...
% Urban	...	...	...	12.1	50.0	12.0	...	...	...	...	...	...
Energy Consumption per Capita	...	...	...	...	...	...	...	...	...	...	...	...

Environment	1970-74	1975-79	1980-84	1985-89	1990-94	1995	2000	2003	2004	2005	2006	2007
('000 MT)												
Emissions of Organic Water Pollutants (kg/day)	...	...	...	...	...	...	...	...	...	...	...	...
Charcoal Production ('000 MT)	...	...	162.9	322.5	509.0	562.0	645.0	833.5	871.9	910.4	...	...
Fuelwood Production (Coniferous) ('000 m3)	...	...	...	...	...	...	...	...	...	...	...	...
(Non-coniferous) ('000 m3)	...	...	4 834.7	6 259.1	8 900	9 321	9 637.5	10 485.7	10 769.9	11 054.7	...	...
Traditional Fuel Use (% total energy use)	...	...	...	...	...	...	...	...	...	...	...	...
CO2 Emissions - Total ('000 MT)	...	...	1 163.3	984.1	1 233	1 275.9	1 795.4	2 358.6	2 602.7	2 544.2	...	...
Per Capita (MT)	...	...	0.11	0.08	0.09	0.09	0.11	0.13	0.14	0.14	...	...
Kg per 2000 $ of GDP	...	...	0.41	0.31	0.39	0.40	0.46	0.60	0.63	0.59	...	...
Electricity Production (Billion kwh)	...	...	0.48	0.54	0.58	0.61	0.78	0.89	0.97	1.05	...	...
Annual Freshwater Withdrawals (m3)	...	...	...	16.3	...	...	...	...	...	...	...	...
Per Capita Cubic Meters (Internal)	...	...	35 228.9	30 639.1	26 640.3	...	...	...	...	...	...	18 306.3
Annual Internal Renew. Water Resources (m3)	...	...	337.0	337.0	337.0	...	...	...	...	...	...	337.0

Table 31. Average salary, unemployment and under-employment by region in 2005

Region	Average annual salary (Ariary)	Unemploy-ment	Under-employment related to the duration of work	Inadequate employment
Analamanga	1 319 000	5,1	20,6	27,2
Vakinankaratra	621 000	2,0	44,8	61,8
Itasy	581 000	0,9	34,3	60,8
Bongolava	580 000	3,2	28,1	55,8
Mahatsiatra Ambony	964 000	2,5	21,5	38,5
Amoron'i Mania	398 000	3,4	17,3	84,0
Vatovavy Fitovinany	779 000	1,7	30,9	53,3
Ihorombe	1 085 000	2,0	27,9	28,8
Atsimo Atsinanana	602 000	3,8	32,7	60,3
Atsinanana	1 336 000	3,4	28,0	25,5
Analanjirofo	941 000	2,2	28,7	39,6
Alaotra Mangoro	664 000	2,7	25,9	51,0
Boeni	1 181 000	5,3	17,8	26,5
Sofia	1 031 000	1,1	4,0	30,6
Betsiboka	884 000	1,0	16,7	52,2
Melaky	945 000	1,9	17,7	52,2
Atsimo Andrefana	719 000	1,8	28,9	58,2
Androy	1 005 000	0,9	30,0	40,9
Anosy	901 000	3,6	25,9	53,6
Menabe	1 113 000	3,3	23,0	44,8
DIANA	1 097 000	7,6	16,0	23,1
SAVA	1 310 000	1,4	24,4	22,4
Overall	**991 000**	**2,8**	**25,2**	**42,5**

Source : INSTAT/DSM/EPM 2005

Appendix 2. Summaries of Key Informant Interviews

Chronology of fisher migration to Andriamitaroke, Nosy Be and Andravoho

Table 32. Approximate chronology of fisher migration to Andriamitaroke, Nosy Be and Andravoho drawn from KI interviews

Year	Event	Interview
	Vezo from the Befandefa have always migrated North since anyone can remember; though some came back, they would often stay	34
	All the Vezo villages in the Belo-sur-mer region were founded by migrants who came from the South; from Manombe	52, 57
1940's	Sara from St. Augustin, Anakao and Tulear migrated up the entire West coast to fish large pelagic fish far offshore, on the most westerly reefs on the NW part of the coast	3, 34
	Some Vezo from the Befandefa area accompanied them; but most Vezo did not migrate long distances	34
1940's	The Vezo would migrate to new fishing sites on the mainland; they would not go to the islands because all of them, including Andriamitaroke, were *faly*; boutres would sometimes anchor close to the islands to take shelter in storms, but no one would go onto the islands	17
	Fishers from villages of Befandefa commune – Ampasilava, Andavadoaka, Lamboara, Bevato, Belavenoke and Tampolove – and villages further South, such as Tsifota and Fianamarasay, used to go up the Mangoky to cut *farafatse* and make pirogues; they would also stop at Ambohibe (before Morombe was founded) or Andranopasy to buy provisions	1
	these trips would take them one to four months and they would fish along the way just for subsistence	1
	Fishers from Fianamaharasay would go to Ankoba to cut *farafatse* for their pirogues; Fianamaharasay, Ambatamilo, Bevohitse, Ampasilava and Andavadoaka are villages from which fishers traditionally migrated North until the Barren islands	34
1970's	The islands, particularly Andrevoho, had huge nesting seabird populations; clouds of birds with no where to walk on the island	53
1970's	Surveys of the islands of Belo-sur-Mer carried out in the late 1970s reported that the largest island of Nosy Andriamitoraka was rarely visited by Vezo fishers	
	Since this is the southernmost island in the Belo-sur-Mer region, and so the most accessible to migrant Vezo fishers originating from the southwest of Madagascar, it is likely that the recorded scarcity of fishers at Nosy Andriamitoraka was true of the other Belo and Barren islands at this time	
1983	Fishers from the South camped two or three nights on the islands before returning to Belo-sur-mer	20
	Migrants encountered no problems with the residents of Belo-sur-mer; migrants presented their passports in Belo-sur-mer and performed fomba with the local spiritual leaders before going onto the islands	20

Year	Event	Interview
Pre-1990's	Vezo migrants would not stay on Nosy Be or Andrevoho as these islands were *faly*	16
1990	At the beginning of the 1990's Asian demand for shark fin and trepang increased in Madagascar; the increased prices marked the beginning of the Vezo migrating in large numbers	1, 4, 5, 7, 16
1990	At the beginning of the 1990's the principal goal of seasonal migrant fishers from Befandefa changed from mounting the Mangoky to cut *farafatse* (Givotia Madagascarensis) for making pirogues to one of fishing In particular they would fish near Nosy Andriamitaroke, which the residents of Andranopasy did not fish; the migrants fished all species but particularly sea cucumbers Fishers from Andavadoaka, Lamboara, Tampolove, Bevohitse and Ambatamilo would stay on the island from May until October / November They would sell dried fish, octopus, sea shells and trepang to buyers in Morondave and Morombe or to a buyer who visited the island At this time fishing nets became more available to the Vezo of Befandefa; more fish-buyers (particularly Betsileo) became active in the area	1
1990	In the early 1990's these same fishers begin going further North for the good shark and sea cucumber fishing around the islands offshore of Belo-sur-mer and Maintirano	1, 34
1990	*Jarifa* shark nets became available and Asian trepang and shark fin buyers / demand became present	1, 3, 4, 5, 7, 34
1990	Whereas traditionally the principal Vezo migration was northwards, with increasing demand for shark fins fishermen also started migrating South in larger numbers	3, 7
1990's	Vezo fishermen migrated South until Fort Dauphin, not only for shark fishing, but also to dive for lobster; the latter activity created some conflict with local fishermen	3, 7
1990	In the early 1990's a scuba dive team harvesting sea cucumbers lived on Nosy Be	58
1990 – 1991	Most migrants from Morombe and Befandefa did not go further North than Andriamitaroke, where they fished mostly shark fins and sea cucumber, but also for fish, lobster and octopus; However, in the early 1990's more began working there way northwards	1
1992	fishers harvest sea cucumbers on foot on the reef flats of Nosy Be and Andrevoho; migrants live on the islands for 2 weeks at a time	16
1993	The scuba team of Sidony lived on the Belo-sur-mer islands to collect sea cucumbers	53
1993 – 1994	Fishers from Morombe and the villages of Befandefa started fishing near Nosy Be (Belo-sur-mer) for shark and sea cucumber and lived on the islands	1, 18
1994 –	Increasing numbers of migrants from Morombe and the villages of Befandefa started to go to Andravoho and Nosy Be for shark and sea cucumber	

Year	Event	Interview
1995		
1995	A marked decrease in shark and sea cucumber fishing in the Befandefa area means that more migrants start going North, until the Barren islands, to find new fishing grounds	
1995	In the mid-1990's migrants from Morombe and the villages of Befandefa travelled North until Morondave, but this was not a favoured destination because the fishing sites are far from the town	1
1996 - 1997	South African trawler anchors off the islands to harvest sea cucumbers and collect palisandre from the Kirindy-Mitea, as well as transporting zebu to Durban; they donate school and medical supplies to Belo-sur-mer and so their activities are locally accepted	60, 38
1996	The prices of shark fin and sea cucumbers increased at the same time - a large impetus to migrate North and the beginning of large numbers moving	16, 18
1997	Prior to 1997 there was very good shark fishing in the Befandefa area; by this year fishers saw it was fished-out; fishermen from Ambatamilo, Bevohotse, Salary and Andavadoaka – villages with a tradition of shark fishing with *jarifa* – migrated North	16
1998	Around about 1997 / 98 increasing numbers of migrants from Morombe and Befandefa started to go to the Barren islands	1, 34
2000's	The number of migrants arriving on the islands began to decrease as the sea cucumber and shark catches had diminished; many migrants continued North rather than staying on the Belo-sur-mer islands	53
2004 – 2006	There were large numbers of migrants on the Belo-sur-mer islands; before there had never been this many	52, 54
2005 / 2006	Both shark and sea cucumber fishing around Belo-sur-mer and the islands diminishes markedly	1, 16
2007 / 2008	Migrants from Morombe and Befandefa start going to mainland villages North of Morondave (Mozambique, Benjavily, Bemakoba), which are reputed to have good shark fishing	1
2008	Increasing numbers of migrants from Morombe and the villages of Befandefa go to Andravoho and Nosy Be	1

Chronology of fisher migration to the Barren islands

Table 33. Approximate chronology of fisher migration to the Barren islands drawn from KI interviews

Year	Event	Interview
1940's	Sara from St. Augustin used to migrate up the entire West coast to fish big pelagics far from the coast, on the most westerly reefs on the NW of this coast	3, 34
	Some Vezo from the Befandefa area accompanied them; but most Vezo did not migrate long distances	3
1960 / 1961	Several families left Anakao in search of new fishing grounds; they stopped over in Belo-sur-mer and Morondave, continuing until Maintirano	22, 24, 29
	Some families also passed by Morombe, where they had family from Anakao staying at Mjinorano	29,
1961	One group of Sara migrants from Anakao spent 3 months in Saohany, just North of present-day Mozambique, before continuing to Nosy Lava	29,
1960's	One group of Sara migrants spent five years living permanently on Nosy Lava, before building homes in Maintirano	29, 36, 37
1960's	Sara fished in the islands; also guided residents of Maintirano out to the islands, where they would fish for 2/3 days before returning	20,22
	Sara lived on the islands (Nosy Lava, Nosy Drano, Mboro, Maroantaly, Dondozy, Abohazo) from April / May until the end of November, they would then return to Maintirano where they had homes	22, 36
	The Sara would go to Mahajunga once or twice a year just to sell their catch	22
	Certain families who migrated from Anakao lived permanently on Nosy Lava at this time; they were the only habitants of the islands	29, 36
	The death of a child on Nosy Lava made this Sara family go to Maintirano to bury the child; the residents of Maintirano welcomed them and gave them a parcel of land to settle on	29,
	The Vezo Sakalava residents went to the islands to hunt turtles; but infrequently and they never stayed there:	36, 37
	there were many *faly* on the islands;	
	and the Vezo Sakalavas' pirogues were crudely made	
	The Sara showed them how to make more seaworthy pirogues	
1966	One group of Sara fished around the islands, camping during a week then returning to Maintirano	22, 23
1968	Though the Sara had been well received by the residents conflict existed:	38
	the Sara were good divers and had nets, so they captured far more than the resident Vezo Sakalava;	
	the residents did not want the Sara to settle on the islands because these have many *faly*	

Year	Event	Interview
1960's /70's	French built a water reservoir on Nosy Lava; there is also an old airstrip on the island that was built in the 60's or 70's	32
1984	Residents of Maintirano did not come out to the islands; the Sara, originally from Anakao but now residents, encouraged the residents of Maintirano to fish in the islands	20
1984	There were already migrant Vezo from the South camping on the Barren islands	20
1984	Fishers from the South (Andavadoaka, Antsatsamoroy, Belavenke, Bevohitse) camped on the islands (Nosy Lava, Nosy Mangily); fishers from Maintirano already on Nosy Lava	20, 24
1985	Before the mid-1980's the resident Sara did not see migrants from the South on the islands	23
1986	Fishers from Andavadoaka and Antsatsamoroy lived on Nosy Abohazo, Nosy Dondozy and Nosy Mboro	
1986	Sara began to live seasonally on Maroantaly, from March to November; the reason for this was that, though the fishing was good, they were no longer able to catch enough during a short period to justify the return trip to Maintirano	22, 23
1988	Migrants from the South were already fishing shark and sea cucumbers in the Maintirano region, though they outnumbered by the resident fishers	33
1990's	Guano exploited on the isles by a South African based in Morondave	
1990 – 1992	Fishers from Befandefa villages and Morombe begin to come in larger numbers to the islands	20, 25, 30, 36
1994 - 1997	Vezo Sakalava from Morondave migrated North to mainland villages as shrimp trawling in their home grounds diminished the fishing resources accessible to them	4
1996	Shark fin and sea cucumber buyers note a definite increase in the number of migrants from the South	33
1997	Fishers from Befandefa (mostly Bevato) and Maintirano (Sara of Anakao) settled on Nosy Lava, Anbohazo, Dondosy, Maroantaly, Nosy Mboro	19, 20, 24, 27
1998	The period when migrants from the South started to live on the islands in significant numbers; there numbers have increased continuously every year since, with the most arriving in 2008	22, 24
1998	Before 1998 there had been migrant fishers from the South on the islands, but in 1998 they started to become numerous	1,18, 23, 24

Year	Event	Interview
	No conflict existed between migrants and residents; they were welcomed by the residents	24, 25, 29
2000	Migrants from the South arrived in larger and larger numbers	24, 25
2000	*ZDZD* kirara technique was introduced to Maintirano fishermen, particularly the Sara	37, 38
2000 – 2002	A sea cucumber scuba dive team from Nosy Be lived on Nosy Mboro and caused a lot of damage. Before this the *faly* of not frequenting the high part of the island had been respected and there had been a large seabird nesting colony on the islands	31,
	During this era there were up to 150 divers working for scuba teams in Maintirano / the Barren islands; this stopped when Ravalomanana came into power	32, 33
2001	Fishers from Maintirano settled on Nosy Mangily	19
2001	Fishers from Belavenoke settled on Nosy Drano	19
2002	There were already migrants from the South living on Nosy Vao, 120 km North of Maintirano	26
2003	A large family from Andavadoaka settled on Nosy Mangily and have lived there seasonally ever since	19,
2003	Fishers from Befandefa (Andavadoaka, Tampolove) and Morombe settled on Mananja and Marife	19,
2003 – 2004	A number of families, who were resident in Maintirano, started living on Maroantaly during the fishing season; they previously did not do this but with acquisition of *ZDZD* kirara they started living on the islands	37
2006	Migrant fishers settled on all of the islands and became much larger in number	19,
	In 2005 there were not that many migrants; the turning point was 2006	19, 22, 28, 33
	Conflicts with the migrants began at this time	28, 29, 30, 31
2007	A local law forbids fishers to camp on Nosy Mboro; it is not really enforced but is generally respected	
2007 - 2008	In 2007 and 2008 the largest number of migrants from the South arrived	20, 22, 24, 25, 26
	There had not been serious conflict between residents and migrants; but now that the migrants began arriving in much larger numbers and don't respect the *faly*, conflict began	19, 26, 27
	In 2007 and 2008 migrants paid the pirogue tax of 30 000 Ar	19, 22, 26,
2008	Migrant fishers from the South arrived in the largest numbers yet	22, 23
	Near the end of March conflict began between the residents of Maintirano and the migrants; the residents argued that the migrants were taking all of their catch	19, 26

Year	Event	Interview
2008	There was some enforcement of local law forbidding fishers to camp on Nosy Mboro	19,
	However, it is still frequented by groups who will stay there three / four days before returning to their base at Mananja	
	Fishers persist in camping on the island as there is good shark and sea cucumber fishing in the vicinity; some fishers still access these sites from Mananja	19, 29
2008	Local authorities and leaders in Maintirano tried to limit the number of pirogues in the Barren islands to 150; there were already150 local pirogues and therefore no allocation for migrants from the South	19, 22, 23, 26,
	The residents with ties to families from the South protected the migrants	19, 22, 23, 26,
	A tax of 30 000 Ar per pirogue payment for migrants and 10 000 Ar for residents is decided	19, 22, 23, 26,
	In 2008 migrants paid this but do not want to in 2009 as they saw no returns from it, believing that the local president of the fishers union misspent the money	19, 22, 23, 26,
2008	Sara family from Maintirano moved North in search of new fishing grounds; they fished off of Nosy Kely, a coral cay South West of Cap St. Andre	37, 38
2009	There is no present-day migration of Sara from Anakao or Tulear	23

Chronology of fisher migration to the mainland villages North of Morondave

Table 34. Chronology of fisher migration to the mainland villages North of Morondave (such as Bemakoba and Benjavily) drawn from KI interviews

Year	Event	Interview
2005 / 2006	Both shark and sea cucumber fishing around the Belo-sur-mer and Barren islands diminished markedly	1, 16
2006	An important shark fin buyer spent 2006 testing the fishing grounds between Morondave and Benjavily for shark fishing; he had a very clear idea of what kind of habitat shark species can be readily caught in and found that there was good shark fishing near Bemakoba	16
	He then recruited and encouraged teams from Andavadoaka and Morombe to come these areas knowing that they would sell to him	
2007	Migrant shark fishermen, mostly young fishermen from Bevato, arrive for the first time in Ampatike	15
2009	Presently a shark fin buyer operating the length of the coast considers South of Morondave as fished-out, while between Morondave and Maintirano there are still productive sites	16

Year	Event	Interview
	For example between Morombe and Morondave he buys 20 – 30 kg of fins / week; between Bemakoba and Borengengna alone he gets 80 kg / week	
2009	The new mainland fishing villages are becoming popular destinations for migrants	1, 16

Direct drivers of migration

Table 35. Key direct drivers of migration described by KIs

Push Factors	Interview
Scarcity of resources	
In the past, when the coast was still only sparsely populated, the Vezo would migrate when local fishing resources became insufficient to support a growing village population. The surplus population would move to new fishing grounds, allowing recovery of the fishing resources and so the establishment of an equilibrium between the population of a village and the state of their resources.	7
Fishers from Morombe began migrating in increasing numbers from the beginning of the 1990's as the local catch no longer sufficient for them to live properly.	27,
If the Vezo have enough they prefer to stay in the same place; they only move if fishing resources are over-exploited locally. The Vezo migration is a search for fishing resources as these are locally exhausted.	4
Fishers who stay in their villages of origin face real difficulties because there are too many of them and not enough fishing resources; to force these people to stay in the same place would have damaging consequences for them.	26, 5
The Vezo traditionally managed their fishing resources through movement.	7
They could live if they were forced to stay in their home villages, but would spend all of their money on food; they are not able to save any money.	26,
The scarcity of *farafatse* (the tree used to make pirogue hulls) and the consequent outlawing of its cutting, has led to the Vezo travelling the length of the SW Malagasy coast to the Mangoky river; they travel long distances upstream, until Bereroha, to source large *farafatse*.	7
Vezo migration is an adaptation strategy to diminishing fishing resources.	8
It is difficult to feed your family during the rainy season because rice becomes expensive and weather prevents effective fishing. Migration allows fishers to save enough money to get through this difficult period; if we stay here we cannot catch enough to be able to save money.	40
Between 1994 and 1997 Vezo Sakalava from Morondave migrated North as shrimp trawling in this area depleted the fishing resources accessible to traditional fishers in their home fishing areas	4
Culture / Tradition	
It is an old tradition of the Vezo to move from the South, not to stay in their natal village. Here they are too many, if they move they can earn more money relative to their village.	20, 22, 57
It is an important tradition of the Vezo to migrate; when the return back they want to take something of great value back with them	26,
The ambition to escape poverty and make their fortune pushes the Vezo to migrate.	57, 44

Pull Factors

Choice of destination

A confident who worked on a transport boutre knew of the fishing grounds from his passage through the area.	20, 29, 36
A confident had been to that area and had told him that the fishing was good there.	19, 24, 25, 26
They have family and relatives in the village of destination.	20, 22
Good fishing sites within proximity; from our experience as fishermen we a very clear idea of what kind of habitat shark or sea cucumber can be readily caught in. It is also based on experiment; if the fishing is not good we will explore new potential sites.	24, 41
An important shark fin buyer spent 2006 testing the fishing grounds between Morondave and Benjavily for shark fishing; he then recruited and encouraged teams from Andavadoaka and Morombe to come these areas knowing that they would sell to him	16

Resources

There is better fishing here.	19, 20 ,23, 25, 26, 10
The presence of good sea cucumber and shark fishing sites are the drivers of present-day migration.	4, 5
The Vezo traditionally migrated according to the movement of fishing resources, as well as the seasons; the demand for sea cucumber and shark fins brought new drivers to the migrations and changed migration patterns.	3
The Sara from Anakao migrated to the Barren islands to harvest coquillage rouge, which French buyer paid well for; the Sara could earn well from this.	29,

Markets

Vezo migrated to be closer to higher paying markets – urban centres (such as Tulear and Morombe), but also tourist centres where hotels pay a premium (such as Mangily); in these centres of consumption they can sell their catch directly to the public rather to middlemen. For example Bemakoba is in proximity to Belo-sur-Tsiribina.	7, 16
Since the commercial octopus buyers have extended their collection network to more remote villages (and so creating a market in them), Sara from Anakao have moved South to join their relatives in these villages.	10
Collection boats from Morondave buy from the migrants on the Barren islands; there is no revenue for the commune and this is part of the problem.	28,
Similarly the same company (SOPEMO) from Morondave buys produce on Andravoho, Nosy Be and Andriamitaroke as well as Manahy and Andranopasy (for crab) on-the-black; the local communes don't benefit from this in anyway.	7, 50, 52
Collection boats come from Morondave and Morombe buy octopus, lobster and fish and so drive these fisheries on the islands.	7, 50, 52, 54

Education

Schooling, particularly secondary, is limited in the rural areas of SW Madagascar; fishers migrate to urban centres (or closer to them) so that their children can attend school; the parents continue their fishing activities, as do the children on the weekends.	7
Accessible schooling for children, for example, Bemakoba and Maintirano.	20, 21, 17

Conflicts

Table 36. Summary of key local conflicts described by the KIs

Conflicts	Interview
Faly	
Migrants do not respect the *faly* of the islands; this is a fundamental problem	26, 27, 28, 29, 31, 2
***Faly* (Barren Islands)**	
Previously it was *faly* to take animals or plants to the islands; now people cultivate on the islands and keep chickens, cats and rats	27
Our forefathers only stayed a few days on the islands as they are a sacred place; now the migrants live on them for months	27,
Migrant fishermen are said to have buried their dead children on the islands	1, 27
***Faly* (Belo-sur-mer islands)**	
You cannot live on the islands like the migrants do; it is acceptable to fish there, to rest on the islands but not to live there; it is very rare for the residents to stay longer than a night	52, 53, 54, 57
The migrants take women and infants to the islands, where they live; this is *faly*	52, 53
Women cannot give birth on the islands and the migrants have done this	
Children have died on the islands and the migrants buried them there	1, 54
Migrants have cut down sacred trees on the islands	52, 53, 54
Traditional governance and regulations	
Here the migrants want to behave like they do in their home villages; but their behaviour is not in keeping with our traditions or custom and they don't respect this	27
Previously there was a local tradition of protecting the birds on Nosy Mboro and a very large nesting colony of seabirds existed on the islands; with the arrival of the migrants this has been decimated	27
Taking seabird eggs from the Belo-sur-mer islands was a luxury, a ceremony done with elders only on certain occasions; the migrants have destroyed the nesting colonies	52, 53, 54
They have degraded their own resources; because of this they are no longer able to adequately fish and now are coming here to do the same to our resources; they should ask themselves why they have problems in their home villages	27, 28
If the migrants respected the local laws and customs then they would be welcomed; but they do not want to do this	27, 28, 29, 30
The Sara who came to the Maintirano area in the 1960's were welcomed; but they weren't many and they respected the community of residents, and so the residents gave them place to settle	27
In general there is not serious conflict between migrants and the residents of Ampasimanjoro in	29, 30

Conflicts	Interview
day to day living	
Numbers	
The migrants outnumber the resident fishers	21, 23
Before there was no conflict with migrants but now they come in too large numbers; this is causing conflicts	23, 27, 24, 29, 58
The migrants know that the islands are sacred places with many *faly*; they understand these but are not able to respect them properly because the islands are too crowded	52, 53
Migrants in times past were usually welcomed; but they weren't too many	23, 27
Many migrants crowded onto the islands creates insalubrious conditions, particularly as many fishermen had a habit of keeping shark heads next to their camps as trophies; the remains of shark carcasses are also left rotting on land or thrown into the sea near the beach	54, 58
Behaviour	
Prostitution; migrant fishermen sleep with very young girls, 10 years old (Maintirano)	20, 22, 54
Migrants fight in bars; disturb the peace and quiet; and when drunk act in ways that are offensive to residents	2, 25, 54
During 2006 and 2007 many migrants lived next to Belo-sur-mer as the mayor, not wanting them to live permanently on the islands, invited them to live next to Belo; however, the hotel owners to the South of Belo complained that the migrants were disturbing their guests dirtying the beach	54
Tourism brings in significant money for the residents of Belo-sur-mer; through their behaviour in the village and their presence on the islands, the leaders of the village see them as a negative force on tourism	54
While the migrant fishers earn significant amounts of money (and much more than resident fishers) little of this returns into the host community, except what is spent in the bars and karani (Malagasy of Indian descent) shops and on prostitutes	54, 58
Nor does the commune benefit from the wealth of resources that the migrants harvest as these are bought by outside buyers from Morombe and Morondave	54, 58
The migrant fishers often don't make any contribution to the social life of the host communities even though they are earning more from the residents' natural resources than the residents themselves do	54, 58
Fishing	
In socio-economic surveying carried out in the coastal villages of the Kirindy-Mitea area villagers consistently cited two major problems: industrial trawlers (shrimp) and migrant fishermen from the South	57
• Local fishermen state a number of problems with trawlers:	
• the trawlers operate close to shore, within the fishing grounds of traditional fishermen;	
• on occasion they endanger the traditional fishermen, who fish from dug-out canoes or out-rigger pirogues;	

Conflicts	Interview
• they sometimes snarl and shred local fishers nets – a huge material loss for a traditional fisherman for which he is rarely compensated;	
• through bottom trawling close to shore they cause extensive damage to benthic habitat	
Migrants harvest all of the residents' marine resources	24, 29
Migrants take all of the catch; if they carry on like this there will not be any left for the residents' children	20, 23
The migrants come here to over-exploit our fishing resources so that their own are able to recover in their absence	54
Migrants have more effective fishing techniques and are able to dive deeper for sea cucumbers	23, 24, 33, 36
Migrants earn more money because they know how to sail far into the Mozambique channel, use *jarifa* and dive deeper for sea cucumbers	24, 29, 52
There is little real conflict with the Sara of Maintirano as they use mostly *ZDZD* kirara and therefore are targeting different species	24
The migrants cast spells on certain sites; residents are frightened by this and do not want to fish in the same place	24, 29
Migrants introduced *jarifa* and spear guns to the northern areas more recently; historically they also brought nets to areas that had only used hand lines to fish	23, 57
In the 1990's Vezo Sara migrants came into conflict with local fishermen in the Faut Dauphin region who used basket-traps to fish lobster; the migrants free-dived for lobster, were able to collect larger amounts and were accused of stealing from local fishermen's traps; the Antanosy residents forced the Vezo to leave from some areas	3, 7
Migrants use destructive techniques, such as beach seine nets and laro poison; this has caused conflict with the locals the length of the West coast	1, 10, 12, 51
The Sara and Vezo Sara are notorious for using beach seine nets (called beangata / jaoto / tarikake) with mosquito-netting pockets; this has brought these migrants into many conflicts with residents	1, 34, 51
Some local politicians earn a lot of money from migrants through trading trepang and shark fins, as well as migrants spending in their stores and epi-bars; therefore they don't necessarily want to protect locals / take measures to control the problem	23,
Conservation	
The presence of migrants has decimated nesting colonies of sea birds on a number of islands (Andriamitaroke, Nosy Be, Andravoho, Nosy Mboro)	8, 58, 27, 31
Migrants actively hunt turtles and harvest their eggs; this is a particular problem in Barren islands, which form a key regional nesting ground	28, 32
There are migrants from Morombe who deliberately hunt turtles and have killed large numbers along the coast between Andranopasy and Belo-sur-mer; they build temporary camps here where they dry the meat to supply the market in Morombe	57
Migrant fisherman have cut down many of the trees that once existed on certain islands	1, 54
Recently migrant fishermen have cut down a lot of *farafatse* in the Kirindy-Mitea to make pirogues; Belo-sur-mer has become a known source for new hulls	1, 58
The Kirindy-Mitea has been afforded legal 'temporary protection' by the Malagasy government as a protected area; many of the Vezo migrants do not know this	9

Conflicts	Interview
Malagasy National Parks want to strictly prevent any fishers from staying on the islands; they must stay on the mainland; using communal regulations they can achieve this	9, 11
Migrants stop over at Mitea (a source of water and a landmark easily distinguish from the sea); this is the a key conservation area of the Kirindy-Mitea national park	58
The islands (Nosy Be and Andravoho) will form a key conservation area of the new MPA and will be off-bounds to exploitation	58

Management actions taken at a local level

Table 37. Summary of the management actions taken at a local level described by the KIs

Barren Isles	Interview
All fishermen must pay a pirogue tax, on doing so they will have their pirogue numbered and will be given a fisherman's card, with their fishing activities listed on it	19, 26, 27, 28
This law was to be applied by the 15 May 2009, but one of the de facto leader of the Vezo migrants, Valerison, requested that its application be delayed until the 25 May 2009 so that all migrants would have the time to observe it; Valerison was working to educate the migrants about it	26,
The regulations to enforce this have already been promulgated; the migrants papers will be verified and those without them wand have are not registered by the 25 May 2009) will have to pay a fine of 100 000 Ar / will be sent back	28
PTM (the fishers federation) with the PSDR and the Mayor are implementing this and have the accord of the ministry responsible (MAEP); MAEP is considering implementing it elsewhere if it is effective	28
The mayor of Maintirano sent a letter to the authorities of Morombe district saying that migrants needed to have all the necessary documents; this information was communicated to the village presidents by the mayor of Morombe's office	28
The mayor of Maintirano is limiting the age beneath which children can stay on the isles; a major problem with the migrants is that the children are not attending school; the mayor wants to at least prevent this problem	28
Fishermen cannot throw shark carcasses (the head, skin and skeleton that remains after slaughter) into the water; they must be buried under the sand (previously many fishermen kept the heads next their camps as trophies)	26, 27
In February 2009 a meeting was held where it was decided to limit the number of pirogues to 150; initially there were to be only 40 for migrants from the South, but it was finally decided that there would be 150 for all	26
The local fishers have proposed giving a single island to the migrants (for example Nosy Andrano); the other isles will be open to the residents	28, 29, 32
The Vezo want a period when they can hunt turtle, perhaps June – August, with the rest of year being outlawed	26, 32
A new association for the protection of the marine and coastal resources in the area, particularly the Barren Isles, was formed in 2008; the president of the association is Sibani Norbert, the ex-mayor of Maintirano; the association is working with present mayor and the Barren Isles turtle conservation project to control the conservation problem caused by the migration	27, 28,29, 32
Maintirano: the residents are divided: there are those who are related to migrants and must protect them; there are those who have ties with the migrants and simply do not want them to come	29, 32
Tambohorano: the residents had had enough of the migrants and forced them to leave themselves (April 2009)	29

	Barren Isles	Interview
Andriamitaroke, Nosy Be and Andravoho		
in a meeting in Befandefa (5 February 2008) the maire communicated to the presidents of fokontany that migrants would need three documents if they wanted to fish in Belo and Maintirano: 1. certificate of residence from the chef de Fokontany; 2. passport signed by the chef de fokontany of the migrants village; 3. a 'bilan numero trois' from the Morombe court		2
In 2008 migrants were turned back for not having these papers; this was the first time this had happened		2
Morombe, 25 – 27 April 2008, a meeting took place between the authorities of Menabe and the South West over: the utilisation of the islands off Belo-sur-mer and Andranopasy by traditional fishers from the South West and plans to manage these islands as a conservation area the presence of industrial trawlers from Tulear and Morondave and the damage they are causing to the sensitive benthic habitat The main outcomes of this meeting were: • Re-establishment of the respect for local customs and beliefs • Respect of maritime fishing regulations • Support for the protection of the islands as a MPA • All fishers without exception must live within the village of Belo-sur-mer, but they have the right to use the isles as a temporary camp and fish around the isles for a maximum of a week • Actions will be taken to educate all local people of these actions • A full consultation will take place with local community stakeholders over the establishment of the MPA.		
Following this the authorities communicated (should have) with their local communities the outcome of the meeting and began the consultation with the fishers		2
The mayor of Belo-sur-mer wanted a law that prevented any migrant fishers from the South going there; Mayors of Befandefa and Manombe successfully argued against this		
The Menabe authorities wanted to only allow fishers to stay on the islands for a maximum of three days		
12 May 2008, the “Chef de Region” of Menabe prohibited fishers from settling on the islands of Belo-sur-mer and Andranopasy so as to: 1. ensure the respect of local customs and beliefs; 2. and to protect the biodiversity of the isles from further degradation with a view to creating a MPA The pertinent articles of the ruling are: (i) due to the continued degradation of the biodiversity by the fishers, principally migrant, it is now prohibited to settle on the islands in the Menabe Region (ii) the isles proscribed are: in the rural commune of Belo-sur-mer (Nosy Andravoho, Nosy Tania, Nosy Andragory, Nosy Angarahoka, Nosy Be); in the rural commune of Andranopasy (Nosy Maheloholo, Nosy Andriamitaroke). (Note: only Nosy Andriamitaroke, Be and Andravoho are currently settled; the other isles are effectively		

Barren Isles	Interview
uninhabitable sand cays)	
(iii) traditional fishing within the regulations is permitted	
(iv) the department of fisheries, the gendarme, the prefectorial police, the mayors of the rural communes of Belo-sur-mer and Andranopasy, and the district heads of Manja and Morondave will be responsible for enforcing the regulation	
(v) the regulation is effective as soon as it has been sufficiently publicised (local radio, posters and village meetings)	
According to many migrants in 2008 this regulation was not rigorously enforced and the three isles were settled during the fishing season	
The migrants were invited to come and live next to the village; the objective of the local leaders is that the migrants live on the mainland	54, 58
Kirindy-Mitea National Park	
The Kirindy-Mitea is a protected area and has been afforded legal 'temporary protection' by the Malagasy government; many of the Vezo migrants do not know this	9
Malagasy National Parks want to strictly prevent any fishers from staying on the islands; they must stay on the mainland; the MNP can use local regulations to achieve this	9, 11
One of the islands, most likely Andriamitaroke, could be set aside for the migrant fishermen; this would be a compromise and not ideal for MNP	11, 58
A strong human presence on the isles is not acceptable as it won't allow the conservation objectives of the Kirindy-Mitea to be achieved	58
The isles (Nosy Be and Andravoho) will form the key conservation area of the new MPA and will be off-bounds to exploitation; they will be an inner, fully-protected reserve	58
During the creation of the Kirindy-Mitea MPA there will be a full public consultation with the migrants fishers; this will begin in June 2009	58
MNP plan to widely publicize the inter-communal regulation through local radio and communication with communal authorities and village presidents	58
In May 2009 a public consultation over the creation of the MPA is planned with the migrant communities	58
The local authorities with the Kirindy-Mitea co-management association Hahitamani, have cleaned the isles three times – in 2006, 2007 and 2008	58
Hahitamani, the local gendarme and communal authorities will work together to enforce the regulations	
MNP management is not against the migration if the migrants meaningfully respect the resident's traditions and their efforts to conserve their biodiversity	58
General	
No one can forbid the Malagasy to go where they want to; this is Madagascar and we are all free to move in our country and let others do so	
There are no national laws or policy governing migration in Madagascar; the only regulations that exists are the local traditional laws and traditions enforced at a village level	3, 5, 7, 8, 10, 11
Solutions	

Barren Isles	Interview
There is a critical need to stabilise rural populations rather than have a migration policy per se; migration is manifest of the many difficulties rural people face	11
Preventing traditional fishermen migration would mean that certain members of the community would be deprived of protein; it would provoke localized population pressures, further exhaustion of scarce natural resources and a lack of food for the people	7
How can one limit migration as it is a tradition of the Vezo? To do so would have serious, negative consequences	11, 26, 12
Fishers who stay in their villages of origin face real difficulties because there are too many of them and not enough fishing resources; to force these people to stay in the same place would have bad consequences for them	26, 48
They could live if they were forced to stay in their home villages, but would spend all of their money on food, they are not able to save any money	26, 37, 49
Migration of poor people from the interior to the coast to subsist from open-access coastal resources is as much a problem as the migration of fishers along the coast; both must be tackled	7
The challenge is bring back the true traditions that surround the islands	58
Because the migration is an ancient one the residents are often of not only the same origin, but also of even of the same lineage; here the residents cannot publicly express their sentiments l*et al.*one turn the migrants away	57
The migrants are frequently the principal clients of the epi-bars and Karani stores; they are important to the women who supply salt and the firewood sellers; these people do not want to see the migrants pushed out	57,
Local authorities are involved in the sea cucumber and shark fin trade; they benefit from the migrants and so don't want to bring in regulations that restrict them	24, 32
Village actions	
In the village of Ampatike migrant fishermen pay a tax of 10 000 Ar / pirogue / year to the fokontany; they respect this and relations between migrants and residents are good	15
In the village of Bemakoba migrant fishermen pay a tax of 5 000 Ar / pirogue / year as well as 10 000 Ar / year tax to sell their catch; the migrants stay in an area well separate from the residents, but they pay the tax to the fokotany and relations are good	35
Suggestion from the general assembly of the Kirindy-Mitea villages: that everyone must have the permission of the Chef de Fokotany before fishing in the zone of that village	57
In the Mangoky delta area, fishers (mainly from Morombe) in temporary camps pay a tax (of how ever much they want) to the local fokontany before they fish; this has ensured relations remain amicable	60, 65
Fishing villagers and some local authorities do not accept migrants who use beach seine nets (often Sara migrants from Tulear); the village will push them out and they just continue North until they can find a place where the residents allow them to use this method	51, 52

Migration characteristics

Table 38. Migration characteristics described by KIs

Migration characteristics	Interview
Migrants	
Young fishermen, who migrate without any family, increasingly dominate the migration	24, 4, 5
Fishers migrate in groups that can be loosely defined as either:	1,34, 56, 19
being made up of close family members,	
or as a team of younger fishermen with a group leader.	
The family group will most often comprise a father with his wife and some children; his sons may also bring their wives and children; the group may be made up with other relatives.	
A team leader will be somebody who already has the means to travel North to fish shark and will recruit young fishermen from his extended family or fishermen in whom he has confidence to make up a full team; he will pay for their food, take care of them and pay them a share of the profits	
Only fishers of a certain wealth are able to migrate as it is essential to have a large pirogue (7/8 m in length); shark nets are a significant cost for most fishermen	4
Poor fishermen do not have the means to migrate and, unless they are recruited to join another team, they will generally stay in their home village	
A prominent shark fin buyer sponsored a number of migrants from Andavadoaka and Morombe to come North and fish shark; these people did not have the means themselves, but the shark fin buyer supplied them with fishing material and food until they were able to buy food themselves; in return they would only sell their catch to him; this was the case of many of the migrants in Bemakoba	16
Similarly a shark fin buyer based in Morombe "rents" *jarifa* and palangre to fishers in whom he has confidence; in return they sell only to him	16, 37
Activities	
Women and children glean if there are suitable reef flats in proximity	24, 39
In addition to shark and sea cucumber fishing many fishermen will use spear guns to catch fish for food	
The '*jarifa*' shark net is said to have originated from / first or was first popularised on the West coast in Morombe; this would partly explain the traditional prevalence of migrants from Morombe and the neighbouring Befandefa area amongst shark fishermen	7
Fishers fish chiefly for their own food needs, but also to bait their *jarifa*. The surplus catch is sun dried (venza); most fishermen on the islands don't fish to produce salted fish as the amount of salt needed to do this is too expensive and heavy to transport out to the islands; relative to salting fish little salt is needed for trepang and shark fins	14,
Palangre is increasing in popularity as a fishing method, not only in shallow (30 m), muddy water, but also deep water (200 m)	50
ZDZD – a fishing net introduced by the German development organisation GTZ in the North of Madagascar	24, 52

Migration characteristics	Interview
Leadership	
There is a lack of leadership amongst the fishers in most places because their origins are diverse; they do not form a coherent group with a common voice or representation	36,
Barren Isles: the migrants have no association or grouping but want to form one to defend their rights; Velarison Bontira, a fisherman from Andavadoaka who has been fishing in the isles since 1995, wants to form an association with locals; he has a knowledge and understanding of Velondriake Association (his wife works with Velondriake and BV) and wants to do something similar in Barren Isles; Velarison works with the Sibane and the present Mayor of Maintirano	24, 26
Migrants characteristically do not have a voice, they are not able to meaningfully participate in decision making processes and so are often marginalised	11
In the Barren Isles 2 migrants from Nosy Hao died while free-diving; every year this can happen; two they died because they did not respect the fady; migrants sacrificed a zebu so that they were able to continue to stay	26,
Movements	
Between 1994 and 1997 Vezo Sakalava from Morondave migrated North as shrimp trawling in this area depleted the fishing resources accessible to traditional fishers in their home fishing areas	4
Migration became increasingly common from 1990 because of the increase in Asian demand for shark fins and sea cucumbers	4, 5
Fishers from the villages between Manombe and Morombe migrate seasonally northwards until Maintirano	5
Though the migration takes place between March and the end of November, with many migrants arrive after 26 June	22, 24,
Migrants will go as far South as Fort Dauphin and North to Mahajunga, but this is uncommon	4, 10
Fisherman from Tulear and Anakao migrate South until Fort Dauphin and the Manantenina area in SE Madagascar	5, 7, 10
Since the commercial octopus buyers have extended their collection network to more remote villages (and so creating a market in them) Sara from Anakao have moved to join their relatives in these villages	10
Most migrants who have the means to buy sufficient food prefer to sail directly to their destination (such as the Barren isles) without frequent stops. Others who do not have the means will stop to fish, particularly on the isles of Belo-sur-mer, and work their way up the coast to the Barren Isles over a period of weeks	24, 25
In addition to the movement of traditional fishers up and down the coast, there is a significant transhumanance by the Tandroy and Tanalana from their inland farming and grazing areas to the coastal areas south of Tulear	5,6
In 1985 drought and famine (“kere”) forced many Tandroy from the interior to move to the coast and to try to survive from the sea (gleaning for sea cucumbers and octopus)	7
Drought has driven the movement of Tandroy to the coast; they return to the interior to cultivate when the rains return; following this pattern temporary coastal villages grow and then disappear	7
The Masikoro living between the Mikea forest and the coast will also opportunistically become fishers during the dry season; according to the season they will concentrate on planting, weeding and harvesting their crops or fishing	

Migration characteristics	Interview
There is a seasonal migration of fishers from mainly Morombe, but also villages further South, to virtually all of the mainland villages North of Andranopasy; the number of people is significant	57
In the first instance Vezo would traditionally migrate short distances from their village, returning after a week or so; in a second phase, as resources become more depleted, they would migrate large distances; these movements would be definitive movements away from the village of origin	7
The settling of the islands by migrant fishers from the South is a relatively recent phenomenon	57
Sara	
The Sara don't have a great tradition of migrating but moved opportunistically to earn more money, they sought out better fishing as a business opportunity and are normally more entrepreneurial than the Vezo	29
Sara from Anakao have migrated southwards until Androka over the last sixty years; the temporary, seasonal camps that they first formed have become permanent villages	10
Though these migrations are definitive, the Sara always maintain ties with their parent village (for example, Anakao), particularly returning to bury their dead in family tombs; they only cease to do this once Sara tombs have been established in their destination	10
Numbers	
In 2008 there were 264 pirogues (4 / 5 persons per pirogue) in the Barren Isles	28
In 2008 there were about 700 migrants on the Barren Isles	30
Local resident Vezo of Maintirano are also part of the problem: their population is increasing and they have more access to affective fishing materials (*ZDZD* kirara)	32
In times gone by the migration was seasonal; but now increasingly migrants are staying, marrying and forming ties with resident families; however this does not change how they fish / their use of destructive practices and this is a negative consequence of migration	57
More than half / two thirds of the young migrants from the villages of Befandefa who go North do not return to their home villages	1, 14, 50
Groups made up of largely family members will normally return to their home villages, as will team leaders who have left behind their wife and children	1, 14
For example, the ex-President of Andavadoaka knew of 67 fishermen who had migrated between 2005 and 2008 and had not returned to the village; most had settled in the Maintirano region or in the small coastal villages between Morondave and Maintirano	14
Migrants marry with residents; they come to respect local customs and are in turn accepted and are able to buy land	28, 37, 52
Earnings	
In a good month a Vezo fisherman can earn significantly more than a well-paid civil servant through shark and sea cucumber fishing	32
In 2000 shark catch decreased significantly; before this a team could earn 5 – 6 million Ar in a season (April – November); now most who fish South of Morondave will earn only 400 000 – 600 000 Ar; the better teams 800 000 Ar – 1 million Ar	50

Migration characteristics	Interview
Young Vezo migrants from the South waste their earnings; they demonstrate a total inability to save any; don't look to the future	32
Vezo fishermen from the South are known as 'tsy mandamone' – don't need any change' – because of their great munificence	1
The young Vezo migrants must return to the village with an ostentatious show of wealth; they spend their money on new, flashy clothes, trainers, Hi-Fi's etc.; they don't invest their earnings in fishing material or pirogues	1, 33, 56

Appendix 3. Tables of migration routes

In the tables the villages of origin are listed in the left hand column while the villages of destination are listed in the top row; a grey block indicates that migration takes place between them.

Local migrations

Table 39. Local migrations undertaken by fishers of the villages of Befandefa

	Destination				
Origin	Andranombala	Morombe	Nosy Be (Morombe)	Nosy Hao	Nosy Mitata
Ampasilava				■	
Andavadoaka	■			■	
Antsatsamoroy					■
Behovitse				■	
Belavenoke	■				
Bevato	■				
Lamboara				■	
Salary				■	
Tampolove				■	
Tsifota				■	

Table 40. Local migrations undertaken by fishers in the area of Morombe and Andranopasy

Origin	Destination											
	Ambalahonko (Andranopasy)	Ampasibe	Ampatike (Andranopasy)	Avarandrova	Belavenoke	Bevato	Bevara	Borongeny	Marohata	Nosy Be (Morombe)	Nosy Lava	Tambohobe
Andranopasy												
Andavadoaka												■
Antsatsamoroy												
Belavenoke												
Bevato												
Fianamaharasay												
Morombe	■	■	■	■		■	■	■	■	■	■	■
Nosy Be (Morombe)												

Table 41. Local migrations undertaken by fishers in the area of Maintirano

Origin	Destination									
	Anabohazo	Dondosy	Mananja	Marife	Maroantaly	Nosy Lava	Nosy Mangily	Nosy Mboro	Nosy Vao	Tambohorano
Ambalahonko (Maintirano)				■						
Ampasimanjoro (Maintirano)	■		■	■		■				
Tambohorano										

Table 42. Local migrations undertaken by fishers in the area of Ambohibola

	Destination							
Origin	Andoharano	Ambohibola	Anjahava	Fanambosa	Lanirano	Marohao	Nengengy	Nosy Manitsa
Andoharano								
Ambohibola	minor	minor	minor	important	minor	minor	important	important
Anjahava								
Fanambosa								
Lanirano								
Marohao								
Nengengy								
Nosy Manitsa								

Table 43. Local migrations undertaken by fishers in the area of Manombe and Befandefa

	Destination										
Origin	Ambatamilo	Ambolomailike	Andravona	Andrevo-bas	Befandefa area	Fianamaharasay	Mangily / Ifaty	Manombe	Morombe	Salary	Tsiandamba Tsifota
Ambatamilo											
Ambolomailike											
Andravona											
Andrevo-bas											
Befandefa area											


Fianamaharasay
Mangily / Ifaty
Manombe
Morombe
Salary
Tsiandamba
Tsifota

Distant migrations

Table 44. Migrations undertaken by fishers from the Tulear area

Origin	Destination										
	Anakao	Andravoni	Beheloka	Itampolo	Fanambotse	Mangily / Ifaty	Manombe	Morombe	Soalara	St. Augustin	Tulear
Anakao		minor				minor	minor	minor			
Andravoni											
Beheloka											
Itampolo											
Fanambotse											
Mangily / Ifaty											
Manombe											
Soalara		minor				minor	minor	minor			
St. Augustin		minor				minor	minor	minor			
Tulear											

Table 45. Migrations undertaken to the isles of Andriamitaroke, Andravoho and Nosy Be

	Destination		
Origin	Andravoho	Andriamitaroke	Nosy Be (Belo)
Ambatamilo			
Ampasilava			
Andambatihy			
Andavadoaka			
Andranombala			
Antsatsamoroy			
Befandefa			
Behovitse			
Belavenoke			
Bevato			
Dondosy			
Fianamaharasay			
Lamboara			
Morombe			
Morondave			
Nosy Be (Morombe)			
Nosy Mitata			
Salary			
Tampolove			
Tsifota			
Tulear			

Table 46. Migration routes undertaken by fishers to the Barren Isles

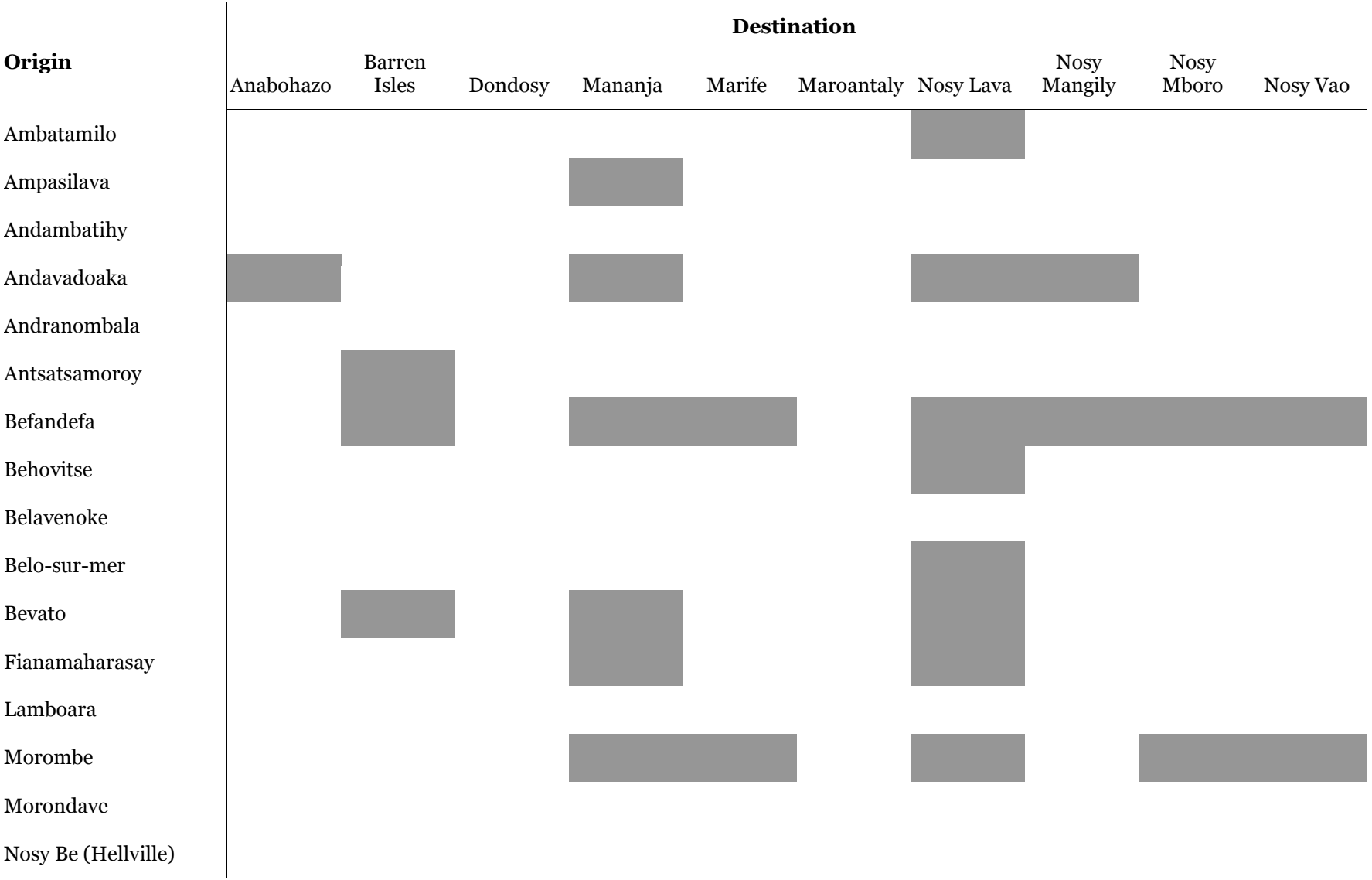

Table 47. Migrations undertaken to the mainland villages North of Morondave

	Destination															
Origin	Ambal-atagna	Ampatike	Andal-anda	Andevetse	Ank-evo	Avarand-rova	Belalanda	Bemakoba	Benjavily	Bevara	Borongeny	Kimazimazy	Mozambique	Nosy Kely Morondave	Tamb-ohobe	Tambo-horano
Ambatamilo																
Ampasilava																
Andambatihy																
Andavadoaka																
Andranombala																
Antsatsamoroy																
Befandefa																

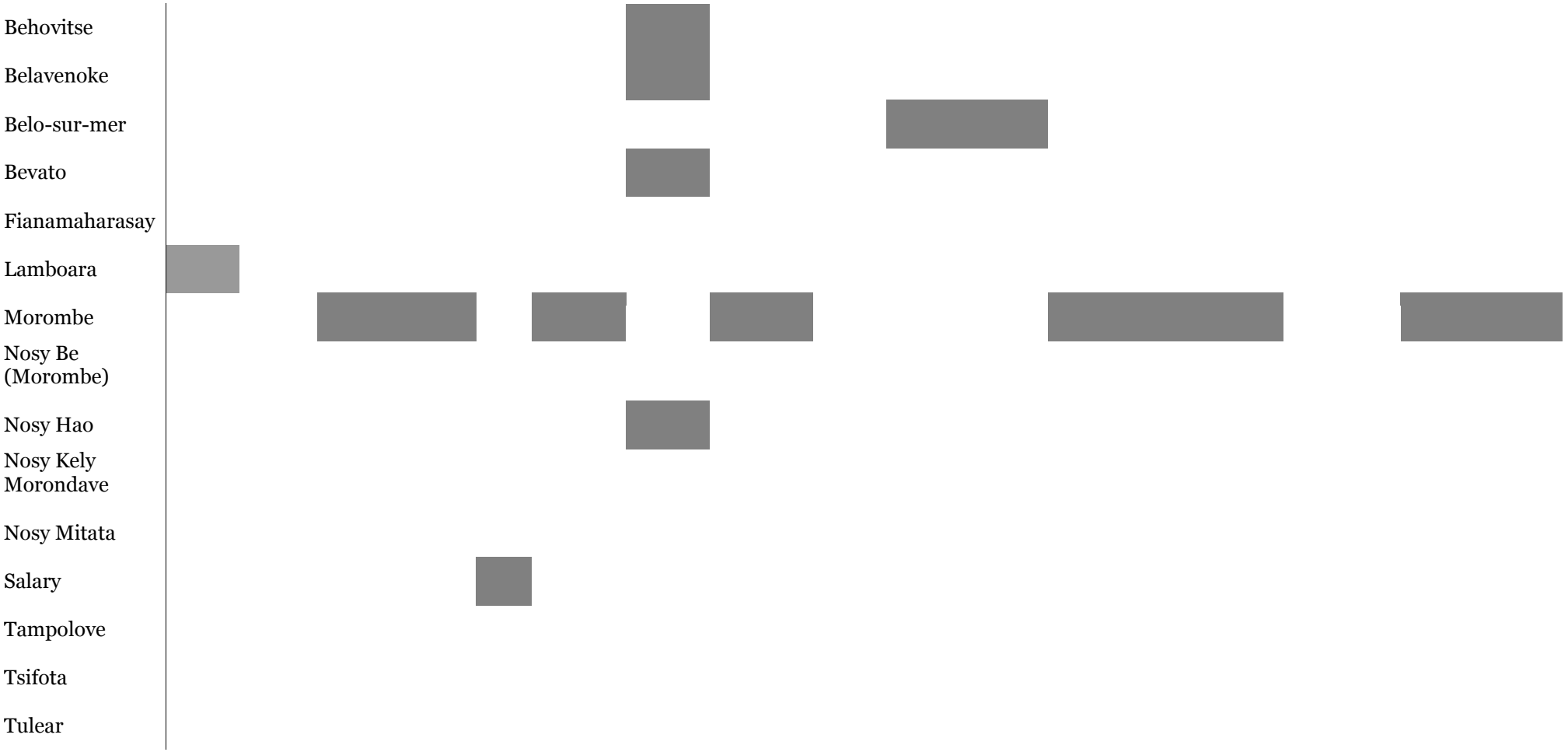
Behovitse
Belavenoke
Belo-sur-mer
Bevato
Fianamaharasay
Lamboara
Morombe
Nosy Be (Morombe)
Nosy Hao
Nosy Kely Morondave
Nosy Mitata
Salary
Tampolove
Tsifota
Tulear

Table 48. Migrations undertaken by fishers from the villages South of Tulear

Origin	Destination											
	Anakao	Andravoni	Beheloka	Itampolo	Fanambotse	Mangily / Ifaty	Manombe	Morombe	Morondava	Soalara	St. Augustin	Tulear
Anakao		■	■	■	■	■	■	■	■			
Andravoni												
Beheloka												
Itampolo												
Fanambotse												
Mangily / Ifaty												
Manombe												
Soalara		■	■	■		■	■	■	■			
St. Augustin		■	■	■		■	■	■	■			
Tulear			■	■	■			■	■			

Appendix 4. Survey methods

This study gathered data using three methods:

- key informant interviews with both migrant and resident fishers, village leaders and shark fin and sea cucumber buyers;
- quantitative surveying of migrant groups in certain key migration destinations;
- and key informant interviews with representatives of the government, research institutes, conservation NGOs and local community leaders.

Fisher and village leader KI interviews

Semi-structured KI interviews were carried out at each site to gain a full understanding of current migration including: recent history, dynamics, drivers, conflicts and management actions taken. In addition to using interview guidelines developed to examine these topics, mapping and timeline exercises were used to better understand the patterns of migration. In these the KI was asked to draw a simple map or timeline of migration patterns; the interviewer then used this as a basis for elucidating more detailed information. As the KI guidelines covered a wide spectrum of subjects, which were not possible to cover in a single interview of reasonable length, some KI were interviewed more than once or only certain topics were covered in the KI interview.

Table 51 presents details of the KIs interviewed – their status as migrants or residents, their occupation, whether they had a position of leadership and their age. 81% of KI interviewees were fishermen; 32% were residents while 68% were migrants or had a history of migration; 34% had a position of leadership within their community. In some instances KI interviews were carried out with migrants who were also interviewed as group leaders when it became apparent that they were leaders or had a particular knowledge of migration.

Notes for all of the KI interviews were collated into the themes examined during the interviews as well as additional themes that became apparent during the analysis of the interviews. Through this form of categorised content analysis, characteristics of the migration were synthesised from the interview notes. The themes used to assist in the analysis of the KI interviews were as follows:

- Timeline of fisher migrations (to Andriamitaroke, Nosy Be and Andravoho; to the Barren islands; and to the mainland villages North of Morondave);
- Direct drivers of migration: Push Factors (Scarcity of resources, Culture / Tradition), Pull Factors (Choice of destination, Resources, Markets, Education);
- Conflicts (*Faly, Faly* (Barren Islands), *Faly* (Belo-sur-mer islands), Traditional governance and regulations, Numbers, Behaviour, Fishing, Conservation);
- Management actions taken at a local level (Barren Isles; Andriamitaroke, Nosy Be and Andravoho; Kirindy-Mitea National Park, General, Solutions, Village actions)
- Migration characteristics (Migrants, Fishing activities, Leadership, Movements, Sara, Numbers, Earnings, Importance).

Quantitative surveying of migrant group leaders

In addition to the semi-structured KI interviews a quantitative survey was carried out of all the migrant group leaders in the key destinations listed in Table 50 – the Belo-sur-mer Isles, the mainland villages and the Barren Isles. Migrants were sometimes suspicious of being questioned in-depth because of the current conflicts with the local authorities. The objective of the quantitative surveying was to comprehensively interview all of the migrant groups present. Therefore a short questionnaire was used that that was not onerous to the fishers being interviewed. The questions aimed to establish migration dynamics, fishing activities and migrant understanding of the rules governing their activities.

Table 49. Summary of the number of migrant group leaders interviewed by their village of origin

Origin of group leader	Number of group leaders interviewed	%
Ampasilava	8	14
Andavadoaka	6	11
Belavenoke	5	9
Belo-sur-mer	1	2
Bevato	5	9

Bevohitse	1	2
Lamboara	4	7
Maintirano	13	23
Morombe	17	30
Morondave	1	2
Nosy Be (Hellville)	1	2
Tulear	1	2
Total	**56**	**100**

Sites surveyed

Surveying was carried out in areas of migrant origin (Velondriake MPA, Morombe) and destination (Belo-sur-mer Isles, mainland villages and the Barren Isles). These are presented in Table 50. For brevity Nosy Andriamitaroke (in the rural commune of Andranopasy) and Nosy Be and Nosy Andravoho (in the rural commune of Belo-sur-mer) are referred to as the "Belo-sur-mer Isles". Likewise Ampatike, Bemakoba, Benjavily and Mozambike are referred to as the "mainland villages".

Table 50. GPS coordinates of the villages surveyed in the present study

	Site name	latitude	longitude	utm_easting	utm_northing	utm_zone
Velondriake MPA	Ampasilava	-22.1135	43.24735	319213.5	7553564	38
	Andavadoaka	-22.0712	43.23925	318323.6	7558245	38
	Antsatsamoroy	-22.0092	43.25981	320367.9	7565130	38
	Belavenoke	-21.9545	43.26225	320551	7571191	38
	Bevato	-21.9008	43.28102	322423.4	7577157	38
	Lamboara	-22.1781	43.24853	319418.1	7546421	38
	Nosy Hao	-22.0923	43.19061	313332	7555848	38
	Nosy Andambatihy	-22.0215	43.23908	318243.5	7563741	38
	Nosy Andragnombala	-21.9568	43.20451	314589.5	7570863	38
	Nosy Mitata	-21.9994	43.24038	318349.1	7566198	38
	Tampolove	-22.2249	43.2607	320732.9	7541248	38
Morombe	Morombe	-21.7412	43.36896	331322.4	7594932	38
	Nosy Be (Morombe)	-21.8214	43.29306	323569.6	7585962	38
Belo-sur-mer Isles	Andrevoho	-20.6695	43.84972	7714000	380185.5	38
	Andriamitaroke	-21.0743	43.68912	363820.1	7669073	38

	Nosy Andrangory/Be	-20.8391	43.7595	370931	7695168	38
	Nosy Be (Belo)	-20.8378	43.5905	353343.5	7695165	38
	Belo-sur-mer	-20.7357	43.9987	395750	7706786	38
Barren Isles	Nosy Ambhazo	-18.4962	43.80037	373356.1	7954497	38
	Dondosy	-18.5452	43.85928	379610.9	7949109	38
	Mananja	-18.2119	43.81108	374282.1	7985961	38
	Marife	-18.0575	43.86076	379429.4	8003079	38
	Maroantaly	-18.4178	43.93118	387116.5	7963255	38
	Nosy Lava	-18.5857	43.92665	386748.1	7944675	38
	Maintirano	-18.0592	44.02717	397043.7	8002999	38
Mainland villages	Ampatike	-20.1367	44.37125	434285.4	7773271	38
	Bemakoba	-19.708	44.42787	440041.5	7820732	38
	Benjavily	-18.955	44.23587	419551.6	7903976	38
	Mozambika	-18.9735	44.23789	419773.6	7901934	38

Challenges in establishing migratory movements

Normally fishers should report to their village president to have their passport signed before they leave the village. However, in the larger villages, such as Andavadoaka, the village president was clear that many young fishermen did not respect this regulation. On the other hand, in some of the smaller villages, such as Lamboara and Ampaislava, most migrant fishermen did respect this rule and the village president was able to give a reliable estimate of the number of migrants.

Migration is a complex issue within the villages studied, with a constantly changing flux of immigrants as well as emigrants. Many fishers migrated different distances, from tens of kilometres to hundreds, and on differing time scales, from short fishing trips lasting a few weeks to seasonal migrations of three to nine months, to definitive immigrations. The number of migrants also varied from year to year. It is difficult to quantify these complex migratory movements and though most KIs were clearly knowledgeable about the migration destinations and drivers, many struggled to put an accurate number to the number of people moving. However, general trends in the migratory patterns became clear from the multiple KI interviews.

Table 51. Summary of the village and fishers KIs interviewed, presenting their origin, migration status, occupation and any leadership role

Location	Number of KI interviews	Migration status				Occupation			
		resident	resident-migrant	resident, migrates	migrant	fisherman	Shark fin, sea cucumber collector	Chef de Fokontany or leader	Velondriake committee
Ampasibe	0								
Ampasilava	1	1				1		1	1
Ampatike	1	1				1			
Anabohazo	0								
Andambatihy	1	1				1		1	
Andavadoaka	7	2		5		7		3	
Andranombala	1			1		1		1	
Andravoho	1				1	1			
Andriamitaroke	1				1	1			
Ankevo	1			1		1			
Antsatsamoroy	3		2	1		3		1	
Belavenoke	2		1	1		2		1	1
Belo-sur-mer	1		1			1			
Bemakoba	2		1		1	1	1	1	
Benjavily	2				2	1	1		
Bevato	2			2		2		1	1
Dondosy	1								

Lamboara	1		1			1		1	1
Maintirano (Ambalahonko)	1	1				1			
Maintirano (Ampasimanjoro)	4	4				2	2	1	
Mananja	3				2	3		1	
Maroantaly	4	4				4			
Morombe	5	2		3		3	2		
Morondave (Betania)	4		1		3	3	1	1	
Nosy Be (Belo)	1								
Nosy Be (Morombe)	1	1				1		1	1
Nosy Hao	1			1		1		1	1
Nosy Lava	4		1		3	4			
Nosy Mangily	1				1	1			
Nosy Mboro	0								
Nosy Mitata	1			1		1		1	1
Nosy Vao	0								
Nosy Ve	0								
Tampolove	1			1		1		1	1
Total	**59**	**19**	**8**	**17**	**15**	**48**	**7**	**14**	**6**
%		32	14	29	25	81	12	24	10

resident - resident of the location where the interview was held

resident, migrates - resident of the location where the interview was held, but also migrated or had migrated in the past

resident-migrant - had immigrated in his generation to the location where the interview was held and had settled or married here; a quasi-resident

migrant - migrant to the location where the interview was held

Higher-level KI interviews

Table 52. KIs from local government, the department of fisheries, Malagasy National Parks, conservation and environment NGOs, academia and leaders of the small-scale fishers that were interviewed

Name	Email	Telephone	Role
Malagasy National Parks			
Odile Venty	ventyodile@yahoo.fr	032 05 531 26 033 08 931 34	Directeur du Complexe Kirindy Mite et Reserve Spéciale Andranaomena, MNP, Morondava
Jacques Jao			CVCPM, MNP, Morondava
Jocelyn Rakotomalala	angaptle@wanadoo.mg	032 02 531 26 033 11 435 72	Directeur Interrégional MNP, Tulear
Marc Fenn	mfenn@wwf.mg	032 40 39 243 033 11 928 84	Technical Advisor, WWF/MNP, Tulear
Colbert Kilake		033 09 897 65	Chef de volet Appui au developpement et education environmentale, Parc National Tsimananpestse, MNP
Government agencies			
Dr Edaly	edaly@freenet.mg	032 04 909 88	Directeur Régional, Direction Régionale de la Développement Rural, Tulear
Mike Nadison Andriamaha*faly*	mike_nadison@yahoo.fr		Directeur Inter-regional, Chargee des Regions Atsimo-Andrefana, Androy, Anosy, Menabe, Ministere de l'Environment, Eaux et Forets et du Tourisme,

			Tulear
Dr Armand-Colin Ratsirisija	dr_ratsirisija@yahoo.fr	033 07 075 08	Chef du Service Regional de la Peche et Ressources Halieuatiques, Sud Ouest,Tulear
			Chef de Projet d'Appui aux Communautes des Pecheurs de Tulear (PACP)
M. Zatao		032 02 87 376	Chef de Division, Peche Traditionelle, PACP, Tulear
		033 05 87 376	
M. Noelly		032 41 81 990	Chef Division Peche Industrielle et Artisanale (SRPRH), Tulear
		033 05 46 365	
Gaetan Fanoremae		032 42 690 80	Chef SRPRH, Maintirano
Academia			
Dr Edouard Mara	maraedouard@yahoo.fr	032 02 43 121	Senior Lecturer, IHSM, Tulear
Dr Man Wai Rabenevanana	manbeniev@yahoo.fr	020 94 435 52	Directeur, IHSM, University of Tulear, Tulear
		020 94 419 89	
Dr Lalaina Rakotoson Randriantsitohaina	lalatsitohaina@gmail.com	032 58 581 92	Team Leader, Development & Environmental Law Centre, Fianarantsoa
		033 18 896 37	
Michel Norbert Rejela		033 12 60 433	Geographie-Sociologie, University of Tulear, Tulear
Mansare Marikandia		032 41 88 679	Doyen, Faculte de Lettres, University of Tulear, Tulear
Desire Armand Raharison	kilybemva@yahoo.fr	033 40 011 04	Anthropologue; founder of the Association Kilybe
Conservation NGOs			
Dr Herilala Randriamahazo	herilala@wcs.org	033 11 87 993	Marine Programme Coordinator, Wildlife Conservation Society (WCS), Antananarivo
Harifidy Olivier Ralison	horalison@wwf.mg	033 02 888 05	Marine Programme Officer, WWF, Antananarivo
		032 07 543 06	
Vola Ramahery	vramahery@wwf.mg	033 15 803 58	Marine Programme Coordinator, Antenne Regionale Toliary, Tulear

		032 48 304 85	
Geraud Leroux	geraud.leroux@sunrise.ch	032 44 369 35	Project Manager, Marine Biodiversity Conservation (Geneva Museum), Maintirano
Fishing community associations			
Roger Samba		032 50 088 14	President Velondriake Community-managed MPA, Andavadoaka, Befendefa commune
Sibani Norbert			President, l'Association Pour la Protection de l'Environment Marine, Maintirano; previous Maire of Maintirano
Seta Fantery		032 42 298 76 033 17 671 07	President de l'Association Hahitamami (communes de Befasy, Belo-sur-mer, Andranopasy, Soaserana); previous Maire of Belo-sur-Mer
Mme. Titi			President of Fishers Union (PTM), Maintirano
Local government authorities			
M. Rio			Mayor, Befandefa Commune
M. Simon			Deuxiem Adjointe au Maire, Befanefa Commune
			Mayor, Morombe
			Premier Adjoint au Maire, Morombe
M. Michel		032 57 765 32	Maire, Andranopasy
			Mayor, Belo-sur-Mer Commune
M. Solofo		033 40 013 57	Premier Adjoint au Maire, Belo-sur-Mer
M. George Alain			Conseilleur communale, Belo-sur-Mer
M. Pikulas Andreanos		034 03 305 60	Mayor, Maintirano
Private Sector Firms			
Jaco Chan Kit Waye	jaco@copefrito.com	020 94 438 02	Directeur General Copefrito, Tulear.

	032 02 090 49	
Chrysante Randriambololona	032 04 70 208	Marine resource management consultant, Tulear

Appendix 5. Official documents relating to local management measurements

REPOBLIKAN'I MADAGASIKARA
Tanindrazana – Fahafahana –Fandrosoana

FITANANA ANTSORATRA NY FIVORIANA
MIKASIKA NY FIAROVANA NY TONTOLO AN-DRANOMASINA

Androany zoma tamin'ny efatra ora hariva, dimy amby roapolo aprily taona valo sy roarivo dia nivory tao ami'ny trano fandraisam-bahiny "LE BAOBAB" ny manam-pahefana isantsokajiny avy ao ami'ny faritry ny MENABE sy ATSIMO ANDREFANA miaraka amin'ny "ONG ANGAP" nandinika ny olana mikasika ny fanjonoan'ny mpanjono avy aty Morombe ao anatin'ny nosy manodidina ny kaominina ambanivohitra Belo sur mer sy Andranopasy . Izany Fivoriana izany dia teo ambany fitarian'ny Andriamatoa DAGT ny faritra MENABE.

Ny fandaharam-potoana :
- fandinihana ny lalàna mifehy ny mpanjono amin'ireo nosy ireo mba hiarovana ny tontolo an-dranomasina sy ny manodidin'azy
- fandinihana ny lalàna fiarovana amin'ny faritra manasaraka ny faritry MENABE sy ATSIMO ANDREFANA
- ny fandriampahalemana
- Fandinihana ny fisian'ny sambo be mpanjono avy any Toliara tsy ara-dalana manjono amin'ny Faritry MENABE
- samihafa

I NY AMIN'NY FANJONOANA

a) **Ben'ny tanana Belo sur Tsiribihina**

- Namelabelatra sy nampahafantatra momban'ireo nosy misy olona mipetraka ireo dia ny (Nosy be Andriambory, Andravoho, maheloholo……)
- Fanazavana ny fahasimbana sy fandikana ny fombafomban'ny tany tsy voahaja

b) **Vaha olana efa noraisin'ny tany antoerana**

- Fidinana manam-pahefana antoerana nijery sy nifampiresaka tamin'ireo olona ireo ary filazana taminy mba hanorim-ponenana any amin'ny Kaominina Belo sur mer, tsy nisy fandroahan'azy ireo, fa tsy nety ilay olona,
- Ferana ho telo andro ihany ny fijanonana manjono eny dia mody amin'ny tanana misy azy ny mpanjono

d) **Solontenan'ny mpanjono Morombe sy Ben'ny tanana Befandefa**

- olana ho an'ny vezo izay mipetraka ao ny hipetraka any Belo satria lavitra ny elanelana misy eo amin'ny Nosy sy ny Kaominina
- ny olana mipetraka dia ny fanangonana ristourne satria tsy tonga mandoa any ami'ny kaominina ny mpanjono, fa avy dia mitondra ny vokatra izay azony,
- Ny Vezo avy aty Morombe ihany no manana traikefa manao ny asa magnirika hatramin'ny 25m mandeha any ambany ranomasina
- Efa be dia be ny olona miorom-ponenana any izao , ka ahoana no handaminana ny telo andro ary dia mihisa toy izao ny olona efa any izao ;
  * Andranotaroka : maherin'ny 400
  * Nosy be : maherin'ny 200
  * Andravoho : maherin'ny 100

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e) **Ben'ny tanana Manombo**

- alao ianareo tompon-tanana no hametraka ny fitsipika izay mety hiarovana ireo nosy ireo, fa izahay kosa dia hanao fampilazana izany amin'ny olom-pehezinay ary hanaraka ny fitsipika izay hapetrak'areo raha tian'izy ireo ny hamelom-po any.

f) **Talem-paritry ny mpanjono Toliara**

- hapetraka tsara ny fandravonana ny lalàna iraisana eo anivon'ny vondrom-bahoaka sy ny tekinisianina ao amin'ny fanjonoana ny amin'ny amehezana ny :

* fanangonana hetra
* fanajana ny fombafomban-tany
* ny fanatontoloana

Satria olana ho azy ireo ny fanaraha maso ny zava-misy any antoerana noho ny fahalaviran'ny tany.

g) **Andriamatoa Mpanolontsainam-paritra**

- tsy ampy ho anay ny 3 andro fa aleo atao iray volana satria, betsaka ny olana mety hiseho na ara-toetr'andro,na amin'ny fitantanana ny vatsy ho any
- tsimba azo ajanona ho an'ny mpanjono ve ny iray na roa amin'ireo nosy ireo fa tsy atao "parcs marins"

h) **ANGAP**

- hajoro ny fikambanan'y mpanjono mba ahafahana manaramaso sy mamaritra ny fotoana ijanony eny,
- hapetraka ny fotoana hitariana ny manampahefana amin'io toerana io mba ahafantarana marina ny olona mipetraka ao sy ny tena zava-misy marina

Rehefa samy nilaza ny heviny sy olana misy avy ny andaniny sy ny ankilany, dia nilaza ny ANGAP, fa anatin'ny fandaharam-potoanan'ny fanjakana fa hatao "Parcs marins" ireo nosy ireo manomboka amin'ity taona ity. Noho izany ary dia nifanaraka ny mpivory rehetra fa :

1- vonona hanaja ny fomban-tany . ao ny mpanjono,
2- vonona hanaja ny fanjonoana sy ny lalàna mikasik'azy,
3- fankatoavana ny "parcs marins"
4- mahazo manjono mandritry ny 3 andro ary tsy minday vady amanjanaka
5- tokony ho isy ny fifandraisana sy fanatonana amin'ny fokonolona ary koa solontena isaky ny kaominina amin'ny fotoana fananganana "Pars marins" io
6- mbola mahazo mipetraka sy manjono amin'io toerana ion y mpanjono mandra-pipetraky ny "Parcs marins"

i) **Filoha lefitry ny FIMAMI**

Apetrakay amin'ny Ben'ny tananan'I Belo sur mer ny fametrahany ny lalàna hifehy ny fanjonoana amin'ireo Nosy ireo, avy eo dia manaraka ho azy izay manjono amin'ireo Nosy ireo.

Farany moa dia mbola eo ampandaminana ny lalàna mifehy ny fanangonan-ketra ny ny faritra Menabe amin'izao fotoana izao, ka ampahafantarina amin'ny manaraka izany raha efa vita

Nifarana tamin'ny fito ora sy fahefany hariva ny fivoriana tamin'ny daty sy toeana voalaza etsy ambony ihany.

Ny Mpitan-tsoratra

RAMBELOSON Lucie

Ny filoha

SABIRE Jerome

REPOBLIKAN'I MADAGASIKARA
Tanindrazana – Fahafahana –Fandrosoana

TOHIN'NY FITANANA ANTSORATRA NY FIVORIANA MIKASIKA NY FANDRIAMPAHALEMANA

Androany asabotsy tamin'ny enina ora hariva, enina amby roapolo aprily taona valo sy roarivo dia nivory tao ami'ny trano fandraisam-bahiny "LE BAOBAB" ny manampahefana isantsokajiny avy ao ami'ny faritry ny MENABE sy ATSIMO ANDREFANA miaraka amin'ny "ONG ANGAP" nandinika ny olana mikasika ny fandriampahalemana. Izany Fivoriana izany dia teo ambany fitarian'ny Andriamatoa DAGT ny faritra MENABE.

Ny fandaharam-potoana :
- fomba handrindrana ny fiaraha- miasa eo anivon'ny olom-boafidy sy ny olom-boatendrin'ny fanjakana amin'ny mpitandro ny filaminana mikasika ny fandriampahalemana amin'ny halatr'omby,
- Ny fiaraha- miasa eo anivon'ny olom-boatendrin'ny fanjakana sy ny mpitandro ny filaminana
- fitadiavana ny tombotsoa iombonana handravonana ny olana izay misy

II ***Fandrindrana ny fandriam-pahalemana eo anivon'ny olom-boafidy sy olom-boatendry ary ny mpitandro ny filaminana***

a) **ny kolonely lehiben'ny zandarimaria Morondava**
- iaraha midinika ny dina hampiarina raha misy ny olana eo amin'ny fizaran'ny faritra roa "limitrophe"
- fandrindran'asa sy fiaraha midinika hiarahan'ny olom-boatendry sy ny mpitandro ny filaminana
- miara miombonkevitra amin'ny fanatanterahana ny dina izay misy ary samy mandray andraikitra amin'ny anjara manandrify azy
- fandrindrana ny fandriampahalemana eo anivon'izy samy mpitandro ny filaminana
- eo ambany fahefan'ny olom-boatendry (Chef District) ny Police Administrative ka andraikiny ny mametraka ny lamina tiany hapetraka mba hanana fandriampahalemana

b) **Tale kabinetran'ny tontolo iainana**

Dingana lehibe amin'ny ady amin'ny fahantrana ny fametrahana tsara ny fandriampahalemana, noho izany tsy tokony atao ambaninjavatra ary tokony apetraka ny paik'ady, sy fomba fiasa R.R.I.

d) **Lehiben'ny Distrika ny Morombe**

- Ho an'ny Distrikan'ny morombe dia efa manana dina nivolavolaina fa saingy mbola ampiandrasana ny famoahan'azy,
- Fahavononan'ny Distrikan'ny Morombe hiara hisalahy amin'ny Faritry MENABE
- Fanomezan-danja ny fiarahamiasa amin'ny fitandrovana ny tombotsoa ho an'ny vahoaka tsy mandady harona

e) **solontenan'ny Faritra ATSIMO ANDREFANA**
tokony miara misalahy mifanome tanana ho toko telo mamasa-nahandro ny olom-boafidy, ny olom-boatendry ary ny mpitandro ny filaminana

f) **ny sosokevitra niarahana**

- ezahina ho araky ny lalàna ny Dinan'ny kalaony eo anivon'ny tribonaly,
- fanadihadiana sy fandrindrana ny fiaraha-miasa amin'ny mpitandro ny filaminana mba tsy hisian'ny hevitra mifanipaka
- fidinana an-toerana amin'izay toerana manana olana mba ahitana ifotony ny zava-misy marina,

FEHINY :

Niara niaky ny mpivory fa :

- hifanampy sy hifanome tanana amin'ny olana manana olona ny mpitondra sy ny kalaony
- hivondrona ary hiray hina ny manam-pahefana hananatra ny zanany
- Hisy ny vinavina famoriana izay mbola tsy voafaritra fa karazan'olona iza no hivory, inona ny antontataratasy ilaina amin'io fivoriana io, oviana ny daty hanaovan'azy , aiza ny toerana hivoriana ary iza no hizaka ny lany amin'ny fivoriana ? Napetraka tamin'ny solontenan'ny faritra Roa moa ny famaliana ireo fanontaniana ireo dia ny ATSIMO ANDREFANA SY MENABE mba handray ny fanapahan-kevitra mifanandrify aminy

III ***Fandrindrana ny fandriam-pahalemana eo anivon'ny olom-boatendry sy ny mpitandro ny filaminana***

Toy ny vary sy rano ireo roa ireo ka tsy afa-misaraka noho izany tsy tokony avela hiasa irery ny mpitandro ny filaminana fa tokony hiara hiasa akaiky amin'ny manam-pahefana ara-pitantanana (Autorité Administrative).
Mitaky fifampiresahana sy fifanatonana ary fiaraha midinika izany rehetra izany

a) **Andriamatoa DAGT MENABE**

- vonona izahay hanatanteraka izay voalaza rehetra izay
- ho anareo "Commandant " mba misy fotoana ianareo manoro hevitra ireo Ben'ny Tanana ireo satria misy amin'izy ireo tsy mahalala ny tokony ho ataony
- Fampahafantarana sy fananarana ny zavatra tsy mety ataon'ireo solontenam-panjakana any amin'ny sehatra misy azy any, fa tsy hijery harona antava

b) **olana miseho anatin'ny Distrikan'ny Beroroha**

- tapaka fa miara midina any Beroroha ny Commandant roalahy tompon'ny olana hiara mijery sy handinika ny tokony hatao amin'ny famahana ny olana misy
- ny handehanan'ny Filohan'ny Faritra Atsimo Andrefana na ny solon-tenany miara mijery ireo olana misy ireo, ka hifanome fotoana amin'ny Commandant roa lahy amin'ny fotoana maha mety izany
- anjaran'ny kolonely Rakotobe Christian kosa no manao tatitra ny fandaharam-potoana izay ho tanterahina any amin'ny lehiben'izy ireo any ambony.

Nifarana tamin'ny folo ora sy sasany hariva ny fivoriana tamin'ny daty sy toerana voalaza etsy ambony ihany.

Ny Mpitan-tsoratra

RAMBELOSON Lucie

Ny filoha

SABIRE Jerome

REPOBLIKAN'I MADAGASIKARA
Tanindrazana – Fahafahana – Fahamarinana
****

MINISTERE DE L'INTERIEUR ET DE LA DECENTRALISATION

REGION DU MENABE

ARRETE N° 013/2008

portant l'interdiction de s'installer en permanence sur les îlots, se trouvant au large de la Commune rurale d'Andranopasy, District de Manja et de la Commune rurale de Belo sur Mer, District de Morondava, Région du Menabe

LE CHEF DE REGION

- Vu la Constitution ;
- Vu la Loi N° 2004- 001 du 17 Juin 2004 relative aux Régions et les textes subséquents ;
- Vu la Loi N° 94-007 du 26 Avril 1995 relatives aux pouvoirs, aux compétences et aux ressources de Collectivités Territoriales Décentralisés ;
- Vu la Loi N° 94-008 du 26 Avril 1995 fixant les règles à l'organisation, au fonctionnement et aux attributions des Collectivités Territoriales Décentralisées ;
- Vu l'Ordonnance N° 93-112 du 18 Janvier 1994 portant organisation générale des activités de la pêche maritime ;
- Vu le Décret N° 97-1455 du 18 Décembre 1997 portant organisation générale des activités de collecte des produits halieutiques d'origine marine ;
- Vu le Décret N° 2004-859 du 17 Septembre 2004 fixant les règles relatives à l'organisation, au fonctionnement et aux attributions des Régions, en application des dispositions transitoires de la loi N° 2004-001 du 17 Juin 2004 relative aux Régions ;
- Vu le Décret N° 2007-022 du 20 Janvier 2007 portant nomination du Premier Ministre, Chef du Gouvernement ;
- Vu le Décret N° 2007-817 du 28 Août 2007 portant nomination du Chef de Région du Menabe ;
- Vu le Décret N° 2008-427 du 30 Avril 2008 portant nomination des membres du Gouvernement.

ARRETE :

ARTICLE PREMIER :

Face à la dégradation incessante dûment constatée de la biodiversité marine et côtière par la plupart des pêcheurs, immigrant, il est strictement interdit, désormais, de s'installer sur les îlots, se trouvant sur la mer territoriale des Communes Rurales d'Andranopasy, District de Manja et Belo sur Mer, District de Morondava, Région du Menabe, quels que soient les motifs évoqués.
Cette interdiction n'est pas applicable aux chercheurs, aux touristes et aux pêcheurs célébrant leurs cultes rituels habituels.

ARTCLE 2 :

Les îlots concernés au présent Arrêté sont :

- Dans la Commune Rurale de Belo sur Mer :
  Nosy Andravoho

Nosy Tania
Nosy Andragory
Nosy Angarahoka
Nosy Be

- Dans la Commune Rurale d'Andranopasy:
  Nosy Maheloholo
  Nosy Andramitaroka

ARTICLE 3 :

Toutefois, toute activité inhérente à la pêche, notamment la pêche traditionnelle, sera autorisée, durant la campagne, pour les espèces réglementées. Seule, l'installation permanente est interdite

ARTICLE 4 :

Le Chef de Service Régional de la Pêche, le Commandant du Groupement de la Gendarmerie Nationale, le Chef de la Brigade Préfectorale de la Police, les Chefs de District de Manja et de Morondava, les Maires des Communes Rurales d'Andranopasy et de Belo sur Mer, seront chargés de l'application immédiate du présent Arrêté.

ARTCLE 5 :

En raison de l'urgence et conformément aux dispositions de l'Article IV de l'Ordonnance N° 62-041 du 19 Septembre 1962 relatif aux dispositions générales de droit interne et de droit international privé, le présent arrêté entre immédiatement en vigueur dès qu'il aura reçu une publication suffisante (émission radio locale, affichage et Kabary).

Fait à Morondava, le 12 Mai 2008
LE CHEF DE REGION
ANDRIAMASIARISON Mamy Elysée

« POUR AMPLIATION CONFORME »

MINISTERE DE L'INTERIEUR ET DE LA DECENTRALISATION

REGION DU MENABE

N° 177 /REG/MBE/SG/DAGT/SRPRH

Morondava, le 13 Mai 2008
P.LE CHEF DE REGION
Par délégation
Le Secrétaire Général.

BOANA Idy

DESTINATAIRES:
MININTER/DECENTRA.....Antananarivo
MINENVEF.....Antananarivo
«A titre de compte-rendu»
CHEF Région / Sud-Ouest.....Toliara
CHEF District.....Morombe
«Pour Information»
Chrono
Archive

REPOBLIKAN'I MADAGASIKARA
Tanindrazana – Fahafahana – Fahamarinana
****

MINISTERE DE L'INTERIEUR ET DE LA DECENTRALISATION

REGION DU MENABE

NOTE DE PRESENTATION

relative à l'interdiction de s'installer en permanence sur les îlots, se trouvant au large de la Commune rurale d'Andranopasy, District de Manja et de la Commune rurale de Belo sur Mer, District de Morondava, Région du Menabe

Pour préserver les espèces de la biodiversité marine et côtière, d'une part, et pour pallier à la dégradation environnementale incessante, due aux activités du plus grand nombre de pêcheurs, allant s'immigrer pendant la période de pêche, d'autre part, sans parler du non respect des us et coutumes, célébrés habituellement par les *Vezo*, la Région du Menabe a pris une noble décision, d'interdire les pêcheurs, de s'installer en permanence sur les îlots au large des Communes rurales d'Andranopasy et de Belo sur Mer.

En effet, dans le cadre de la mise en place du Système des Aires Protégées Marines à Madagascar (SAPM), la Région envisage de protéger ces îlots, ayant une importance capitale, pour l'enrayement du processus de dégradation de la biodiversité marine, et ainsi au profit du développement de l'écotourisme, dans la Région du Menabe.

Tel est, dans l'ensemble, l'objet de la présente note.

Morondava, le 13 Mai 2008.

LE CHEF DE REGION

REGION MENABE

ANDRIAMASIARISON Mamy Elysée

Arrivée N° 191 26 MAY 2008

C O M P T E - R E N D U

Une réunion de concertation entre les Régions de MENABE et SUD-OUEST, sur la gestion des îlots au large de BELO/MER et ANDRANOPASY ainsi que sur la gestion des zones limitrophes s'est tenue à MOROMBE pendant le période du 25 au 27 Avril 2008.

La Délégation de MENABE, dirigée par Sieur SABIR Jérôme DAGT est composé de 12 personnes dont:

1 – Monsieur SABIRE Jérôme, DAGT Région MENABE
2 – Le Lieutenant-Colonel RAKOTOBE Christian, Commandant le Groupement de la Gendarmerie Nationale de MENABE.
3 – Madame VENTY Odile, D.P ANGAP
4 – Monsieur RAJERISON Hubert, Directeur Régional Pêche MENABE.
5 – Monsieur TAKOZA Justin, MAIRE de la Commune Rurale BELO/MER.
6 – Le Chef d'Escadron TSIKETA Bernard Dieu-Donné, Commandant La Compagnie Territoriale de la Gendarmerie Nationale de MANJA
7 – Le Capitaine TOTO Hajanirina, Commandant la Compagnie territoriale de la Gendarmerie Nationale de MORONDAVA
8 – Le GP1C MOYETZIS Emile, Commandant la Brigade Territoriale de la Gendarmerie Nationale de MANDABE;
9 – Le GP1C RANDRIANASOLO François, Commandant la Brigade Territoriale de la Gendarmerie Nationale de MARERANO;
10 – Le GPHC RANDRIANAMBININA, Commandant la Brigade Territoriale de la Gendarmerie Nationale de MANJA;
11 – Le GPHC TSIBARA, Commandant la Brigade Territoriale de la Gendarmerie Nationale de ANKILIABO;
12 – Le GP1C TSARAMARO, Commandant la Brigade Territoriale de la Gendarmerie Nationale de ANDRANOPASY;

La première partie de la Délégation a pris le vol régulier de l'AIR MAD du Vendredi 25 Avril 2008, tandis que la deuxième partie s'est rendue au lieu de la Réunion à bord du TOYOTA Z-4706, dotation de la Compagnie territoriale de MANJA.

Les deux Chefs de Région étant retenus par d'autres obligations, la réunion a été dirigée conjointement par le DAGT de MENABE et le représentant de la Région du SUD-OUEST.

La réunion proprement dite s'est déroulée comme il suit:

La journée du 25 Avril 2008.

Lieu: salle de réunion de l'Hôtel restaurant le BAOBAB à MOROMBE.
Durée: du 16 heures à 19 heures 30 minutes.
Participants: 44 personnes étaient présentes (Fiche de présence en date du 25 Avril 2008.)

Quatre points étaient à l'Ordre du jour, à savoir:

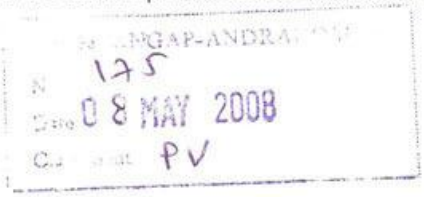
- Utilisation des îlots au large de BELO/MER et ANDRANOPASY par des migrants pêcheurs traditionnels venant du SUD/OUEST et proposition de conservation des îlots en faveur de l'environnement.
- Passage des grands chalutiers venant de TULÉAR et de MORONDAVA dans les zones maritimes très sensibles d'où raclage et destruction des fonds marins.

Après les discussions et les échanges d'information, d'unanimité il a été décidé:

1 – Respect des us et coutumes concernant les sept îlots au large de BELO/MER et d'ANDRANOPASY.
2 – Respect des règlementations sur la pêche maritime.
3 – Accord pour la protection de ces îlots pour devenir "PARC MARIN".
4 – Tous les pêcheurs sans exception doivent habiter dans le village de BELO/MER mais ils ont le droit d'aller pêcher durant une semaine et se servir des îlots comme zone de campement temporaire.
5 – Communication et sensibilisation au niveau de la population locale sur toutes les décisions prises par les Autorités des deux Régions.
6 – Concertation avec la population concernée sur le processus de création de ce PAR MARIN.
7 – La modalité pratique d'exécution du consensus est laissée à la charge de la Commune Rurale de BELO/MER de concertation avec les membres de la Délégation

La Délégation de MENABE a été invitée pour participer à la cérémonie de remise des primes internationales "Equator prize" en faveur de la population du Fokontany ANDAVADOAKA avec l'appui du PNUD et WCS, sous le haut patronage du Directeur de cabinet du MEEFT sur la conservation et production des "Horita"

Il est à noter qu'ANDAVADOAKA est parmi les cinq pays qui ont reçu ce prix et qu'il est classé premier sur 50 pays dans le développement local des activités productrices des fruits de mer en tenant compte de la protection de l'environnement.



La population dudit Fokontany a protégé et fermé ces deux îlots pendant une période de sept (07) mois afin d'augmenter la production d'Horita" plus de 5 fois qu'auparavant. (≥ 1 tonnes 200 kg).

Le 26 Avril 2008 à 18 heures:

Lieu: salle de Réunion de l'Hôtel restaurant le BAOBAB à MOROMBE.
Durée: du 18 heures à 20 heures 30 minutes.
Participants: 41 personnes étaient présentes (Fiche de présence en date du 26 Avril 2008.)

La réunion est divisée en deux grandes parties:

* Réunion discussion entre les différentes Autorités, les représentants du Fokonolona, et les Forces de l'Ordre sur la gestion zone limitrophe,
* Mise au point entre les Autorité Administratif et les Forces de l'Ordre.

1 – Les deux parties étaient d'accord sur le principe de concertation dans le cadre de la résolution des problèmes de sécurité dans les zones limitrophes.

2 – Reconnaissance de l'existence de l'organisation dite "Kalony" dans le cadre de la sécurisation du milieu rural.

3 – Respect des victimes des vols de bouefs et poursuivant par les différentes Autorités (aide et assistance jusqu'à la résolution de l'affaire).

4 – Prise de responsabilité des Autorités de differents échelons (Elues et désignées) afin de résoudre chaque cas de vol qui se présente.

5 – Proposition d'organisation d'une autre d'une autre réunion d'une autre envergure avec la participation des MAIRES des zones concernées mais le lieu, la date et le financement restent à définir. Les deux Chefs de Région décideront de la modalité d'exécution.

6 – Multiplier les contacts entre les Autorités Administratives et les Commandants d'Unité des zones limitrophes pour faciliter la fluidité de communication.

7 – Les deux Commandants de Compagnie Territoriale de MANJA et ANKAZOABO/SUD se rendront à BERoROHA éventuellement avec le DAGT de la Région SUD/OUEST pour résoudre le problème opposant les membres de Kalony de MARERANO – MANJA – MANDABE avec les Autorité de cette localité suite à l'affaire de VB au préjudice du nommé DOIT-DONNE.

RESOLUTIONS

La Réunion a été présidée par le DAGT de la Région du MENABE sous le haut patronage de Monsieur le Directeur du Cabinet du MEEFT qui était de passage à MOROMBE;

La matinée du 27 avril 2008.

La dernière partie de la Réunion s'était tenue a huit clos entre les éléments de la Gendarmerie des deux Régions.

LES MEMBRES DE LA DÉLÉGATION
Le Lieutenant-Colonel RAKOTOBE Christian,
Commandant le Groupement de la G.N de MENABE.

LE CHEF DE LA DÉLÉGATION
Monsieur SABIRE Jérôme, DAGT
Région MENABE

Madame VENTY Odile, D.P ANGAP

Monsieur RAJERISON Hubert, Directeur Régional Pêche MENABE.

Monsieur TAKOZA Justin, MAIRE de la Commune Rurale BELO/MER.

PLAN D'ACTION

ACTIVITES	LIEUX	CHRONOGRAMME	MOYENS	RESPONSABLES
Etude socio-économique et étude d'impact sur la création du parc marin		A partir du 15 Mai 2008	ANGAP	ANGAP et Service Régional de la Pêche et des Ressources halieutiques
Lecture de l'Arrêté Consultation du Public et sensibilisation pour les CR Andranopasy et CR Belo sur Mer	Andranopasy	30 Mai 2008	Région	Région et Services Régionaux District Manja
	Belo sur Mer	05 Juin 2008		
Accélération des travaux de construction du Poste avancé de la Gendarmerie dans la CR de Belo sur Mer	Belo sur Mer	25 Mai 2008	Mairie Gendarmerie UADEL	Mairie, Entreprise, UADEL, Gendarmerie Nationale
Opérationnalisation du Poste avancé de la Gendarmerie Nationale	Belo sur Mer	1er , 2 et 3 Juin 2008	Gendarmerie Nationale	Mairie, Gendarmerie Nationale, UADEL
Etude scientifique sur la création du Parc Marin		10 Juin 2008	ANGAP	ANGAP et Service Régional de la Pêche
Assainissement et Contrôle des îlots	Sur les Ilots	20, 21 et 22 Juin 2008	Région ANGAP Mairie	Région ANGAP Mairie

Appendix 6. Coordinates of migration villages on the West coast of Madagascar

Table 53. GPS coordinates of the villages involved in the migration routes presented

Village_name	latitude	longitude	utm_easting	utm_northing	utzone
Abohazo	-18.4962	43.80037	373356.1	7954497	38
Ambatamilo	-22.4218	43.26761	321695	7519459	38
Ambohibe	-21.3506	43.51275	345782.8	7638319	38
Ambohibola	-25.0381	44.15846	415104.7	7230567	38
Ampasibe	-19.7481	44.39183	436281.1	7816281	38
Ampasilava	-22.1135	43.24735	319213.5	7553564	38
Ampatike	-20.1367	44.37125	434285.4	7773271	38
Ampatike (Andranopasy)					
Anakao	-23.6618	43.64839	362160.5	7382562	38
Andavadoaka	-22.0712	43.23925	318323.6	7558245	38
Andoharano					
Andolokopaky					
Nosy Andrangory/Be	-20.8391	43.7595	370931	7695168	38
Andranopasy	-21.2822	43.73444	368712.3	7646092	38
Andravona					
Andravony	-22.4742	43.27845	322877.6	7513667	38
Andrevo-bas	-23.0294	43.54897	351317.6	7452491	38
Andrevoho	-20.6695	43.84972	7714000	380185.5	38
Andriamitaroke	-21.0743	43.68912	363820.1	7669073	38
Androka	-25.0317	44.07211	406387.7	7231226	38
Anjahava					
Ankevo	-20.6013	44.08705	404865.5	7721712	38
Antsatsamoroy	-22.0092	43.25981	320367.9	7565130	38
Beheloka	-23.9057	43.67845	365477.7	7355582	38
Behovitse					
Belavenoke	-21.9545	43.26225	320551	7571191	38

Belo-sur-mer	-20.7357	43.9987	395750	7706786	38
Bemakoba	-19.708	44.42787	440041.5	7820732	38
Benjavily	-18.955	44.23587	419551.6	7903976	38
Beroroha	-21.6768	45.16585	517157.9	7602939	38
Bevato	-21.9008	43.28102	322423.4	7577157	38
Dondosy	-18.5452	43.85928	379610.9	7949109	38
Fanambotse					
Fianamaharasay	-22.9011	43.42143	338093.6	7466560	38
Ifaty	-23.1598	43.61231	357945.6	7438110	38
Itampolo	-24.6807	43.95023	393792.3	7270000	38
Lamboara	-22.1781	43.24853	319418.1	7546421	38
Lanirano					
Maintirano	-18.0592	44.02717	397043.7	8002999	38
Mananja	-18.2119	43.81108	374282.1	7985961	38
Mangily					
Manombe	-22.9605	43.47071	343217.6	7460036	38
Marife	-18.0575	43.86076	379429.4	8003079	38
Maroantaly	-18.4178	43.93118	387116.5	7963255	38
Marohao					
Morombe	-21.7412	43.36896	331322.4	7594932	38
Morondave	-20.2956	44.28159	424990.2	7755647	38
Mozambika	-18.9735	44.23789	419773.6	7901934	38
Nengengy					
Nosy Andambatihy	-22.0215	43.23908	318243.5	7563741	38
Nosy Andragnombala	-21.9568	43.20451	314589.5	7570863	38
Nosy Be (Belo)	-20.8378	43.5905	353343.5	7695165	38
Nosy Be (Morombe)	-21.8214	43.29306	323569.6	7585962	38
Nosy Hao	-22.0923	43.19061	313332	7555848	38
Nosy Kely Morondave	-20.304	44.26723	423495.4	7754709	38
Nosy Lava	-18.5857	43.92665	386748.1	7944675	38

Nosy Lava (Morombe)	-21.7358	43.29314	323472.9	7595445	38
Nosy Manitsa	-25.2241	44.21885	421316.3	7210007	38
Nosy Mitata	-21.9994	43.24038	318349.1	7566198	38
Nosy Maholollo	-20.9175	43.75487	370516.5	7686484	38
Nosy Motsadinitsy	-20.7031	43.82707	377852.9	7710271	38
Nosy Tania	-20.7776	43.816	376760.3	7702018	38
Nosy Vao	-17.4906	43.76683	369074.9	8065749	38
Salary Atm.	-22.5791	43.29173	324377.7	7502064	38
Salary Ava.	-22.5547	43.28701	323861	7504762	38
Soahany	-18.6718	44.21256	416959.1	7935303	38
Soalara	-23.5935	43.71626	369015.3	7390193	38
St. Augustin	-23.5463	43.75998	373431.2	7395453	38
Tambohorano	-17.5076	43.96144	389748.9	8063988	38
Tampolove	-22.2249	43.2607	320732.9	7541248	38
Tsiandamba	-22.691	43.33687	329157.7	7489727	38
Tsifota	-22.8251	43.36604	332317.8	7474912	38
Tulear	-23.3444	43.67011	364050.9	7417732	38