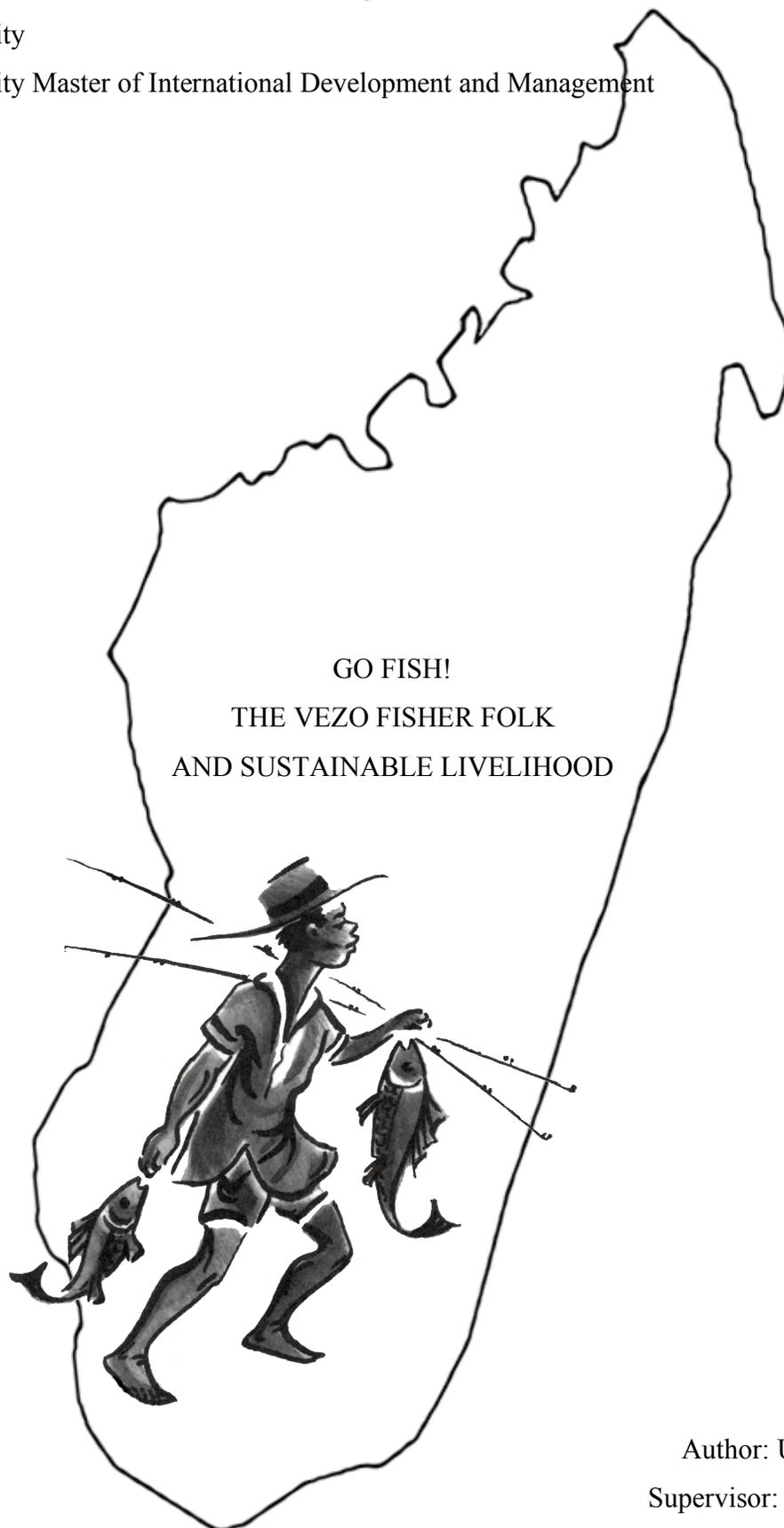


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Abstract

This Master thesis deals with the environmental and economical sustainability of and their effects on the livelihood strategies of the Vezo fisher folk in Saint Augustin, Toliara region, Madagascar. By using the Sustainable Livelihood theory and adopting the different forms of capital (human, social, physical, natural and economic) in the Analytical Framework the income activities of the fisher folk are analysed and explained. The conflict between environmental and economical sustainability is the underlying base and the mutual interdependence is discussed, in regard to the Vezo livelihood strategies and the general debate.

Fieldwork in Saint Augustin enabled the data collection. Qualitative methods were used. The findings are discouraging: there is no environmental or economic sustainability among the livelihood strategies adopted by the Vezo fisher folk. The lack of alternatives hinders the Vezo from changing strategies even though the forms of capital are many. These livelihood capital all revolve around fish, which is the main obstacle for changes within the Vezo livelihood.

Keywords

Fisher folk, Madagascar, strategies, economic sustainability, environmental sustainability

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List of Acronyms

ANAE	Association National d'Actions Environnementales (National Association for Environmental Action) (Madagascar)
Ar	Ariary, the national currency in Madagascar
EIU	The Economist Intelligence Unit
FAO	United Nations Food and Agriculture Organisation
ICL	International Constitutional Law
MINENVEF	Ministère de l'Environnement, des Eaux et Forêts (Ministry of the Environment, Waters and Forests) (Madagascar)
NGO	Non-Governmental Organisation
PO	Participant Observation
SAGE	Service d'Appui à la Gestion de L'Environnement (Support Services of Environmental Management) (Madagascar)
SEI	Stockholm Environment Institute
SL	Sustainable Livelihood theory
USD	United States Dollar
WB	World Bank
WCED	United Nations World Commission on Environment and Development

Glossary

(Words in *italics* in the text are explained in the Glossary)

Akiyo	Vezo for shark
Aluale	Vezo for barracuda
Angeleke	Vezo for captain fish
Artisanal	The art of small-scale fishing without motor or other electric equipment; often involves the whole family
Bycatch	Fish that is accidentally harvested and (often) thrown back into the sea
Commune	Consists of several fokontany
Epicerie	Smaller shop that sells household utensils and other imported merchandise
Fari	Local nutritious fruit
Fisher folk	A gender neutral term used to include both sexes in the fishing activities
Fokontany	Sector of the village
Lamantsa	Vezo for tuna
Lamba	Rectangular fabric, worn as skirt or used for other practical reasons
Laro	Toxic vegetable poison
Livelihood	(Economic) means that one person has for living, sustenance
Lugi	Vezo for sardine
Masikoro	Ethnic group that is mainly cultivating crops and taking care of livestock; living in southwestern Madagascar
Mihaza	Vezo for line fishing
Patsa	Small (sun-)dried shrimp
Pirogue	A dugout canoe
Soruboir	Vezo for skate
Tarikaky	Vezo for onshore fishing
Taxi brousse	Truck bus
Vezo	Ethnic group whose identity is defined by the sea and fish related activities; living on the coast in western Madagascar. Vezo is also the name for the language spoken by the Vezo

Introduction

The focus is the *Vezo fisher folk*, in Saint Augustin, Toliara region, southwestern Madagascar, for whom fishing is their main income and the researcher analyses the economic and environmental sustainability in their *livelihood* strategies. The thesis tries to show whether the fisher folk's own ways of livelihood are economically and environmentally sustainable or not, based fieldwork research carried out in autumn 2007. In order to fully describe the environmental impact and economical livelihood, a long-term perspective must be used. The Brundtland Commission's (WCED 1987) definition of the 'next generations' is used as a time perspective. Seeing the development over generations, both for the past and the future, creates a better picture of the fisher folk's dependence of the environment and whether the current strategies will be sustainable in the future.

Economic and Environmental Sustainability

In a utopian world, nature and humans would live in perfect harmony. Economic and environmental sustainability have often been described as two paradox states, which are hard to harmonise. Hence, they have almost never been unifiable. Nature has always been a source of economic income for humankind and as long as the rate of consumption was lower than the rate of biological replenishment this was not a problem. The evolution of the human species has put hard pressure on the earth to provide food, clothing and other material. The pressure on the environment varies spatially. Wealthy inhabitants that live in industrialised countries can knowingly cause or prevent human pressure on nature to escalate depending on their own choices. For marginalised people in poor countries the situation is harsher. Often they are forced to live off the nature and its products. This does by no means indicate that poor people are the cause for environmental degradation; but their possibilities and/or knowledge might be limited.

Economic welfare is a prerequisite for human survival but resource availability has only been an issue for the last hundred years. The intention is to link environmental sustainability with economic development and the people's need to survive. People struck by poverty have to ensure that they have food and shelter for yet another day; but this might mean that they need to use and exploit valuable environmental resources. In what way poor people exploit nature depends on

their livelihood strategy. These vary for example over time, geographic location, age and sex. Economists claim that poor people overexploit the environment, but it is important for them also to acknowledge the intergenerational equity and the inheritance. Thinking that environmental justice will be done over time and generations and that the inheritance might not be purely monetary are factors that affect the might justify short-term overuse of natural resources in economic terms. Human capital, such as knowledge, is just as important for environmental sustainability as economic conditions. (Jaeger 1995:45). Being economically poor, having a low economic income, means to fail to have a reasonable living standard. The chance for change into a more environmentally friendly livelihood is hindered by the crucial economic survival (Bhandari and Ghant 2006:18). Economists state that marginalised people are the cause for environmental degradation due to their overexploitation.

Environmentalists argue that current generations have an obligation to ensure that entire ecosystems are protected and will live on for the future generations. This is a holistic approach, where the individual no longer determines resource usage. Instead, a greater aim is the guarantee for the next generation. Concerning the transfer of capital, environmentalists state that resources need to be protected and that the romantic view of the rural farmer always being the most knowledgeable is not always applicable (Jaeger 1995:45). Modern regulations try to ensure the environmental survival, but in Madagascar there are few alternatives, especially for the Vezo fisher folk. The open access to fish harvesting does not apply a holistic approach for management of common resources. Humans are vital in reshaping the marine ecosystem and have through their exploitation disturbed the maritime pattern (Campbell and Pardede 2006:75).

The lack of long-term perspective and protection of natural resources for future generations show how important the economic survival is for humans. Environmental sustainability is necessary but the economic interests are crucial for livelihood strategies. Economic strategies are valued and preferred for livelihood survival. Livelihood is, in this thesis, looked at through the Sustainable Livelihood (SL) theory. SL maps out different forms of capital that the population has used/is using. It is in the nature of the SL theory that it is people-centred and revolves around the individual. SL describes and identifies different livelihood strategies. Each case is different, but the common core is that the people are the key actors in defining, shaping and changing

livelihoods. Important concepts within the theory's focus in this thesis are various forms of capital, such as social, economic, human, natural and physical (Krantz 2001:7, 9, 21-22; Forsyth 2007:94).

The Malagasy Context

Madagascar faces general resource exploitation and is slowly losing its biological richness. President Ravalomanana has promised changes, especially through the so-called Durban Vision, which aims at expanding the country's protected areas (SAGE undated). The Durban Vision was declared at the World's Park Congress in South Africa in September 2003. The goal is to triple the protected areas within five years, from 1.7 to 6.0 million hectares. The deadline expires in September 2008 and, if successful, the agreement will ensure that 10% of the land surface area is protected (Kremen et al. 2008:7). Additionally, the Madagascar Constitution, adopted on August 19, 1992, states in Article 39 that "everyone shall have duty to respect the environment; the State shall assure its protection" (ICL 2008). Any conflict between human survival and environmental sustainability is not mentioned. Successes in environmental sustainability are depending on the participation of the fisher folk (Gelcich, Edwards-Jones and Kaiser 2005:866).

Analysing the relationship between economic and environmental sustainability is crucial and the Vezo fisher folk are the key actors in this thesis. The population of Saint Augustin is poor, from a relative perspective, and is entirely dependent on the natural resources in the sea. Their situation has not been focused on before, despite their livelihood being threatened. The Vezo fisher folk focus solely on fishing activities and are dependent upon the natural resources. This makes the thesis important, highlighting the individuals and the environment in Saint Augustin, Madagascar. The analysis in the thesis builds upon unique empirical material, in the sense that the location and the research questions have never been combined and explored in this way. The material clearly shows that livelihood alternatives are limited and that the environmental existence and economic survival is threatened.

Aim of Research and Research Questions

The thesis focuses on economic and environmental sustainability and how the Vezos livelihood strategies are affected by and affect the above-mentioned sustainability. The research carried out

aims to contribute to and enhance the current knowledge (McIntyre 2005:117). As mentioned before, this thesis is unique in combining the theoretical framework of SL with the Saint Augustin context. The information gathered might be useful to other scholars doing similar research, even if the study setting itself cannot be applied universally and might not be transferable as an entirety. Generalisations are based on the Saint Augustin context and the contribution the conflict is supported by the case of the Vezo fisher folk. Therefore, the chosen research questions focus on Saint Augustin and on the conflict between economic and environmental sustainability.

The research questions are:

- Is the present fishing in Saint Augustin sustainable in an economic and environmental sense?
- What are the main driving forces within the Vezo fish folk in Saint Augustin in regard to individuals' livelihood strategies?
- Is there a contradiction among the Vezo fisher folk in Saint Augustin within these livelihood strategies concerning economic interests and environmental sustainability?

Structure of Thesis

This thesis presents the economical and environmental conflict, exemplified by the livelihood capital and strategies of the Vezo fisher folk. The Research Frontier offers a deeper plunge into other livelihood studies as well as gives a short theoretical introduction to the Sustainable Livelihood (SL) theory. SL is explained in the following chapter along with the Analytical Framework used. The Malagasy Background presents Saint Augustin and the Vezo fisher folk. The Methodology includes a discussion about qualitative and quantitative methods and describes the methods used to collect the data in the field. A short Case Description where empirical material is presented as well as fishing routines are explained precedes the Analysis. This chapter will combine theory and original material, describing and defining the livelihoods of the Vezo in Saint Augustin. The Conclusion will end the thesis.

Research Frontier

Much of the previous literature dealing with fish and/or sustainable livelihood does not concern Madagascar. The closest source are livelihood studies dealing with fish in other countries and locations. Also, other studies concerning sustainable livelihood are consulted. First of all, the crucial debate between environmental and economic sustainability will be briefly presented. The debate is the underlying base for this thesis and affects the forms of capital as well as the livelihood strategies chosen.

Theoretical Perspective

Forsyth (2007) states that livelihood alternatives, meaning different options within the livelihood strategies, reduce vulnerability when under economic and environmental stress (2007:93). This is a view that unites the paradox of economic and environmental sustainability: they both constitute a problem that affects the fisher folk. To find solutions that create sustainable livelihoods environmental and economic sustainability must be achieved. Economic wealth is crucial for the survival of humans, but can often not be achieved without extracting natural resources. The environment is equally important, as it is the basis for income. When exhausted, these resources can no longer contribute to welfare and there are no economic means for survival. As the two forms of sustainability are interdependent, both must be achieved for a sustainable livelihood.

Economic interests are often prioritised. Rural coastal livelihoods are dependent on fish, and to maintain or even increase their income the fisher folk might decrease mesh sizes to catch smaller fish. According to a study in Lake Malawi, population growth has affected the efficiency of fishing gear, for example mesh size, and also increased the exploitation of previously unwanted fish (Mpondal 1997:8-9). The ambition for a large harvest jeopardizes the juveniles, as these most often live in vicinity to the coast or in mangrove marshes (Arellano-Torres, Pères-Castañeda and Defeo 2006:309). This is the other side of sustainable livelihood; the health of the environment is a prerequisite for a prosperous economic future of the people. When fisher folk try to maximise their economic income they might destroy both the environmental habitats and their own economic sustainability.

SL defines a holistic and integrated approach towards eradicating poverty. It emerged in the 1990's with the main aim to find solutions for economic as well as environmental sustainability. Cross-thematic poverty eradication, fuelled by the people's own talents and abilities, drove the development of SL (Helmore and Singh 2001:4). The definition of sustainability is quoted from the Brundtland Commission's 'Report of the World Commission on Environment and Development': "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987). The Commission argues that the next generation has to have access to raw materials and ecosystems and this has to be taken into consideration when making decisions today (WCED 1987). It does not, however, touch upon the issues of what kind of living standard the future generation should have, giving space for economic and environmental alternatives worse than today.

Livelihood refers to the "manner of life" and the "various means of maintenance", according to Högger (2004:35). Furthermore, the phrase Sustainable Livelihood means that the livelihood must be able to deal with and recover from stresses and shocks. The Stockholm Environment Institute adds that the resources need to be protected for future generations as well as provide the population with the basic needs to ensure a minimum living standard (SEI 2008). It is important to notice that the ultimate definition of sustainability, livelihoods and sustainable livelihoods lies within the local context and that the researcher's perception might not be the same as the local one (Höger 2004:35). This thesis will focus on available livelihood capital and the relation to environmental and economic sustainability. The forms of capital are the concept of the SL theory and highlight strategies the people apply. The different variables concern different issues, such as human, physical, social, natural and economical capital. These terms and their meaning will be further explained in the Theory.

Fishing and Livelihood Perspective

Human livelihoods affect the environmental sustainability and the choices made can have positive or negative effects for the fish. Most coastal folk are *artisanal* fisher folk and use non-motorised boats, draw upon labour in the family and supply smaller markets. These people have larger choices in affecting the environment, but are hindered by the need for economic survival. An FAO report illustrates the dimensions of artisanal fishing:

“Lack of occupational and geographical mobility may result from [...] low formal education, advanced age, preference for a particular way of life, cultural taboos, [...] inability to liquidate one’s assets, indebtedness or just lack of knowledge and exposure to opportunities. The consequence of immobility is that fishermen may continue fishing even if they earn far less than their opportunity costs.” (Panayotou 1982:20)

Allison and Mvula (2002), connecting to the quote, present ideas on the economic poverty of fisher folk. Poverty is related to the overexploitation of environmental resources. A process termed “Malthusian overfishing” (Allison and Mvula 2002:3) indicates that open access to fisheries attracts groups that do not traditionally fish in combination with the lack of (enforced) catch limits. This results in declining resources and overexploitation.

Concerning economic causes, Cinner and McClanahan (2006) noticed, in their research in Papua New Guinea, that the fish most overexploited were the ones that rendered good prices on the local market. Their respondents’ socio-economic welfare was entirely dependent upon fish. Livelihood strategies could not be diversified, as there was neither access to nor any availability of alternatives as of that time (Cinner and McClanahan 2006:73, 78). The issues of environmental sustainability were not mentioned; the grave overfishing implies a destructive use of the natural resources. Cinner and McClanahan mention the importance of the access to the market and this is an equally important external issue in Madagascar. Laroche, Razanoelisoa, Fauroux and Rabenevanana (1997), describing the Toliara region, state that the poor road network is an obstacle for fishery development and that densely populated regions within the country, potential markets, cannot be reached easily. Since transport is difficult, fish trading is often limited to regions close to urban centres. The market plays an essential role in the livelihood strategies adopted. Not only does it create additional employment opportunities but transforms fish into hard cash and offers social networking. Laroche et al. conclude that the living standard has declined due to increased difficulties in selling fish and the lack of modern technology (Laroche et al. 1997:286, 297-298).

Overpopulation is an internal factor that puts additional pressure on already limited natural resources. A sharp decline in resources creates severe livelihood insecurity among the population, which in the long run leads to social, political and economic problems. Individuals, households

and the entire community will be affected, state Bhandari and Grant (2006:17). Related to this is the problem of enforcing the prohibitions that exists, in order to protect the environmental sustainability and ensure human livelihoods. Most often the case is that a protective legislation is not enforced and overexploitation of natural resources is taken for granted (Rakotonrina and Cooke 1994:410). Gelcich, Edward-Jones and Kaiser (2005) add that any restrictions on the harvest of natural resources must be developed and implemented together with the involved community. Livelihood strategies might be so diverse that external experts or even governmental representatives cannot identify all the complexities and therefore might destroy people's income rather than enable them to live in a more environmentally sustainable way (Gelcich, Edwards-Jones and Kaiser 2005:866). Damodaran (2006) shows that this was the case in South India. The author describes how access to the beaches enabled artisanal fisher folk to fish without hindrance. As the regional government limited access and introduced a control mechanism to ensure environmental sustainability, the small-scale fisher folk lost their access and most important economic activity ceased and many families were driven into deeper poverty. The government did align these restrictions with different schemes of welfare and development assistance but the livelihoods that emerged were not results from strategy diversification but merely a rushed solution (Damodaran 2006:67). Human livelihood depends upon the free access and strategies revolve around the possibilities that humans have. Many small-scale fisher folk apply a collective strategy and often fish with the family and thereby gain social support (Hilborn, Parrish and Litle 2005:192).

The fishing activities today are more complex than before. Allison and Mvula (2002) point out that modern artisanal fisher folk are not as immobile as Panayotou describes them and that they have responded to the declining fish stock. The fisher folk themselves may be the main cause of the diminished harvests. Fisher folk's livelihood strategies are greatly dependent on other options available in their vicinity, such as other income activities, being able to save money, social support. In Malawi, fishing is regarded as one of many possibilities to diversify income (Allison and Mvula 2002:3-4, 14), rather than being a part of the identity as the case is among the Vezo in Madagascar.

Sustainable Livelihood Theory

As shown in the Research Frontier, sustainable livelihood tries to connect environmental and economical sustainability. The conflict about the alignment and fulfilment of these paradoxical states has shaped the theory. Believing that the people affected are the drive for sustainable livelihood, the SL theory highlights the forms of capital used. This, as explained in the Analytical Framework, has enabled the researcher to identify livelihood strategies and show environmental and economical concerns.

Forms of Capital

Livelihoods are not comprised of one income/activity but actually include a portfolio of tangible and intangible assets. Krantz (2001:7, 21-22) mentions tangibles such as stores (food, jewellery) and resources (water, means of production) and intangibles such as claims (demands on material, moral support) and access (use of resources, employment). The forms of capital overlap with these assets:

- Human capital: knowledge, skills, capacity, creativity, adaptive strategies
- Physical capital: buildings, roads, machinery, infrastructure, crops/livestock
- Natural capital: land/soil, air, water, forestry/vegetation
- Social capital: governance structures, decision-making power, community groups, community and other institutions, culture, participatory process
- Economic/financial capital: savings, loans, income

(Adapted from Krantz 2001:9; Forsyth 2007:94, Helmore and Singh 2001:ix-xi, 4, 87-88.)

Furthermore, technical assets and indicators to measure livelihood security are needed (Bhandari and Grant 2006:18). Entitlements, such as support from the family or clan and basic rights in national and international constitutions and regulations, are important as well for the livelihood and for creating strategies. In all, a combination of assets, capital, activities and entitlements form each individual's livelihood. Additionally, in order to be sustainable, livelihood systems must show economic efficiency concerning use of resources, respect social equity in the sense that one livelihood does not hinder or destroy options for other livelihood, strengthen ecological integrity

through preserving natural resources for future generations and be resilient (Helmore and Singh 2001:4, 88-89).

Several scholars, as Bhandari and Grant (2006:19) point out, have argued that there is a democratic aspect; all household members should be able to influence the decision-making process in the community or at another relevant level. Concerning the relationship between the environment and more material factors, including the economical capital, natural resources play an important role in adjusting the SL theory to the local context. Dynamic and complex strategies are important for livelihood diversification and the environment is an easily accessed part that enables the local population to live their daily lives (DaCosta and Turner 2007:193).

One last important factor for SL is the issue of resilience. The people must be able to cope with and recover from shocks and stresses. Only then can their livelihood strategies be seen as sustainable and their basic needs fulfilled (Helmore and Singh 2001:8-9).

People and Community

This thesis discusses the environmental and economic issues. The humans will be the focus and their actions affecting nature will be analysed. Environmental prerequisites and the nature are important for humans and open up for another aspect: The people affected should be the key actors for change and set livelihood priorities (Krantz 2001:18, Forsyth 2007:93). SL acknowledges that people have a certain right, but also a responsibility. The people need to take responsibility for their own livelihood. Environmental sustainability is the impact of one's livelihood on other livelihoods and especially the effects it has on local and global resources. The sustainability refers to the internal capacity within the livelihood to withstand outside pressure (Krantz 2001:7).

Many formal institutions and stakeholders on higher levels try to change people's livelihood to become more sustainable, but they often neglect to use the local actors as a driving factor in this process. Outsiders might not be aware of the context and might actually create worse scenarios for the marginalised people (Forsyth 2007:93). Involving the community is an important aspect of the SL, but one should definitely not assume that this community is representative. There are still diversities on the individual level. Identification of the local people and representatives is

therefore important. Within the SL theory, Casse et al. (2005) touch upon an interesting aspect: how willing are the individuals to change? Every individual's characteristics influence long-term investments or responsibilities (Casse et al. 2005:705). One solution here is to give people better access to their livelihood capital, as it will give them more responsibility and possibilities to influence structures and processes (Krantz 2001:20). The globalisation process has also had impacts on the rural population, as their activities suddenly become a piece in an international game. Even though empirical studies show that there is a positive relationship between environment, economy and development, any negative global effects might strike hard on people already living in poverty (FAO 2004:12).

Critique

The SL theory can mainly be criticised for not including the poorest of the poor. Depending on how the forms of capital are evaluated and the theory applied, the general basic needs do not need to be accounted. As the poorest people struggle for survival each day, this might exclude them from any benefits that an applied SL might mean and, even worse, might destroy their applied strategies since they are not visible. As mentioned above, researchers might miss certain strategies due to not belonging to the community, and this might also be the case for the poorest of the poor. Development is complex, but the poorest of the poor are an important step in the change and progress and not mentioning basic needs is therefore a fault (Helmore and Singh 2001:9).

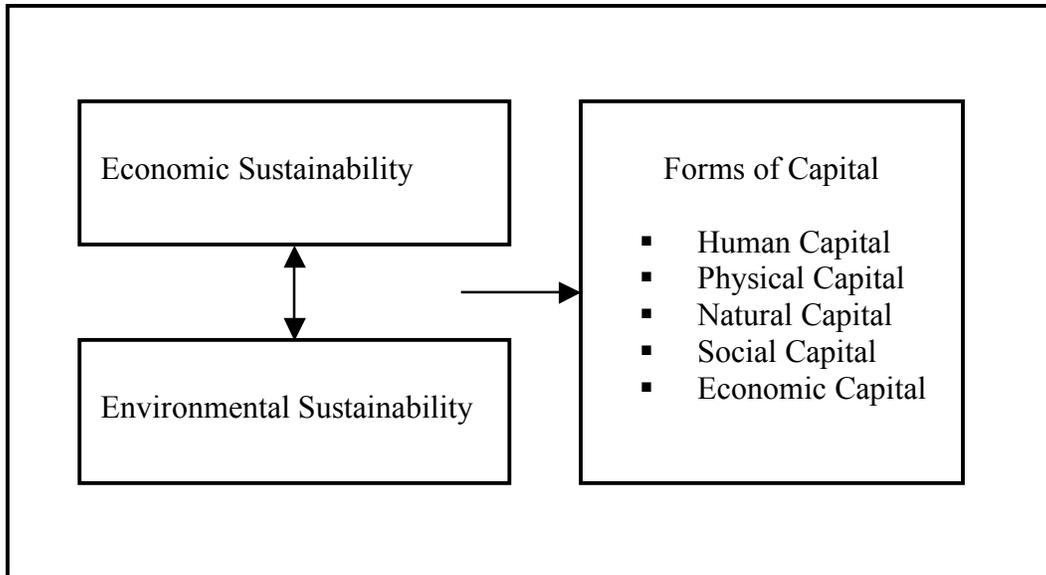
The United Nations Food and Agriculture Organisation (FAO 2004) made an evaluation of SL and tackled the prejudice of it being too Anglophonic. Their conclusion was that the institutional, organisational and cultural context set the framework for any development with SL. What they define as more Anglophonic features, such as time keeping and lack of internal blockages, were found to promote SL, but in the end it is still leadership and commitment that ensure the integrated approach (FAO 2004:52).

Analytical Framework

To analyse how the livelihood strategies in Saint Augustin are shaped and to show the economic and environmental sustainability, certain variables have been chosen. These are the different livelihood capital that were listed in the beginning (see Forms of Capital). They are

interconnected and overlap, but each livelihood capital is still an identifier for strategies, sustainability and livelihood survival. Exactly how each variable is shaped in a Saint Augustin context is shown in the analysis. The forms of capital mentioned are a general collection, but the variables vary over time and between individuals' studies.

Figure 1 The Analytical Model



The analytical model chosen, adopted from Sustainable Livelihood theory and the conflict between economic and environmental sustainability.

To facilitate the analytical framework a model will be used (see Figure 1). The model shows the mutual conflict and relationship between economic and environmental sustainability. The two forms of sustainability are required for a prosperous future. None of the above can function on its own, as the interdependence arrow indicates. This is the main focus of the thesis. The sustainability issues in turn affect the various forms of capital and set the prerequisites for the importance of the capital. These livelihood capital are the base for the thesis and are used as variables to facilitate the analysis.

The term economic capital needs to be defined. Economic capital is used instead of financial capital, as it has a wider meaning for the researcher. Financial capital relates to money, coins and notes, whereas economic capital is used as a broader term, which also includes goods and

services that can be traded. As the economy in Saint Augustin consist of both a monetary and barter, both will fit under the definition of economic capital.

The Malagasy Background

To understand the Vezo fisher folk in Saint Augustin a general background to Madagascar, Saint Augustin and fishing will be given. Furthermore, a brief introduction of the fish regulations is given, as these affect the fisher folk but also are tools' for solutions. As the Vezo ethnicity is strongly related to fish an explanation will be given.

Madagascar (see Map 1) is rich in natural resources, such as vanilla and minerals, but the inequality gap is not bridged, as can be expected. Around 80 percent of the population live in rural areas but agriculture production and fish harvesting still does not meet the domestic food needs. The major cause of household food insecurity is related to the frequent exposure to shocks, such as cyclones, and limited alternatives for livelihood strategies. Even among the richest 20 percent of the population the children show significant signs of malnutrition (Irin 2007).

Fish harvesting is not listed as a dominant activity, even though it is the main income for almost all coastal people. It is however counted among the natural resources (Irin 2007). People are vulnerable to starvation when the access and availability declines (Davies and Hossain 1997:14), as is the case in Toliara region since fish stocks are depleting. If the Vezo fisher folk lose their main income activity, as fish harvesting is, they lack alternatives for economic income.

Map 1 Madagascar



Source: Adapted from CIA World Factbook (2008)

Map of Madagascar showing the most important cities. Toliara is situated on the southwestern coast.

Saint Augustin

The community of Saint Augustin (see Figure 2 and Map 2) has around 4000 inhabitants and approximately 3000 live in the actual village, according to the latest census carried out by the *fokontany* in 2006. The ethnicity is mainly Vezo; the *Masikoro* constitute around 25 percent. Fishing and limited agriculture are the main income sources. The area of Saint Augustin village is 2.01 km² and there are 590 households with an average of 5.35 inhabitants per household (ANAE 2007:10, 16). There are no numbers available that show the poverty level of the village. Many live under the 1 USD/day World Bank limit, but economical definitions are not always usable. The Vezo people are poor, seen in a relative and absolute economic way, but the social definitions, which includes lack of basic needs, shows that the fisher folk are not always among the poorest (WB 2008). The Vezo define lack of electricity and no access to modern technology as indicators for poverty and as a result consider themselves poor.

Figure 2 View over the Centre of Saint Augustin



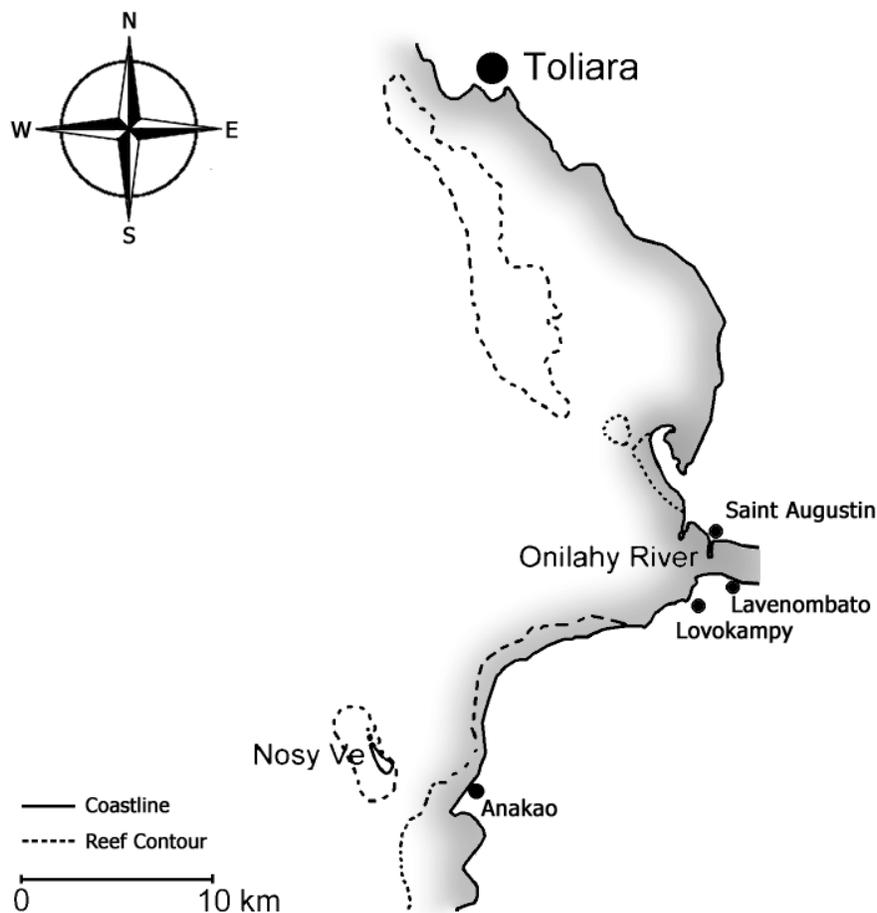
Photo taken by Kate Clark

This photo shows the centre of Saint Augustin; as the photo is taken from the hills behind the village the rest lays hidden in the shadow of the hill.

Geographically, the main village is located where the Onilahy River meets the Mozambique Channel and surrounded by hills on three sides. The main choice of transport is by *pirogue* or on foot; there is a *taxi brousse* running to Toliara five times a week, which is used for transporting

heavier things and to bring the fish to the regional market. Because the road is bad, the trip takes between two and four hours one-way. Saint Augustin is most times isolated from the world, especially during the cyclone season in December to March when the road is flooded and the sea dangerously high. Waves as high as three meters make navigation difficult for the pirogues. Since the Onilahy River is affected by the tide, the already high tide of three meters increases even more during the cyclone season and causes extreme flooding in Saint Augustin (ANAE 2007:14). The average climate is semi arid, defined by a short rain season November-March and a long dry season stretching from April to October.

Map 2 The Region surrounding Saint Augustin



Source: Adapted from Frontier-Madagascar (2003:9)

This map displays Saint Augustin and its most important neighbouring cities, as well as the surroundings and the regional city Toliara.

The village has no running water or electricity and the fixed telephone connection is very unstable. There are several primary schools in the community, but only one secondary school. Thursday is market day and people from the neighbouring villages make their way to Saint Augustin to sell everything from food to clothes and pottery. Saint Augustin still has a better position than many smaller villages situated in the interior of the Toliara region. It is possible to bike or walk into Toliara and this proximity supports the development of the village. Many tourists travel through the village on their way to Anakao, a tourist location just south of Saint Augustin.

In a report published by ANAE (2007) various development criteria are presented. Divided under various headings such as socio-economic development and sustainability criteria, the maritime fishing and the marine environment are reflected in every section. The prioritisation always puts these issues in the top 10 (see Appendix 1) which gives an indicator of how important these factors are for the Vezo fisher folk and Saint Augustin.

Vezo Ethnicity

The word vezo means paddle and literally the Vezo interpret the meaning as “people who struggle with the sea and live on the coast” (Astuti 1995a:1). Vezo people are found all along the western side of Madagascar. They only live on the coast and define themselves through the activities they do. These involve, amongst others, swimming, fishing, consumption of fish, building pirogues and sailing (see Figure 3). A person who cannot do any of the mentioned activities is not considered Vezo. These activities, all related to the ocean, are “a genuine statement of identity” (Astuti 1995a:2).

People cannot be inherently Vezo – no one is born Vezo, nor becomes Vezo by descent (Astuti 1995a:3). This is true, as small children are not yet familiar with any of the abilities one has to know in order to be called Vezo. This also opens up for outsiders to become Vezo, whether it is spouses from other ethnic groups or foreigners who visit a Vezo village for a shorter while and integrate fully. In Saint Augustin one fourth of the population is Masikoro who cultivate crops and are pastoralists (see Map 3). Although living in the same village, they are clearly living away from the coast. If members from both groups marry, the person herding cattle will become

Masikoro and the person marrying into a Vezo family will be taught how to sail a canoe and eventually turn into a Vezo. Vezo people are sometimes marked from their fishing activities, as their fingers and often the whole body has signs and scars from fishing lines, sailing ropes and other gear belonging to the different Vezo activities (Astuti 1995b:472).

Figure 3 Pirogues on the Beach in front of the Village of Saint Augustin

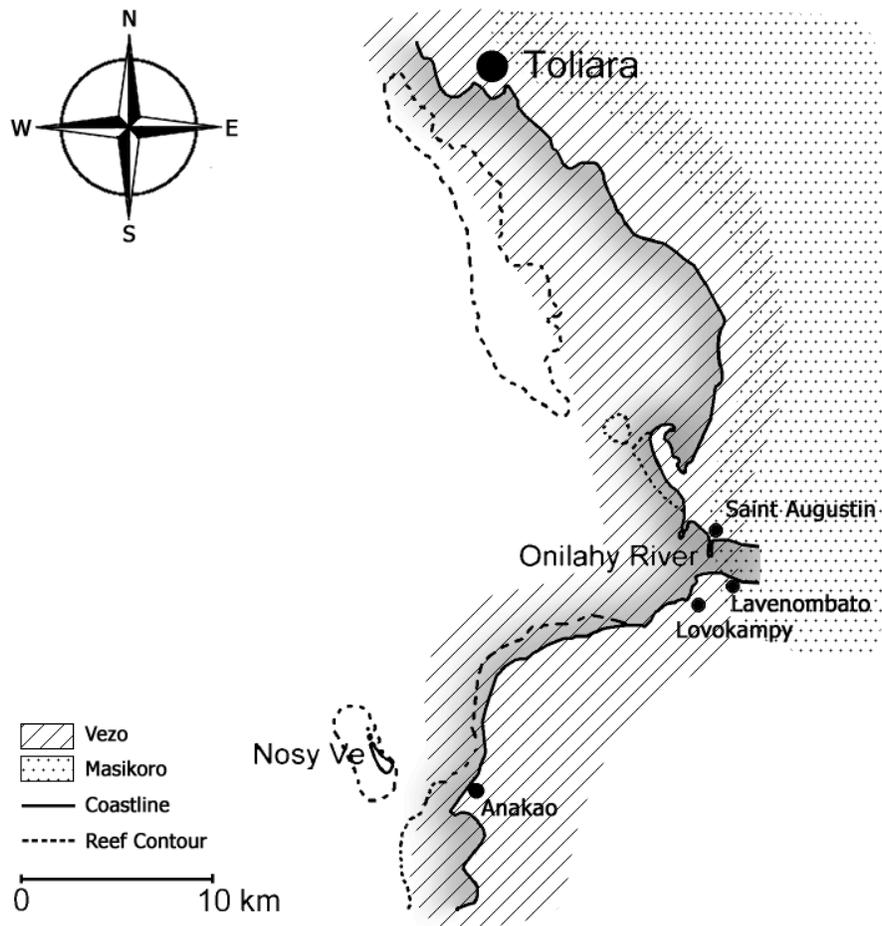


Photo taken by Kate Clark

Pirogues lying on the beach, with the fishing nets drying in the sun. This typical sight shows the importance of fish for the Vezo fisher folk.

The struggle with the sea is central for being Vezo, as is learning to master a livelihood depending on it. Vezo must learn how to exploit the sea in a skilful way and not abuse it. For the Vezo, the ocean equals money, “they ‘find money in the sea’” (Astuti 1995b:474) and they are unable to save money, a fact that has grave implication on the livelihood of the people.

Map 3 The Vezo and Masikoro in the Saint Augustin Region



Source: Adapted from Frontier-Madagascar (2003:9) and SAGE (2002:127)

This map shows the both ethnicities: Vezo and Masikoro. The Vezo fisher folk live along the coast and are active in the sea and just onshore. The Masikoro are cultivators and stay inland. The ethnicities overlap in Saint Augustin, amongst others. For more information about the Masikoro, see the section The Masikoro further below.

It is very important for this thesis to acknowledge that the Vezo are both involved in marine stewardship that is imposed on them by institutions but that they also have to follow their call within their ethnicity. If they stop the activities that are connected to the ocean, they will cease to be Vezo. Middleton explained in a book review of Bernard Koechlin's work that the Vezo life is a part of the total social-ecological system (Middleton 1977:440). The Vezo are in every aspect integrated in the nature and the sea and survival without these environmental preconditions seems

impossible. Solutions for other acceptable livelihoods might be taking tourists to different sites or transporting them to their next stop; respondents in the village claimed that as long as the activities involve Vezo tools and the sea, the people carrying out these activities are still Vezo.

Artisanal Fishing and Regulations for Fishery

Toliara region is characterised by its artisanal fishing. Artisanal fishing differs highly from industrial fishing, most noteworthy through the absence of advanced technical equipment. Bâche and Cecil (1989) define artisanal fishery as “ownership of means of production, profits and losses assumed by the artisan. Simple and practical technology, [...] contributing especially to food self-sufficiency, and creation of numerous jobs for both women and men” (the authors’ own translation; 1989:13). Basically, artisan fisher folk do not have motors, only fish small-scale and often involve larger parts of the family. In Saint Augustin all fishers are artisans, and either fish with line and hook or onshore with large trawling nets (ANAE 2007:20-21).

Fishing in itself is often regulated with certain measures. Especially size regulation and protection of species are important. Unwanted *bycatch* must be decreased; even if artisanal fishing does not have much bycatch since the fisher folk use most of the catch. The most common regulations, also implemented in Madagascar, are mesh size and closed seasons. These measures are supposed to lead to better environmental stewardship and resource management. Artisan fisher folk often catch juveniles since they are close to the coast where the eggs hatch (Arellano-Torres, Pérez-Castañeda and Defeo 2006:309). Since the fisheries are tremendously important for the livelihood in Saint Augustin, the Vezo themselves must be part of the solution. As the SL theory states the individuals must be used as key actors for change. Key actors must be involved in this change in order to ensure any success (Gelcich, Edwards-Jones and Kaiser 2005:866).

Methodology

This thesis builds upon primary material, collected during fieldwork in August 2007 to January 2008. The main method was using in-depth semi-structured interviews, which provided qualitative material. As a complement, participant observation and secondary sources were used. This method was chosen because it suits the research questions and enabled the researcher to find the answers. Interviewing the target population and trying to define their view of their livelihood strategies and economical and environmental sustainability provided rich information. Triangulating with observation, in order to confirm or dismiss statements, and other official interviews gave trustworthy qualitative data. The above-mentioned choice of methods was influenced by the SL theory. The people are in the centre of the theory and it is therefore only naturally to use tools that enable the people to answer for themselves. Their views, perspective and knowledge are the heart of this thesis.

Qualitative and Quantitative

The qualitative method was chosen since the objective of the qualitative approach created the best possibilities for answering the research questions. Since the focus of this thesis lies on Saint Augustin and the aim is to research present livelihood strategies and determine whether the fishing is sustainable from different aspects, doing quantitative research would not have given satisfying results. Quantitative research deals with many people and the researcher distances him/herself. Through structured surveys the researchers tries to find statistically significant facts that could be scaled up. In general, quantitative methods are based on a scientific perspective – meaning that everything could be explained by fact and figures (Bryman 1997:20, 22-24). Qualitative research on the other hand involves the researcher in a closer perspective. Main methods used here are unstructured interviews and participant observations, which complement each other but can be carried out and are valid seperately. The researcher does not want to interfere but instead receive open answers from the respondents. These methods are related to the phenomenology, that human behaviour is a product of how the world is interpreted (Bryman 1997:58-61, 65, 67, 77; Johannessen and Tufte 2003:68).

When comparing these two methodologies it is clear that a thesis building on fieldwork requires

qualitative methods in order to find answers to the research questions. The researcher was allowed to be close to the target population and was regarded as an insider. Qualitative research is the only thorough way to find evidence for and explanations of socially complex relations and social processes, which are an important part in answering the research questions (Bryman 1997:113, 124, 131; Johannessen and Tufte 2003:68-70).

Reliability and Validity

The issues of reliability and validity are very important for qualitative studies. Data only represents the reality and should not be taken as being the reality (Johannessen and Tufte 2003:47). Both reliability and validity are strong due to lengthy amount of time spent in field. The reliability stems from the fact that the method chosen enabled measurements more than once; in this case 96 interviews were carried out as well as several participant observations, all substantiating the findings. Also, the reliability is high due to consistent results, deriving from the interviews (McIntyre 2005:66-67). Reliability is a prerequisite to validity. Concerning the validity, the researcher should measure what he/she thinks is measured. This influences the methodology as validity is interlinked with the research questions. To increase reliability and validity triangulation will be used. Quantitative data can and will not be avoided as it will be part of the triangulation. Verification of qualitative research is important as it is accused of being too subjective (Bryman 2004:284, 287).

Primary Data Collection

The basis for the thesis is the interviews carried out with respondents. In total, 96 interviews were done in the village of Saint Augustin, both with individuals and in groups. The total sum of the respondents is 247 (see Table 1). The interviews from Saint Augustin are the base for the analysis. Some of the inhabitants in the neighbouring villages were also interviewed in order to triangulate the information received (see Table 2).

Table 1 Respondents in Saint Augustin

Section of Village	Ethnicity		Number of Interviews	Number of Respondents	Reference Code
Ampasinabo	Vezo	Group interviews	8	18	Va-g1 to 8*
		Individual interviews	2	2	Va-i1 to 2
		Total	10	20	
Lovokampy II	Vezo	Group interviews	16	63	Vb-g1 to 16
		Individual interviews	7	7	Vb-i1 to 7
		Total	23	70	
Ampasinihita	Vezo	Group interviews	9	26	Vc-g1 to 9
		Individual interviews	4	4	Vc-i1 to 4
		Total	13	30	
Ianantsono	Vezo	Group interviews	24	66	Vd-g1 to 24
		Individual interviews	5	5	Vd-i1 to 5
		Total	29	71	
Ambalaviro	Masikoro	Group interviews	3	8	Ma-g1 to 3
		Individual interviews	2	2	Ma-i1 to 2
		Total	5	10	
Tanambao	Masikoro	Group interviews	13	43	Mb-g1 to 13
		Individual interviews	3	3	Mb-i1 to 3
		Total	16	46	
All		Group interviews	73	224	
		Individual interviews	23	23	
		Total	96	247	

*V and M indicate the ethnicity, Vezo and Masikoro respectively. The following letter (a-g) is an indicator for the village sections, prioritised after ethnicity. g and i indicates group and individual interview respectively. The final digit is the sequence number for the interview.

The table shows that 96 interviews were carried out, with a total of 247 respondents. Of these, 73 were group interviews and 23 individual interviews. The number of interviews and respondents in each category was chosen according to a convenience sampling and is not related to ethnicity, sex, age or other factors.

Table 2 Respondents in Neighbouring Villages

Village	Ethnicity		Number of Interviews	Number of Respondents	Reference Code
Lavenombato	Vezo	Group interviews	7	22	Ve-g1 to 7*
		Individual interviews	3	3	Ve-i1 to 3
		Total	10	25	
Anakao Bas	Vezo	Group interviews	3	7	Vf-g1 to 3
		Individual interviews	1	1	Vf-i1
		Total	4	8	
Lovokampy	Vezo	Group interviews	5	13	Vg-g1 to 5
		Individual interviews	3	3	Vg-i1 to 3
		Total	8	16	

*The decoding scheme is the same as for Table 1.

This table shows that between 4 and 10 interviews were carried out in the neighbouring villages, including between 8 and 25 respondents. A convenience sample was used.

Respondents were chosen through a convenience sampling, in order to catch as many different aspects and livelihood perspectives as possible. A systematic walk through the village determined which houses would be sampled and respondents were then asked to participate by chance. Almost all respondents agreed to being interviewed, only two declined in Saint Augustin. Since the sampling was convenient, the respondents cannot be seen as fully representative for the village (Bryman 2004:87, 100). Given the high number of interviewees though, around 8 percent of the inhabitants of, or 16 percent of the households in, the village was covered. This high rate of participating villagers will allow generalizations in the final analysis (Stake 2000:23). Interviews were done with men and women, a very important fact since livelihood affects them differently and they sometimes carry out diverse economic activities within the family. Information was therefore needed from both sexes, and all ages, for a complete picture of strategies applied (Helmore and Singh 2001:8). All respondents will remain anonymous; in the analysis references for interviews will occur according to a coding system (see Tables 1 and 2). This is for protection of the respondents since they placed confidentiality in the researcher; their answers might not be dangerous in a present context but might create conflict in between neighbours. The interviews showed that it did not matter whether the respondents were female or male, young or old; the data collected highlighted the importance of experience and the forms of capital.

The interviews were undertaken with semi-structured interview guides. According to the qualitative method, they should have been unstructured, but in order to facilitate the analysis and keep the focus of the thesis, the questions were determined beforehand but open ended. The respondent(s) answered freely and sometimes received follow-up questions on issues that were not covered in the interview guide. This method of interviews was chosen because it allowed the researcher to collect additional and unexpected information. The first interviews are regarded as pilot interviews, and were only carried out to test the questions and the structure in order to avoid any mistake in questioning and to determine if the questions received answers that fitted the aim. This, in turn, is an assurance for validity (Bryman 2004:119, 145, 159-60; Willis 2006:146).

Interviews were carried out in Malagasy and literally translated by a paid translator into French. Some interviews were done without a translator if the respondent spoke a fair amount of French. It should be noted that the translator also acted as an ethnographic informant and as well as translated also explained various issues and guided the researcher around the village. The later had an important impact, as the accompaniment of a local villager increased the acceptance among the respondents and within the village itself (Simon 2006:165). This enhances the reliability and validity of the data collected. There is a risk that some interesting aspects were lost in translation, but due to the high amount of interviews carried out, the majority of aspects were recorded and confirmed, especially as the researcher's Malagasy improved.

In order to complement the local respondent's answers with a more official view, interviews were carried out with key persons and organisations in a local and national context. These stakeholders provided the researcher with general information about the area itself on a more statistical base.

Participant Observations

Participant observations were chosen as a qualitative triangulation method. They are important as they enhance the quality of the interviews carried out (Gesson and Horowitz 2002:200). The role as an observer was moderate: The researcher participated actively in fishing but did not always identify herself as a researcher (DeWalt and DeWalt 2002:8, 20). Reasons for this are partially the language barrier and also because it is desirable that the fisher folk act naturally and not stage anything for the research. Otherwise, regarding observations, they are closely linked to the researcher's frame of subjectivity and that the researcher looks for evidence that supports his/her

work (Williams 2002:128). Even though being open minded, the researcher cannot guarantee complete objectivity. The reliability and validity is still high since awareness of this problems was shown (Sanchez-Jankowski 2002:146).

Secondary Material

The secondary materials used are primarily reports and studies from and about Madagascar and the selected region of Saint Augustin/Toliara. It has been obtained through different libraries and resource centres, including electronically accessible sources, as well as from fellow researchers. Knowledge from previous experiences, regarding SL, livelihood strategies and methodology, has enhanced the quality of this thesis. Also, the different materials enable the researcher to broaden the perspective and to put the research questions and analysis in a wider context.

Case Description

This description will give the information necessary to understand the behaviour and choices of the Vezo fisher folk in Saint Augustin. To understand the conflict between economic and environmental sustainability on ground level, certain factors need to be mentioned, for instance the fishing routines and the relationship to the Masikoro. This is the base on which the analysis is built.

Fishing Routines

The Vezo people of Saint Augustin have always been fishing. The characteristic view of the pirogues leaving shore at 5 am, the latest, is very significant for the livelihood of almost all the Vezo and has defined their life standard for centuries (see Figure 4). Few changes have occurred in the community and even the fishing practices are more or less the same in the village. The most common fishing method is fishing by line and hook or net in the open sea with a pirogue. It takes at least two people to manoeuvre the pirogue, but smaller models used for line fishing can be steered alone. The fisher folk distinguish between *mihaza* (line fishing) and *tarikaky* (onshore fishing). Regulations say that nets must have mesh larger than 20 mm (ANAE 2007:21), but participant observations (PO) showed that this was rarely the case.

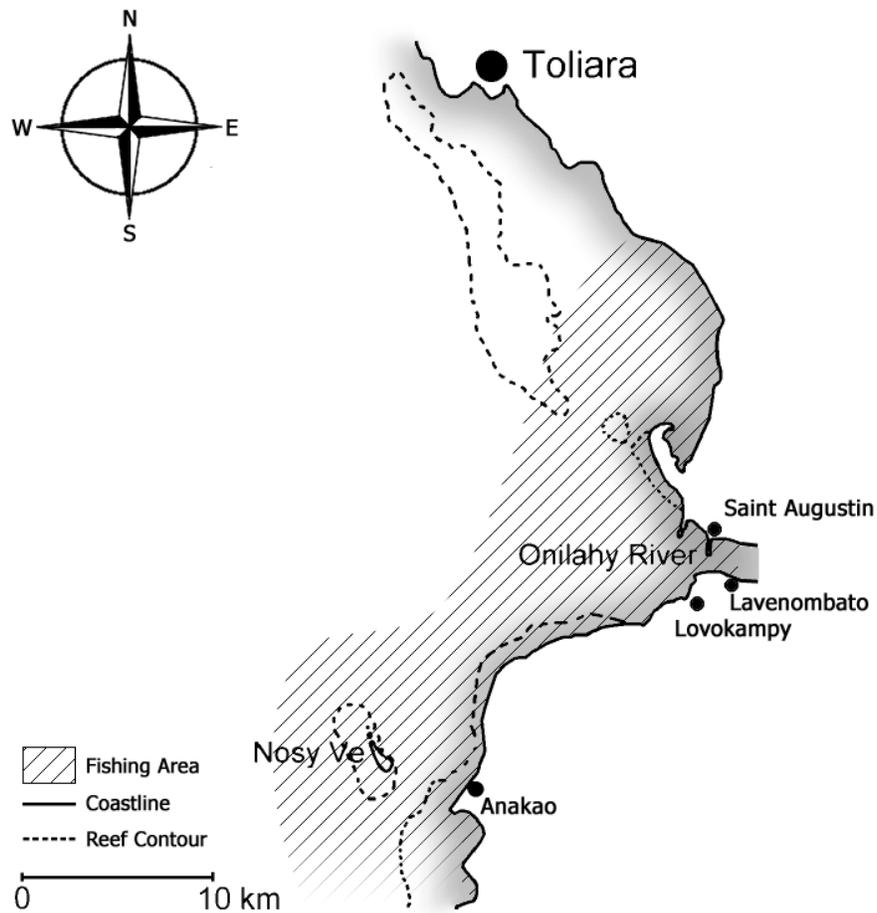
Figure 4 Pirogue on the Way to the Fishing Areas



A pirogue sailing in dawn to the fishing areas.

Photo taken by author

Map 4 The Fishing Areas around Saint Augustin



Source: adapted from Madagascar-Frontier (2003:9) and FISATO 11.11.2007

The map shows the fishing areas that the Vezo in Saint Augustin use. Where they fish on which day is dependent upon weather, season and time, amongst others.

Two major types of nets are used; the seine net is a vertical net, with weights at the bottom and floats at the top. The gillnet traps fish with their mesh size instead; fish swim in to the net and try to get out through the mesh and get caught by their gills that hinder them from getting out/backing. The nets are used for different species and sizes of fish, in different fishing sites and various seasons. Fishing with a pirogue takes between 7-10 hours, which includes 1-2 hours travel time (Interview Ranowe de Pêcheur 03.11.2007). When arriving at the selected spot, the boat is anchored and the sail taken down (see Map 4). There is no shade and the conditions are

harsh. There is limited space, no privacy, no toilet and only a small amount of food and water. Many fisher folk have said that being able to fish a longer time in a pirogue makes you Vezo (Astuti 1995a:15).

Onshore fishing is carried out with a 300 m long line. A pirogue with two-three persons row about 100 meters out from the shore and drop the net into the water. The two ends of the line are held by fisher folk onshore who slowly start to drag the line in. This is very heavy work, as confirmed by the PO carried out. The fisher folk, men and women alike, tie the rope around the waist in order to let the leg muscles work in the sand. The team mostly consists of the extended family, but everyone is allowed to participate. This has the consequence that everyone who has helped out has earned a part of the catch. The biggest share goes to the persons who actually own the net and have done most of the work, but spontaneous helpers would be entitled to a handful of fish – all depending on the amount of aid, the size and species of the catch. One of these fishing occasions takes about one hour from when the pirogue has dropped the net until the catch is split up. Variations are due to the number of people pulling and amount of fish in the net (the more the heavier). Onshore fishing is mostly carried out in the mornings, due to the hot sun. The total amount of time spent on the activity depends on the amount of fish caught, but mostly the net is dropped 4-5 times in the sea (Interview Ranowe de Pêcheur 03.11.2007; PO 10.12.2007).

Workers at a local NGO said that the people in Saint Augustin use mosquito nets for fishing, especially onshore fishing, and the POs confirmed this. These practices are highly destructive as the nets have such a small mesh size that nothing can escape. The old proverb about “give a man a fish and he will have food for a day, teach him how to fish and he will have for every day” has had the opposite effect in Saint Augustin. Nets are not the traditional way of fishing in the sea, but since importation started about one generation ago this has become common practice. Nets have an extensive size, they simply are more effective and have contributed a great deal to the overfishing of the sea.

Table 3 Season Scheme for Fish Species

Fish species	J	*F	M	A	M	J	J	A	S	O	N	D
<i>Akiyo</i>	X										X	X
<i>Aluale</i>								X	X	X	X	X
<i>Amatu</i>								X	X	X	X	X
<i>Ambatsoy</i>								X	X	X	X	X
<i>Angeleke</i>								X	X	X	X	X
<i>Antserake</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Arobe</i>	X										X	X
<i>Atentu</i>								X	X	X	X	X
<i>Bemasu</i>	X	X										
<i>Dagesu</i>				X	X	X						
<i>Gamo</i>								X	X	X	X	X
<i>Geba</i>			X	X	X	X	X	X	X	X		
<i>Hambitsus</i>								X	X	X	X	X
<i>Honta</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Kabill</i>					X	X	X					
<i>Kimbatsoky</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Kipela</i>										X	X	
<i>Lamantsa</i>								X	X	X	X	X
<i>Lanoura</i>								X	X	X	X	X
<i>Lembe</i>				X	X	X						
<i>Lemeleme</i>					X	X	X					
<i>Lili</i>				X	X	X						
<i>Lugi</i>							X	X	X	X	X	X
<i>Luww</i>							X	X	X	X	X	X
<i>Malila</i>				X	X	X						
<i>Mulutu</i>				X	X	X						
<i>Pepe</i>					X	X	X					
<i>Romanjea</i>					X	X	X					
<i>Sambounto</i>								X	X	X	X	X
<i>Sargeba</i>					X	X	X					
<i>Soke</i>											X	X
<i>Soruboir</i>								X	X	X	X	X
<i>Tsabeake</i>					X	X	X					
<i>Tsomearane</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Vahohu</i>								X	X	X	X	X
<i>Vatsitsa</i>					X	X	X					
<i>Vuitsu</i>								X	X	X	X	X

*Enumeration of the months in the year.

Source: Fanja 03.11.2007 and Johanison Milan Féanere 09.11.2007

This table shows some selected common fish species and when they are available. Smaller and bigger fish are mixed, but it is still clear that fish are abundant in August – November/December and scarce in January – March.

Each fishing method is chosen according to certain criteria. Most important is the influence from the weather. High waves, cyclones, rain or similar weather makes fishing a dangerous procedure and almost all fisher folk stay in on those days. When there is no wind the fisher folk most often spend the day fishing from the shore. Whether to use net or line is partially dependent on the equipment available, as not everyone can afford a net, and the season of the year. All fish species are not available year-round, the best months being between August/September and November (see Table 3). As different species almost always require a certain fishing method, the gear must be adjusted according to the current season (Interview FISATO 11.11.2007; Vb-g1 29.11.2007; Vb-g12 30.11.2007; Vb-i5 03.12.2007). The amount caught varies greatly. On good days, the collectors say that they buy 150 kg of fish and additional 30 kg of tuna. On bad days they only acquire 5 kg of mixed fish (Interview Frangeline and Mandripy Vovony 12.11.2007).

Figure 5 Collectors and Children Waiting for the Taxi Brousse



Photo taken by author

The collectors and various school children wait early in the morning by the taxi brousse to transport the previous night's catch to Toliara. The fish, in this case tuna, is laid on wood in order to prevent it from getting sandy.

The Collectors and the Market

Regardless of fishing method, the fisher folk either consume or sell parts or the whole catch. As the fish is in demand in the regional city and sometimes also fetches a higher price there, it is sold to various collectors, all of whom are Vezo. Their job is basically to store and transport the fish to Toliara and sell it to an end consumer (see Figure 5). Some collectors are specialized and buy only shark fins or shrimp; others work in tough competition for the bulk of fish (Interview Va-g3 29.11.2007; Va-i2 29.11.2007; Vb-g3 30.11.2007).

The group of collectors, almost exclusively women, look harmonious but separate interviews revealed jealousy and anger between them as their income sometimes solely comes from selling of the fish. Lack of fish results in no income, which can strike hard on the collector if it occurs several days in a row. This happens either when weather conditions prevent the Vezo from fishing or when the amount of fish caught is low and the competition between the collectors leaves some without any fish to sell. In the interviews, the collectors mentioned that they wanted to start an association in order to eliminate problems between them and to develop strategies for the sale in Toliara (Interview Frangeline and Mandripy Vovony 12.11.2007).

An interesting aspect is that some respondents mentioned that the collectors have caused positive social change in the village. The creation of intermediaries in order to maintain better prices and a stronger collective presence in the city strengthened the social capital concerning the community institutions. The collectors also create a dynamic in the fish selling business and have the opportunity to break any stagnation in prices. Some respondents thought that the collectors were not acting in favour of the fisher folk but mainly looked after their own profit. Still, the fisher folk trusted the collectors and supported their work (Interview Va-g3 29.11.2007; Va-i2 29.11.2007). Concerning the price of the fish, it is the fisher who sets the price. The collector makes a rise with 100 % and thereby doubles the price. Very small fish are mostly sold with a 50% rise and big species can have a price more than 150% above the original price (Interview Frangeline and Mandripy Vovony 12.11.2007; Va-i2 29.11.2007).

Figure 6 Fish on Display in the Market



Photo taken by author.

Fish, mainly tuna, on display in the market. A tuna like that would cost about 30 000 Ariary.

Not all fish are sold to a collector (see Figure 6). Interviews showed that the smaller fish could be sold at good prices in the home market or to neighbouring villages. Often, only the larger fish species are sold on to the city, together with shrimp, crabs and various dried marine products. Really small fish are sold in the local market (Interview Frangeline and Mandripy Vovony 12.11.2007; Vb-g6 30.11.2007; Vc-i1 03.12.2007). They are mostly baby fish caught ‘by accident’ and sold in heaps or groups of five, just as every other item on the market (PO 13.10.2007). There are more or less regulated prices for every fish species, depending on size,

amount and how much fish that was caught in total that day. Fish costs between 100 Ariary¹ (a heap of the smallest size, mixed species) to 1000 Ar (one slice of good tuna) (PO 04.12.2007). A percentage of what the salesperson makes at the market is turned in to the *commune* for further administration and investment. This applies to fish as well as other items.

Figure 7 Sun-dried Fish



Photo taken by author

Tuna and kipela drying in the sun. This simple method preserves the fish for a couple of days.

Some Vezo do not sell products in the market but trade them directly in other villages. Saint Augustin has the advantage of being the biggest village in the commune and is therefore a natural meeting point for the neighbouring villages in terms of commerce. Many Vezo, mostly the

¹ 100 Ariary (Ar) = 0,04 Euro (May 2008).

women, do expand their market and dry fish and sell it themselves on markets in other villages (see Figure 7). This gives a slightly higher pay, but also involves more work and input, in terms of collecting firewood to dry the fish for instance. Some respondents mentioned that in times of fish scarcity this might result in really good profit, as prices rise and the competition is lower. Another benefit is the direct trading. If the fisher folk do not have money to buy rice, they can go to a neighbouring village with cultivators and trade fish for rice directly. Depending on the fish species and the abundance of rice, the trade can be 5 kipela for one small basket of rice, which is approximately enough for a family for two days. This direct trade of merchandise can also be an exchange of fish against meat or other vegetables like manioc, sweet potato or even bananas. This direct trade is beneficial in another way too. When the market is overburdened with fish of the same species, a direct trade at another village might result in a better price than money exchange would have had (PO 13.10.2007; Interview Vc-i1 03.11.2007).

The Masikoro

The village of Saint Augustin is divided into different fokontany and in the fokontany situated furthest away from the sea the people belong to the ethnic group of Masikoro. They are characterised by the ability and choice of cultivation and livestock as an income and livelihood strategy. Almost all respondents had livestock and their cultivation fields were located on the opposite side of the closest hill. They more or less cultivated the same crops, out of which none was a real cash crop: cassava, assorted beans and lentils, rice, sweet potatoes, maize, sugar cane, tomatoes, onion and garlic. Some owned fruit trees, such as mango, guava, bananas or *fari* (Interview Ma-i1 11.12.2007; Mb-g8 13.12.2007).

In the interviews with the Masikoro, questions like fish dependency and fishing habits were still asked. In rare cases they did fish, not in the sea but in a natural spring nearby. There were only small fish, crabs and some shrimp there and recent regulations forbid any fishing activities close to the source. The differences between the fishing practices were significant, as it mostly was Masikoro women fishing and another kind of fishing technique was used. They had either a thin cloth, a *lamba*, with the four ends tied to strings that were connected to a tree branch and worked the same way a sieve does or they used a cylindrical basket with a net at one end. Both methods were reported to be quite successful (Interview Vd-i5 11.12.2007).

In terms of dependency on fish and the importance of the fish stocks in the sea, the respondents consistently pointed out that this issue did not affect them at all. If the fish would vanish, they would simply eat something else, often referring to their agricultural land. This clearly shows that even if the Vezo and the Masikoro live in the same village, the approaches to livelihood are different. The reliability on the fields and the cattle gave the Masikoro an insurance against maritime destruction. Their livelihood is not uncomplicated either though and could be threatened by cyclones, droughts and pests. Furthermore, the local market in the village is important for the Masikoro in terms of selling crops and meat and for buying fish and additional supplies (Interview Vd-i3 10.12.2007; Mb-g3 13.12.2007).

The Masikoro and the Vezo intermarry freely. This creates an additional livelihood strategy, connected to entitlement and social capital: the support from the extended family. In times of difficulties they help each other out, despite being of different ethnicities. Furthermore, the informal trading system, particularly the non-monetary one, enables nutritional variety alongside with filling in any material gaps (PO 31.10.2007).

Analysis

The analysis concerns the various forms of capital. As stated in the analytical model, the relationship between economical and environmental sustainability affects these livelihood capital. In order to display all forms of capital, the analysis will first deal with economic activities related to fish, before showing the livelihood capital, which is the main part in the analysis. The environmental degradation will show how the forms of capital are affecting them and how this in turn affects the livelihood strategies. The final section concerns the importance of fish, as this is crucial for all Vezo capital. The small summary at the end lists the forms of capital in an easily understood manner.

Primary Economic Activities Related to the Sea

All Vezo respondents stated that fishing was the most important source of economic income and the most beneficial activity. Fishing is in line with their livelihood. With fishing and the sea being a central issue in the Vezo culture and life, earning money in relationship to these subjects is important. Fishing also created ‘side’-work, such as cleaning, drying, selling and packing fish and provides work opportunities for collectors (see Figure 8) (Interview Fanja 03.11.207). Often the whole household revolves around fish and all these activities are of high status, both within the family and among the neighbours.

Further income activities were buying, drying and selling *patsa*, a small shrimp species that live in the mangrove and near the Onilahy river mouth. Sun-dried *patsa* is sorted and packed in big sacks with an approximate weight of 50 kg. They are then transported with taxi brousse to Toliara or cities further inland. A single household can deliver a sack of *patsa* once every third week, depending on the availability in the sea and the competition in the village. Handling *patsa* is also mainly an activity carried out by women (Interview Vb-g5 30.11.2007; Vc-i1 03.12.2007; Vc-g8 06.12.2007).

Figure 8 Drying Kipela by the Fire



Photo taken by Kate Clark

Drying fish, in this case kipela, on sticks by the fire is an effective way of preserving them. They are sold on the next day in neighbouring villages or stored in the house for a couple of days.

Livelihood Capital

The SL theory strongly highlights that income activities are not the only livelihood factors in a person's portfolio. The forms of capital are equally important; any ranking in dependency is impossible. One fact is clear, that fishing is the most respected and prized activity. Other forms of capital that follow are hard to value as these vary greatly between households and individuals. Before trying to define all the different livelihood strategies and their importance, additional forms of capital will be listed.

The importance of the family should not be underestimated. Family ties, whether by heritage or through marriage, are essential for many. Families often live together in small clusters, often on land owned by the 'family father'. Daughters move away from the family compound to the husband's family. Family relations are not only important due to the proximity, but also because it makes co-ownership easier. Many pirogues are family owned and the fisher folk most often sail and fish together with relatives, a fact confirmed by almost all the interviews. This eases dividing the catch and also creates fewer conflicts about investment in and usage of mutually owned gear and equipment (Interview Fanja 03.11.2007).

The social capital is very strong in terms of family care. Resources are pooled in a economically beneficial way and expenditures, for instance, for health care are kept to a minimum. One respondent mentioned that he shared fish and money with his family (Interview Vd-g2 06.12.2007). The family ties become very obvious from a livelihood perspective in one of the interviews. A small group of older women (Interview Vd-g11 10.12.2007), all above 60 years old, lived together in a brick house. Brick houses show that the family has money to build more durable houses. Many of the youth interviewed stated that they dream of a brick house for the future, as it is more secure, more stable against sandstorms and healthier from a hygienic perspective. Still, these three women said that they had already been out of food twice this week and had not eaten anything during those days. This interview was carried out during a week when the availability of fish was very scarce and the few fish that were sold were very expensive. These respondents said that they were too old and fragile to carry out any fishing activities and they had to rely on the help of their families for food. Somehow, they managed other activities such as collecting firewood. Furthermore, they mentioned that a recent plague had killed their last remaining hen. These women, as well off as they are in their brick house, are still dependent on their family in order for daily support (Interview Vd-g11 10.12.2007). This clearly illustrates that family bonds are valued, but also that the core family benefits the most from the activities. Elder grandparents could also support their children if the fish was abundant (Interview Vb-i4 30.11.2007). Single parents and elderly showed tendencies of having difficulties creating a sustainable livelihood when they were detached from the family compound. Their living standards increased when their family could support them, even though they might not receive supplies every single day.

It has long been known that a rise in population puts additional stress on the existing resources, mostly due to the increased level of food needed but also because the level of human activity increases. In Saint Augustin this means that more inhabitants harvest natural resources, mainly fish, and thereby hamper other people to execute their livelihood strategies in their fashion. The interviews showed that a population increase was welcome, as it provided security for parents approaching an older age. Negative views were stated as well, such as the access to fish being limited since more people fish and that certain age groups, especially the young had the ability of fishing longer hours than usual. This was an obstacle for some families' well-being, as they might not have children that can fish or unlimited time resources to spend on the harvesting (Interview Va-g1).

The elderly are a significant category in applying livelihood strategies, says FAO demographer Stloukal (23.04.2008). They pervade the family's household and are key contributors to survival. Elder people are often in charge of childcare, basic health care, conflict resolution and fundamental livelihood support, even though they might not contribute economically. Although they might not be able to carry out any physical hard labour due to poor health, they do possess a bank of knowledge and guard traditions. In a society like Saint Augustin, where people do read and write but do not record anything, this is valuable information stored in elder peoples minds. Furthermore, they can also decide when to transfer their property to the family and through this create greater livelihood support when really needed. The elderly also pose stress for the family. They live to a greater extent on a subsistence-oriented livelihood, meaning that they might not plan for the future (Interview Stloukal 23.04.2008).

In order to diversify the economic capital firewood is collected in the nearby spiny forest, a task almost always performed by elder women and younger girls. They can walk up to three hours one-way to find a bundle of 12 kg. The wood is then used within the family, sold at the market in smaller bundles or traded for fish or rice. Some tree species are suitable for manufacturing charcoal and even if the Vezo are not primarily involved in this activity some do know how to make it (Interview Vd-g6 06.12.2007; Vg-g12 10.12.2007; Mb-g8 13.12.2007).

Poultry and livestock are important physical and economic capital. The Vezo keep mostly chickens and sometimes pigs and goats. Very few Vezos own zebus, as they are more expensive and cannot be slaughtered by the family. Most animals are free roaming and a local boy mostly herds the goats. Services like this cost around 5 000 Ar a month or are paid in livestock at the end of the year. Thieves might steal livestock, especially the bigger animals, and since zebus and goats are expensive, they are an important investment that might just disappear overnight. Chickens have less value and also give benefits in terms of eggs. Still, they are no safer since anyone can claim them if they are free roaming. Even though chicken meat is not sold in the market, the eggs are still an additional important income source or source of protein. When an investment, livestock and/or poultry, does not pay off, the owners are severely affected and the Vezos' livelihood is threatened (Interview Va-g6 29.11.2007; Vb-g6 30.11.2007; Vb-i6 03.12.2007).

Table 4 Season Scheme for Cultivated Vegetables and Fruits

Vegetable/fruit	J	*F	M	A	M	J	J	A	S	O	N	D
Fari				X	X	X						
Green beans										X	X	X
White beans										X	X	X
Maize									X	X	X	X
Mango	X									X	X	X
Cassava			X	X	X	X	X	X	X	X	X	X
Onion									X	X	X	X
Sweet potato									X	X	X	X
Rice	X	X	X	X	X	X	X	X	X	X	X	X
Tomatoes									X	X	X	X

*Enumeration of the months in the year.

Source: Fanja 03.11.2007

This table shows the most common vegetables and fruits that are grown around Saint Augustin and/or available on the market. Rice is available throughout the year, if crops do not fail, whereas most others are harvested around September – December.

Livestock are also a good buffer when food scarcity prevails. Not all fish species are available all year-round and vegetable, fruits and staple crops are also seasonal (see Tables 3 and 4). The months of September – December are the richest, when food is most abundant and nutritious. In the beginning of the calendar year almost all crops are finished and the fish is not accessible in the sea outside Saint Augustin. This implies that the fisher folk need to save to live through the scarce months. As it is more or less impossible to store food, because of the heat and insects, people are still dependent on daily fish catches and other tradable goods. Overall, the first three months of the year are harsh, even for families that are well off. This economic pressure causes additional environmental degradation, as the survival of the village is crucial.

Since the village is small there is no greater market for other professions. In total, there are three seamstresses in the village and other services are limited. This is both due to a lack of vocational training and professional education but also because there is no purchasing power in the village. The number of *epiceries* and smaller bars is limited as well (PO 31.10.2007).

Human capital, such as knowledge and skills, is important for the Vezo. Knowledge is needed in order to fish and wisdom is passed on between generations, which increase the livelihood survival. Human capital is also constantly added. If the society functions well, knowledge will be shared among people. In the average family, the children, primarily the boys, start fishing from the age of ten and from then on learn the skills from the elder. But all children observe the fishing techniques from a far earlier age, as they almost always accompany their parents/family. Apart from the traditional knowledge sharing the educational system plays an increasingly important role. Almost all respondents stated that they had been to school (Interview Va-g8 29.11.2007; Vb-i3 30.11.2007). This is a very high in comparison to the neighbouring villages, where the access to school is not as easy. Nonetheless, pupils only receive higher education if they had family in Toliara, as daily transport to town not always exists and would never be on time for the school start. Also, costs increase with the level of schooling and many families cannot afford any higher education (PO 13.10.2007). An interview with a teacher reveals that teaching in school was much about literacy and arithmetic, basic Vezo and sometimes French. The education taught depended on the skills of the individual teachers (Interview Renel Kasite 04.12.2007).

Figure 9 Two Fishermen Repair the Nets



Photo taken by author

The knowledge of repairing nets is a valuable human capital.

Still, there is a lack of human capital. Since people have the artisanal knowledge they need (building pirogues, repairing nets, knowledge of the market) (see Figure 9) they are not prone to learn new skills as their current strategies still work in economic terms. Even as the environment is destroyed, the Vezo still catch enough fish to imagine that this livelihood does benefit them. This seriously impedes their ability to create new livelihood strategies, even if they might not be aware of this fact yet. Especially the lack of knowledge diversification is an obstacle for the village, as the families all compete in the same sectors.

The physical capital is very weak in Saint Augustin. Although being the population centre of the commune and therefore better equipped than the rest of the villages, the options are still slim.

Besides the schools there is a small medical centre, one maternity ward, office buildings for the communal employees, a small library, the market place and the road going to Toliara (ANAE 2007:17-19), the road being in such a poor condition that it is a serious impediment for trading and the like (EIU 2007:15-16). Considering the entire infrastructure, there are three private fixed telephone connections, a couple of mobile phones and a limited number of generators for electricity. As specified before there is no running water and the hand dug wells have small percentages of salt (ANAE 2007:18). There is a lack of technical equipment, no machinery was visible during random walks in the village and vicinities and the only cars seen belong to the occasional tourists or aid organisation. Pirogues are numerous though and fishing gear and equipment as well. Most houses in Saint Augustin are hand made out of plant material with raffia mats to cover the floor. Better off families can afford cement floors and the best off have brick houses.

The link between economic capital and physical capital is periodically very strong. Regarding livestock and poultry, which are seen as an investment for the future, they give profits in forms of milk and eggs. Concrete infrastructure, such as the road, are not seen as only physical capital but also as indirect economic capital since it makes trade easier.

Environmental Degradation

Some of the Vezo respondents mentioned why the environment, and especially the habitat for the fish stocks, was slowly degrading. The boldest answer was climate change; although with no further indication to what kind of climate change and how long it had been going on (Interview Va-g6 29.11.2007). More tangible answers were the change of the river flow. The Onilahy River has slowly changed course and that is a human made impact. The runoff from the river has become more and more sandy due to mining upstream. Madagascar has become more popular for mining companies who have discovered untouched natural resources in the mountains. When extracting these resources, the minerals found need to be washed and as the Onilahy continues on it brings the sediment with it (Campbell and George 1993:24). This has not only changed the course of the river, but also the height. Many sand banks seen today were not there even five years ago, respondents said (Interview Va-g6 29.11.2007; Va-g8 29.11.2007; Vb-i3 30.11.2007). This is a new obstacle for the pirogues, which cannot be manoeuvred as smoothly as before, and for the fish stocks. The fish cannot go upstream anymore and the juveniles are not as protected as

they used to be in the deeper, but secluded river mouth. The shallowness of the river affects the whole fish fauna, as it also clogs the river mouth and nearby shore areas with sand. There is not much the fisher folk can do to prevent the Onilahy River from changing, the impact is done along the 400 km long river (ANAE 2007:13) and the end users in Saint Augustin are forced to accept the sand.

Respondents mentioned the relationship between cutting in the forest and loss of fish biomass. Especially the mangroves were important here. Mangroves, a tree that grows just on the edge between land and sea, holds nutritious sand and creates both a playground and a nursery for fish, shrimp and juveniles. Once the mangroves are cut, this habitat disappears and leaves the fish unprotected (Interview Va-g8 29.11.2007).

The barrier reef was identified as a crucial habitat for fish. It was termed the “house of the fish”, meaning that fish feed, sleep and reproduce there (Interview Va-i2 29.11.2007; Vb-g6 30.11.2007). The destruction of the barrier reef could be influenced. The nets used today are weighted with metallic leftovers, which when dragged along the bottom destroys the natural habitat. Anchors, made of stones or metallic trash are also devastating for the sea bottom. Tourism boats, how few there might be, and the diving for live lobster, shells, octopus and reef fish are also impoverishing the reef. Using permanent anchor buoys and rolls on the nets would diminish the destruction.

Lastly, there is a fishing practice that rarely is mentioned: fishing through poisoning. None of the respondents said they used *laro*, a poison extracted from a local plant, which stuns the fish, and all other species, in the water. Using *laro* is strictly forbidden by law but still practiced. One of the fisher folk associations mentioned it (Interview FISATO 11.11.2007) and the trees whose fruits produce the poison are plenty. It is hard to estimate any rates of usage or the destruction caused by *laro*, but it destroys the entire habitat and effects all living creatures in the water, not only the fish. This practice is commonly used in the coral reefs and the fisher folk of Saint Augustin might not be an exception, as a governmental report gives evidence of villages using *laro* both north and south of Saint Augustin (MINENVEF 2004:59).

In conclusion, the Vezo people, regardless of fishing practice, cause the greatest impact. The natural population growth and the actual total population today, in combination with the destructive practices used, exceed the carrying capacity of the sea. This means that fish stocks are depleting and that they have no chances of reproduction and replenishment. The biomass is diminishing, and all the above-mentioned factors, such as the sediment from the Onilahy River, are contributing. There are currently no sustainable environmental practices and the environment is the greatest loser of the Vezo's lifestyle (Campbell and George 1993:23-24). Even if some respondents showed awareness (Interview FISATO 11.11.2007), there were simply no alternatives for any other sustainable life routine.

Livelihood Strategies Identified

The livelihood strategies identified among the respondents in Saint Augustin all revolve around fish. There are few livelihoods that have no connection to fish. Support from relatives in Toliara, acting as a tourist guide, marry a Masikoro and become a cultivator or running the local bar are almost all examples of strategies not directly related to fish. Still, the Vezo within these professions are dependent on fish as a protein source. As the Importance of Fish will show, the sea is the central object within the Vezo's livelihood. Therefore the strategies all start from the same core. The main driving forces between livelihood strategies all depend on the forms of capital available for the individual. A greater social network enables the person to gain support and connections. Human capital in form of additional skills, such as basketry, can offer a source of economic income. A little slot of cultivation, very rare among the Vezo, could contribute to the food supply. The availability of a pirogue can enable access to outside markets for trading.

As shown above, the environmental degradation is a product of the Vezo livelihoods. There were no strategies identified that did less impact on the natural resources, disregarding service professions, such as teaching, that do not have any direct link to the environment. The Vezo themselves are almost all involved in fishing, even if they only take the opportunity as a side activity. The free access to the sea enables everyone to fish, as long as they possess some kind of fishing gear. Even if the Vezo almost always fish, fishing on overtime is the fallback livelihood strategy for harsh times. In the months of January – March, when food is scarce, the strategies do not vary. More energy is put into income diversification, in terms of selling commodities, rice or offering services as a seamstress, for instance. The scarcity of fish during these months does to a

certain extent influence the fishing practices. Many fisher folk still go out fishing, as they realise that sitting at home would not provide any food either. Many respondents said that you could be lucky and catch something, and time spent on the sea was never wasted.

Importance of Fish

The dependency on the sea and especially the fish is stunning. The local economy all revolves around fish, whether it is actually for self-subsistence in form of consumption or it is traded/sold for money or other merchandise in order to complete the diet or invest in fishing gear, clothes or the house (Interview Va-g4 29.11.2007; Vb-g1 29.11.2007; Vb-g8 30.11.2007). Fish are not only the main extended economic activity, but also the identity of the Vezo people. Livelihood strategies will therefore always naturally revolve around the sea and the fish, in order to stay Vezo. Strategies used which do not include any Vezo activities changes their ethnicity and therefore also the conditions for Vezo livelihood.

One local NGO worker stated that in maybe 10-15 years there would be no more fish. This statement is not scientifically proved, but the core problem still exists. The people are unaware of how much fish there is and believe that there are close to unlimited amounts of fish. The respondents were aware that the amount of fish had decreased. When asking interviewees how access to fish was when they were young, all said that fish was more abundant. Regardless if the respondent was 30, 60 or 90, they all said the same thing; older respondents even mentioning that in their youth, fish could almost be grabbed from the beach (Interview Va-i1 29.11.2007; Vb-g9 20.11.2007; Vd-g16 10.12.2007).

Despite the decline in availability described by the respondents, they did not consider stopping fishing or introducing regulations that would help the fish stocks replenish. Their survival was one important argument, that they needed the fish in order to ensure that they could live another day. Economic values and causes are therefore more important than the conservation of the environmental habitat. This has the long-term effect that the environment might be fully destructed once the Vezo do realise that they have to change their livelihoods, whether they want to or not. The adaptation to ensure the daily catch clearly supports the unwillingness to change:

larger nets with smaller mesh, longer fishing occasions and year-round fishing. This is a very destructive behaviour for the environment.

To conduct the current fishing activities although knowing that the practice is devastating for the environment point at a very crucial fact: the lack of alternatives. Even though the livelihood strategies identified show that the people have the ability to adapt to the current situation it is not sustainable. Adaptation has not and will not lead to less destructive livelihood strategies. As the environmental conditions decline and the natural resources slowly vanish, the basic survival resources disappear. Even if new forms of capital, such as the new road to Toliara that will be built in 2008 (Interview Boniface 02.11.2007), add to the opportunities, there will most surely not be enough for the growing village. The link between economic survival today and environmental sustainability for the future is very weak.

Summary of Analysis

Human capital is characterised by the knowledge about fish and all artisanal issues concerned with fishing (nets, boats, market opportunities) is tremendous. The Vezo are specialists in their current life style and this was a very prosperous way of life until the environmental degradation and destroyed habitats caused a clear decline in fish. The scarcity is a fact known to the Vezo but their current human capital has not provided incentives for changing the strategies used. The ability to be flexible and adopt new ways of living is not within the Vezo thinking; all they see is that the fish available today is still sufficient periodically and that the need for income diversification is not urgent. Their knowledge does often not stretch too far and the formal education offered is not on a higher level. Furthermore, there are few opportunities outside the fishing sector, giving the informal education an advantage and leaving school as excessive knowledge.

Physical capital includes the infrastructure. Roads, houses, telephone lines and official buildings are mostly of bad quality in Saint Augustin. Almost all own the house they live in, as opposed to renting it, and some families can afford a brick house. Even if the road to Toliara will be paved in 2008, the communication with other cities will still be fragile. Possible changes such as more transport options to and from the city might contribute in a positive way to the livelihood

strategies among the Vezo. The Vezo are not traditionally pastoralists, but they still invest some of their money in livestock or chickens. The additional income, as meat, milk or eggs, is an important nutrition source but also means for trading.

Natural capital is the most important capital for the Vezo. The coastal environment and the marine habitat are crucial for any livelihood strategies among the Vezo fisher folk. As their lives spin around fish and fish related activities, they cannot economically survive without the sea. Still, their destructive habits concerning fishing, such as small mesh sizes, destroying the flora on the ocean floor and not respecting reproduction seasons, decrease the availability of fish in the sea. Even if the Vezo are aware of their negative habits they lack alternatives for economic income. The fish are among the natural capital which is the most important and the most threatened resource.

Social capital is characterised by the democratic participation and the family. The democratic environment in Saint Augustin is very open. There are no restrictions, understood by the researcher, to influencing politics and free speech. The communal government is concerned about revenues and its development criteria (see Appendix 1) and the lack of a social security net does not provide any insurance for the people in Saint Augustin. The family has a special place within the social capital. Having a large family, as is the case for most in Saint Augustin, might both be a restraining and a driving force. Elder grandparents might not have the means to support themselves and are dependent on their children or they might have to support their own children, if they are not able to survive economically on their own. The family are a supporting pillar, but might also be very demanding.

Economic capital includes not only the financial aspect but also the informal trading system. Fish is the most crucial economic income source in every aspect. Fish can be sold in the market, fish can be traded for rice in harsh times and fish can be caught in the sea and need not be bought. The fish can also be sold on to a collector or sold by the fisher folks themselves in Toliara or another city. Prices are higher outside Saint Augustin but there is a risk in transporting unfrozen fish. Economic income diversification in Saint Augustin further includes firewood and charcoal making and selling. The market holds a potential for these goods, even if POs showed that most

purchases are made within families and among relatives, as part of the social capital network. Some fisher folk also have epicerics and sell commodities and manufactured items. Tourism is a growing source of income, but the tourists are still not abundant and their revenue does only gain certain families.

Conclusions

This final section will focus on the relationship between economic and environmental sustainability. The conflict between these issues is strained but also of great importance in forming sustainable livelihoods. The model presented under the Analytical Framework is the centre of the conclusion, which is organised according to the Research Questions.

Is the present fishing in Saint Augustin sustainable in an economic and environmental sense?

The thesis has shown that present fishing practices are not environmentally sustainable in Saint Augustin. The Vezo fisher folk are aware of this fact, but are also unable to prioritise environmental concerns as long as the economic needs are greater and there is a lack of alternatives for economic diversification. As a consequence, the sea and its natural resources are slowly being depleted in favour of short-term economic survival. The future for Saint Augustin is not prosperous; the economy built up today is not sustainable in the long run and future generations will have a harsher reality, with already low fish stocks and serious environmental destruction.

As the environment is not managed in a sustainable way, it becomes impossible for the economy to be sustainable as it is dependent on the natural resources. Once these are depleted, there is no mean of income and even the most basic strategy of relying on nature for economic survival will not work. Economical and environmental sustainability are dependent upon each other in the case of the present fishing in Saint Augustin. Conservational actions could be taken already, but as long as there is a lack of economic alternatives for all the Vezo this is not an option. Creating more environmental sustainable fishing practices would benefit the economy in a long-term perspective; this would on the other hand damage and restrain the current generation's ability to gain a reasonable living standard. Nature has in the case of Saint Augustin always provided a steady source of income and has always been the last resort if no other strategy works. This dependence not only shows the problems with the present fishing but also highlights the greater conflict of changing into new and untested livelihoods.

What are the main driving forces within the Vezo fisher folk in Saint Augustin in regard to individual's livelihood strategies?

The main driving force is the economic survival. Strategies are dependent on each individual's livelihood and the various available forms of capital. Individual's livelihood strategies aim at providing the basic needs and all strategies revolve around fish. Natural resources are the main source for economic income and for protein. The free and unrestricted access to the environment enables the Vezo fisher folk to apply a short-term perspective for daily survival rather than think about future generations and environmental sustainability.

The choice of economic survival is crucial for the Vezo but also the most destructive practise for environmental sustainability. Conservation could be a part of the main driving forces, but there are no incentives for a lucrative income. The environment is valued in economic terms and not seen as aim in itself. Environmental and economic sustainability can only be ensured once the main driving forces among the strategies include the use of natural resources in a less exploiting manner.

Is there a contradiction among the Vezo fisher folk in Saint Augustin within these livelihood strategies concerning economic interests and environmental sustainability?

Economic survival is prioritised over environmental conservation. The livelihood strategies among the Vezo fisher folk focus on economic survival and use the environment as a mean of income. The economic interests are imminent as they alone guarantee short-term survival. Environmental sustainability is important, but not realised as an indispensable factor. The assurance of economic survival would change the affect on the natural resources and slow down the destruction; a Vezo livelihood strategy will always include a use of natural resources but future income diversification might enable a more environmentally sustainable use.

The Vezo are keen on providing a viable environment for future generations, but the undertaking ends here. They did not show any suggestions for improvements and conservation of the environmental habitat. Some of the fisher folks associations offered careful alternatives to the present fishing practices and showed a consciousness of the destruction going on. Still, they do

not change any habits and they have slim chances of stopping or improving the damaging practices. The economic interest has a higher priority than the environmental sustainability, even though the awareness of the short-term sustainability is present. Saint Augustin has an atmosphere of *status quo* and changes might not necessarily lead to a positive impact on the environment.

The fish are the most important environmental item for the Vezo fisher folk. The almost systematic destruction of the fishes's habitat does imply that the fish indeed in a quite imminent future will vanish or the stock will decline. There are signs already today that the fish in the sea are not abundant anymore and have diminished: spread, stock size, species size and the number of juveniles. The decline could be caused by either destruction of the natural habitat or by overfishing. The economic importance of the fish should mean that conservation actions would already have started; but the Vezo fisher folk simply have no other choice for survival.

Final Remarks

The Vezo fisher folk and their dependence on an open access natural resource and the effects it has on environmental sustainability is comparable to Hardin's (1968) "tragedy of the commons" situation. Free access to the environmental resources, in this case the fish in the sea, makes the Vezo fisher folk vulnerable and jeopardises the economic income and survival.

The current dependence on natural resources needs to be changed, before it is too late and the environmental habitats are destroyed. The life for the Vezo fisher folk can only become more difficult; but, of course, the future is still hidden. Environmental research, such as studying fish species and tracking their spreading, could show that fish are more abundant than is thought of today. Fish may avoid the bay outside Saint Augustin for reasons other than overfishing and the Vezo might be able to constantly live of fish as an economic and environmental resource if they change fishing area and practices.

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The map relief on the front page is made by Jonas Johnsson. The fisherman is a detail taken from an anonymous postcard printed by Md Paoly (bought in the bookshop with the same name in Toliara).

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Appendix 1 Project Suggestions and Criteria for Development of Saint Augustin

The criteria and suggestions presented in the ANAE report (2007) about the village of Saint Augustin are developed to give implications on important areas and various issues that need to be enhanced and might lead to economic progress in the village. The different criteria are chosen by the government for Saint Augustin in collaboration with SAGE and ANAE. They cover four sections: Sustainable Development Criteria for Saint Augustin, Socio-Economic Criteria for Saint Augustin, Feasibility Criteria for Saint Augustin and Important Criteria for Saint Augustin. They are all prioritised into order of importance and the same criteria are used in all sections. The report does not state how these criteria will be used, handled or fulfilled and there is no plan for the future attached. In order to present a better overview of Saint Augustin villages and the prospects of progress going on, the criteria will be listed. The word *ananambo* is unfortunately not explained anywhere. Also, some criteria might be hard to understand if not places in the rural, poor and coastal context of Saint Augustin. The trees and palms mentioned are ways of income diversification; they both provide shadow and food.

Sustainable Development Criteria for Saint Augustin

1. Protection wall built against flooding
2. Marine Environment
3. Terrestrial Environment
4. Continental Fishing
5. Improvements in Education
6. Access in Drinking Water
7. Improvements in Health
8. Touristic Environment
9. Rural Electrification
10. Coconut Trees
11. Date Palms
12. *Ananambo*
13. Culture and Sports Centre
14. Sheep/Goat Livestock
15. Basketry
16. Woodwork
17. Pigs
18. Poultry

Socio-Economic Criteria for Saint Augustin

1. Continental Fishing
2. Addition of Drinking Water
3. Touristic Environment
4. Marine Environment
5. Terrestrial Environment
6. Protection wall built against flooding
7. Improvements in Education
8. Improvements in Health
9. Rural Electrification
10. Pigs
11. Sheep/Goat Livestock
12. Poultry
13. Culture and Sport Centre
14. Coconut Trees
15. Basketry
16. Date Palms
17. *Ananambo*
18. Woodwork

Feasibility Criteria for Saint Augustin

1. Date Palms
2. Coconut Trees
3. *Ananambo*
4. Adduction of Drinking Water
5. Protection wall built against flooding
6. Terrestrial Environment
7. Improvements in Education
8. Improvements in Health
9. Maritime Fishing
10. Marin Environment
11. Rural Electrification
12. Poultry
13. Pigs
14. Sheep/Goat Livestock
15. Touristic Environment
16. Basketry
17. Woodwork
18. Culture and Sport Centre

(ANAE 2007:32-35)

Important Criteria for Saint Augustin

1. Marin Environment
2. Maritime Fishing
3. Touristic Environment
4. Terrestrial Environment
5. Date Palms
6. Rural Electrification
7. Protection wall built against flooding
8. *Ananambo*
9. Coconut Trees
10. Improvements in Education
11. Improvements in Health
12. Adduction of Drinking Water
13. Sheep/Goat Livestock
14. Pigs
15. Basketry
16. Woodwork
17. Poultry
18. Culture and Sport Centre

Appendix 2 Interview Guide in French

Entretien personnalisé avec questions semi-structurées

Je m'appelle Ulrike Deppert et je suis étudiante en Master à Université Lund de Suède. J'ai choisi d'écrire mon Master sur le thème de la pêche traditionnelle dans la région de Tuléar et j'aimerais par conséquent vous poser quelques questions au cours de cet entretien.

L'anonymat des personnes interrogées est garanti, et les réponses données aux questions ne seront en aucun cas divulguées à des tiers. Les résultats seront analysés dans ma thèse de Master.

Je réalise actuellement un stage au sein de l'association humanitaire SAGE mais il n'existe aucune corrélation entre cette association et ma thèse de Master. Ils n'examineront donc pas les réponses et ils n'exercent par conséquent aucune influence sur mon travail ou sur les conclusions apportées à cet entretien.

Date:

Lieu:

Données concernant la personne

Sexe:

Âge:

État civil:

Enfants (nombre et âge):

Nombres de personnes vivant dans la maison:

Niveau scolaire:

Données concernant les revenus

Evolutions des revenus (rang):

Temps investi (rang):

Qui pêche:

Et en cas de maladie:

Depuis combien de temps pêchez-vous:

Activités des autres membres de votre famille dans votre maison:

Activités secondaire:

Méthode de pêche utilisée

Méthode principale de pêche:

Autres méthodes utilisées:

Matériel utilisé:

Provenance du matériel utilisé:

Accès à la pêche: bon ou mauvais ? Pour quoi ?

Emplacement

Lieu de pêche:

Avez-vous toujours pêche à cet endroit:

Partagez-vous l'emplacement avec d'autres pêcheurs:

Qui vous a donné cet emplacement:

Y a-t-il une certaine concurrence entre pêcheurs pour le poisson:

Temps et saison de pêche

À quelle heure partez-vous pêcher:

À quelle époque de l'année partez-vous pêcher:

Fréquence de la pêche:

Y a-t-il des moments de l'année durant lesquels vous ne partez pas du tout pêcher:

Y a-t-il de grands bancs de poissons disponibles en général, là où vous allez pêcher:

Y a-t-il de grands bancs de poissons disponibles toute la journée, là où vous allez pêcher:

Y a-t-il de grands bancs de poissons disponibles tout au long de l'année, là où vous allez pêcher:

Sortes de poissons

Quelles sortes de poissons pêchez-vous:

Quels autres mammifères marins pêchez-vous également à part des poissons:

Faites-vous aussi des prises inattendues:

Usage

Qui prend soin du poisson après sa prise:

Quel traitement est réservé au poisson:

Qu'arrive-t-il au poisson:

Utilisation du revenu généré par la prise de poissons:

Influences extérieures

Rôle du récif corallien dans le processus de la pêche:

Rôle de la rivière Onilahy dans le processus de la pêche:

Avez-vous élevage:

Autres remarques:

Merci beaucoup!