Norwegian University of Life Sciences
Faculty of Social Sciences
Department of International Environment and Development Studies

Master Thesis 2015
30 credits

Between Conservation and Poverty: Impact Assessment of a Fisheries Management Project in Madagascar

Inga Paukstyte

Between Conservation and Poverty: Impact Assessment of a Fisheries Management Project in Madagascar

Inga Paukstyte

The Department of International Environment and Development Studies, Noragric, is the international gateway for the Norwegian University of Life Sciences (NMBU). Eight departments, associated research institutions and the Norwegian College of Veterinary Medicine in Oslo. Established in 1986, Noragric's contribution to international development lies in the interface between research, education (Bachelor, Master and PhD programmes) and assignments.

The Noragric Master thesis are the final theses submitted by students in order to fulfil the requirements under the Noragric Master programme "International Environmental Studies", "International Development Studies" and "International Relations".

The findings in this thesis do not necessarily reflect the views of Noragric. Extracts from this publication may only be reproduced after prior consultation with the author and on condition that the source is indicated. For rights of reproduction or translation contact Noragric.

paukstux@gmail.com

Noragric
Department of International Environment and Development Studies
P.O. Box 5003
N-1432 Ås
Norway
Tel.: +47 64 96 52 00
Fax: +47 64 96 52 01
Internet: http://www.nmbu.no/noragric

Declaration

I, (name), declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature……..

Date……

Acknowledgments

First of all I would like to thank Thor Larsen and Pål Olav Vedeld. Without you both I wouldn't be able to write this work. Especially enormous thanks to Thor Larsen for all the guidance, so much input, hard work and interesting conversations. Thanks to Kassim Athumani Kulindwa for help in the beginning of the study.

I also have to express my gratitude to WWF-Norway and WWF-Madagascar for beautiful cooperation and so much help. Particularly big thanks to Paolo Tibaldeschi from WWF-Norway, who helped to organize the visit to Madagascar and find local contacts. Without you Paolo this research wouldn't be possible.

Massive thanks to local contacts in Madagascar, WWF staff Lilia Rasolofomanana and Gaetan Tovondrainy. Lilia and Gaetan made my stay in Madagascar as comfortable as possible, helped to reach isolated villages and organized the logistics. I would also like to thank my translator Laza who stayed with me all the time in local villages during my field trip.

I am also very grateful to Ingunn Bohmann for all your help regarding the thesis arrangements, being able to answer all the questions and fix all the problems. Big thanks to Noragric department for possibility to write this work and to do this interesting study.

And the last but not least, huge thanks to Gerard Rocher Ros for all the help and support during the writing, and thanks to my family and friends.

Abstract

This thesis is a study about the role of conservation and sustainable management of natural resources, asking if biodiversity can be maintained whilst people's livelihoods also improved. The study was carried out in remote small villages in southern Madagascar (Maromena, Befasy, Beheloka and Ampasimahanoro) from March 17 until April 14, 2014. The WWF implemented a small-scale fisheries management project between 2007 and 2011. The study compared the outcome from WWF's project with my own findings. The study focused on two main groups: villages where WWF had worked and villages that had not benefitted from WWF's interventions and support. A Livelihood Impact Assessment was used to answer research questions with the help of the Sustainable Livelihood Framework and World Bank's 'Opportunities' approaches. The analysis is based on mixed qualitative and quantitative methods, however emphasis is put on qualitative research. Primary data collection included 10 interviews with key informants, 5 focus groups, 48 household surveys (32 HHs from the project villages and 16 HHs from the non-project villages) and observations. The WWF project had created a Locally Managed Marine Area and reintroduced the traditional governance system – local "*dina"*. The main findings show that the fisheries management project was very beneficial to local communities where WWF had worked. The need for resource protection and sustainable harvesting was understood and appreciated by the project villages. The main reasons were: a) the communities' involvement in conservation and management, b) they had their own local institutions ("*dina"* and CBOs), and c) they had received necessary education and training relevant to management and sustainable use of fish resources. Benefits from conservation for the improvement of local people's livelihood were recognized among the villagers, which led to reduction in illegal fishing practices and seasons closed for fishing. The research results demonstrate striking differences between the project village and the non-project village. The positive outcome in the project villages described above was not apparent in thenon-project villages. This was probably because the traditional *"dina"* was not re-established and that there was a lack of appropriate training related to sound management and sustainable harvesting in such villages.

Key words: Conservation, sustainable management, livelihood impact assessment, sustainable livelihood framework, community based natural resource management, traditional governance, traditional fisheries, poverty.

Abbreviations

CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBNRM	Community-Based Natural Resource Management
CBD	Convention on Biological Diversity
CBOs	Community-based organizations
CCAs	Community Conserved Areas
CEPF	Critical Ecosystem Partnership Fund
COP	Conference of the Parties
CPUE	Catch per unit effort
DAC	Development Assistance Committee
DFID	UK Department for International Development
EKC	The Environmental Kuznets Curve
FAO	Food and Agriculture Organization
GELOSE	Legal framework known as Gestion Locale Se'curise'e
HDI	Human Development Index
HHs	Household Survey
IIED	International Institute for Environment and Development
ICZM	Integrated Coastal Zone Management
IUCN	International Union for Conservation of Nature
LMMA	Locally Managed Marine Areas
MA	The Millennium Ecosystem Assessment
MDGs	Millennium Development Goals
MFA	Norwegian Ministry of Foreign Affairs
MPAs	Marine Protected Areas
MWIO	Madagascar and the West Indian Ocean
NORAD	Norwegian Agency for Development Cooperation
NPAs	New Protected Areas
PM&E	Participatory Monitoring and Evaluation
SLF	Sustainable Livelihood Framework
SPRH	The Regional of Fisheries Administration
TGRN	Natural Resources Management Transfer
UNDP	United Nations Development Programme
WIO	Western Indian Ocean
WWF	World Wide Fund For Nature
WWF MWIOPO	Madagascar and Western Indian Ocean Program Office

List of figures and tables

Table of contents

CHAPTER 1: Introduction

1.1 Introduction

In the past 50 years humans have managed to achieve huge progress in development and significant industrial growth. However, at the same time, in the same 50 years we have managed to make one of the biggest changes for the environment in the history of the humankind. As a result of our activities on the earth, we are making some irreversible changes for the planet, such as climate change or biodiversity loss. Species extinction rate is thousand or more times higher that the natural rate, Fritz-Vietta *et al*. (2011) compared biodiversity loss as to burning down the world's libraries without knowing 90% of the content of the books. The alarming UN Millennium Ecosystem Assessment report demonstrated that growing overexploitation of natural resources decreases nature's ability to provide us with clean air, soil and water, or to control natural disasters (IIED 2004; NORAD 2007).

No doubt that our development and growth is highly important, especially if we live in the world where billions of people still live in the extreme poverty and struggle for their survival. However, on the bigger scale, environment also plays a crucial role for our survival and prosperity on this planet (Bille *et al*. 2012). It is a great challenge to be able to balance between both of these important issues. The questions are: can we continue development and alleviating people from poverty but at the same time protecting the nature? Can addressing both of these issues be successful and who is actually benefiting from it?

As an example a case study from Toliara, Madagascar is taken. In 2007, WWF-Norway supported traditional small-scale fisheries management project in order to protect the third biggest coral reef in the world, so local communities can benefit from it in long-term and, at the same time, contribute to conservation of coastal and marine biodiversity that they depend on. The project goal was to facilitate and support the implementation of strategy for participatory management of marine natural resources (WWF 2007). The project started in four very isolated pilot villages that are mostly populated by *Vezo* fishermen tribe that is totally dependent on marine resources. Due to rapid population growth, climate change and strong poverty level local communities put strong pressure on natural resources. National fishing regulations and legislations are not practices or even known here because these villagers are quite remote. Before the WWF project there was no control or rules on fishing, basically local fishermen had non-regulated access to the sea. Local people could practice any kind of harmful fishing

activities. Today, the project villages have Locally Managed Marine Areas and local regulations on fishing. New local governance system was established: traditional social by-laws called *dina* were created together with communities, number of community-based organizations (CBOs) were created to include local people in conservation activities.

1.2 Relevance of the study

Nature conservation strategies have changed a lot from it's starting point. Historically, the idea of conservation was to separate humans from nature so it would be 'left for nature' and preserved. The formal conservation institutions began to appear in Europe and North America in nineteenth century with creation of reserves and national parks. A model called 'fortress conservation' or 'fences and fines approach' was the most commonly used at that time, which involved creation of protected areas where humans were excluded as residents, the consumptive use was prevented and other forms of human impact minimized. This narrative was commonly used in creation of African conservation. However, in time this approach proved to be quite ineffective for people and conservation. The new counter-narrative called 'community conservation' emerged in 1970s which shifted dominant discourses of development from the 'top-down' model to 'bottom-up', decentralized participatory planning. It was acknowledged that local people shouldn't be excluded physically from protected areas or politically from the conservation policy planning. This new approach had two distinctive elements, first of all allowing people in and around protected areas and including them in management of natural resources; second linking conservation objectives into local development needs (Hutton *et al.* 2005; Hulme & Murphree 2001).

According to Ferraro (2011) and Will *et al.* (2012) there is not many studies showing potential tradeoffs between conservation and poverty alleviation. Since poverty alleviations and biodiversity conservation are major challenges and goals, there is a great necessity to study what are the impacts of conservation on affected local communities. This not only could contribute to improving environmental and development policies, but at the same time change millions of people's lives that are affected by these policies. However, only including local people in conservation activities not necessary will result successful nature protection, there are so many other important issues that needs to be addressed and studied (e.g. who is affected, how and why?).

1.3 Objectives and research questions

The overall purpose of this study is to identify the role of conservation and community based management for improvements of local people's livelihoods, and to answer such important questions like: ***can sustainable management of natural resources benefit both maintaining biodiversity and improving people's livelihoods? Does community approaches for conservation really works?***

This specific example of fisheries management project from Madagascar was taken because, first of all, Madagascar is one of the poorest countries in the world that has one of the most unique but also one of the most degraded natural environments in the world (ASCLME 2012). Second of all, because the project aims to protect the environment by involving local people in conservation activities, and not excluding them. The local communities struggle for their survival because they live in difficult economic or climate conditions, but also because they entirely depend on these natural resources for their livelihoods. The purpose of this study is not to prove that conservation is important in the area, because it obviously is; but if conservation can actually benefit local communities or in some cases bring negative impacts. In addition, WWF Norway that supported the project was interested to do socio-economic impact assessment for future project improvements, since there is not much research done in the area apart from WWF report evaluations.

To be able to answer the main study questions the Sustainable Livelihood Framework (SLF) and the World Bank's 'Opportunities' framework were used. These methods are chosen because they focus on people's lives rather than on increased assets. Besides, 'opportunities' approach addresses the needs of poor people in three important areas: opportunity, empowerment and security. Mixed qualitative and quantitative methods were used, however emphasis is put especially on local people's perceptions and "stories", and not on fish catch or income amount. Unlike most of the reports that basically focus on statistics and increased numbers, I aim to look behind the numbers trying to capture local people's experiences that are often forgotten. In addition, increased economic assets not always represent improvements in livelihoods.

The study has 3 main objectives:

Objective 1: to assess social, economic and environmental impacts of WWF's Toliara Project on local communities;

- What are current livelihood strategies, achievements and priorities in the study site?
- How livelihoods are influenced (changed) by various impacts of the project, and what are the key internal and external influencing factors?
- What are the differences between stakeholder groups in relation to livelihood impacts?

Objective 2: to investigate if sustainable management of natural resources benefit both maintaining biodiversity and improving people's livelihoods;

- What are the differences of the people's livelihoods and general environmental conditions of coastal areas in project and non-project villages?
- What are the differences of people's livelihoods and general environmental conditions of coastal areas before and after the project?

Objective 3: to investigate what are the changes of local people's attitudes and behavior towards environmental issues in the study area;

- Did the people's attitudes and behavior regarding environmental issues change after the project?
- Are there any differences between people's attitudes and behavior towards environmental issues in project village and non-project villages?

CHAPTER 2: Study area

2.1 Madagascar's socio-economic and environmental situation

Madagascar is the 4th largest island in the world with total surface area of 590,000 km^2 (ASCLME 2012). It is one of the most unique and biodiversity rich places on earth, unfortunately at the same time, one of the most environmentally degraded. High number of endemic species and environmental habitat loss made it one of the top 'biodiversity hotspots' on the planet (Fritz-Vietta *et al.* 2011). The main characteristics for biodiversity hotspots are two phenomena: extraordinary concentration of endemic species and more than 70% primary vegetation loss (Myers *et al*. 2000).

Biodiversity

Biodiversity in Madagascar is highly rich and unique as a result of being isolated from the main African land for almost 160 million years. It is interesting to notice that humans arrived to Madagascar only 2,300 years ago (Fritz-Vietta *et al*. 2011). Madagascar has more than 13,000 species of plants and 700 species of vertebrates, which more than 80% are found only in Madagascar (Rasambainarivo & Ranaivoarivelo 2006; Scales 2014).

Coral reefs

Madagascar has the third largest coral reef systems in the world on the southwestern part of the island, that stretches for more than 300 km (WWF 2007). Coral reefs are some of the most diverse and species-rich habitats on the planet. They are home and most importantly nursery grounds for hundred of thousands of organisms and often called the rainforest of the ocean (Fritz-Vietta *et al.* 2011). In addition, they play a crucial role in providing costal protection from erosion and storm damage (Hoegh-Guldberg 1999, Hughes *et al*. 2003). The main marine and coastal ecosystems in Madagascar include mangroves, coral reefs, seagrass beds, lagoons and offshore marine ecosystems (ASCLME 2012). Millions of people directly or indirectly depend on coral reefs. In Madagascar, coral reefs are one of the main sources of animal protein for millions of people (Laroche & Ramananarivo 1995).

However, these complex and highly productive marine ecosystems are extremely fragile and sensitive to any environmental changes. Rapidly growing population puts a great pressure on the reef.

Economic development

In contrast to its natural richness Madagascar is among the poorest countries of the world. According to statistics, Human Development Index (HDI) in Madagascar in 2012 was 0,483; which is the 35th lowest HDI among all 186 countries measured. 81,3% of the whole population in Madagascar lives below the international poverty line of $1,25 per day (2002 - 2011). Life expectancy in the country is 66,7 years. Economic growth rate in 2007 was 5,6% and inflation rate 10,3% (ASCLME 2012). 65% of households experience food insecurity from time to time, half of the children under 5 years old are malnourished (NORAD 2013). Besides, Madagascar has one of the highest human population increase rates in the world. It is estimated that population will increase from 21,9 millions in 2012 to 35,5 millions in 2030 (UNDP 2013). More than 70% of people in Madagascar rely on subsistence agriculture or pastoralism, directly depending on ecosystem services and goods (Rasambainarivo & Ranaivoarivelo 2006).

Environmental degradation and challenges

All of this together with overexploitation of natural resources resulted one of the highest environmental degradation (CEPF 2004). For example, since 1953 Madagascar lost almost half of its forest cover, most of it was coastal lowland forest. Roughly 90% of original forest and half of species in Madagascar are lost forever (Hanski et al 2007). According to 2011 measurements 21,0% of all species in Madagascar are endangered species (UNDP 2013).

As specified by ASCLME report (2012) another serious challenge that is affecting Madagascar is climate change. The average annual rainfall is estimated to decrease by 5% in 2100, however increase by 5-10% in rainy season. Almost every year strong cyclones and heavy floods hit Madagascar. Unfortunately, Madagascar is among the tropical coastal countries that have one of the lowest adaptive capacity and very high vulnerability to climate change (Westernam *et al.* 2013).

2.2 History of nature conservation in Madagascar

Madagascar became independent from France in 1960, however even today institutional and legislative framework for natural resource management is still connected to French colonial era. Most of the protected areas are near the nature reserves that were established in 1927 (CEPF 2004). During 70s and 80s Madagascar became very isolated from the West. Efforts to create central planning for the economy and government had fail, as well as conservation management. In 1979, only because of personal connections to then president Admiral Didier Ratsiraka WWF initiated official representation in Madagascar. During late 80s Madagascar eventually received attention for its biological importance from global conservation communities (CEPF 2004; Cinner *et al*. 2009). In 1989 the government of Madagascar introduced 15-year investment program known as a National Environmental Action Plan, which was the starting point in legalizing the National Environmental Charter and National Environment Policy in 1990 (CEPF 2004).

Protected Areas

In 2003 Malagasy government made a decision to triple the area of Protected Areas in 5 years to achieve the International Union for Conservation of Nature (IUCN) goals. The policy was called the Durban Vision (Fritz-Vietta *et al.* 2011). Today around 10,2 % of Madagascar's area is protected and managed by Madagascar National Parks (MNP) (Fritz-Vietta *et al.* 2011). Introducing New Protected Areas (NPAs) was sometimes on the borders of local communities settlements, that often directly depend on natural resources, for example, timber collection. For this reason most of the NPAs were established as IUCN categories III, V and VI, that has less strict protection status and allows sustainable resource extraction by local communities (Fritz-Vietta *et al.* 2011; Garder 2013). Legislations for these new protected areas permit various use zoning and different forms of collaborative management (Rakotoson & Tanner 2006).

Communities involvement in conservation

Communities' participation in environmental management was described in Malagasy Constitution already in 1990 with the Environmental Charter. It is made of two parts: (1) the transfer of competencies such as the transfer of natural resources management, the protected areas management,

and (2) the contribution to decision-making through environmental management instruments such as the environmental impact study (CEPF 2014). The first legal law known as Gestion Locale Se'curise'e (GELOSE) was created to involve local communities in natural resources management in 1996. It involved forest, fisheries, land, and sea resources (CEPF 2014). The law established the policy of Natural Resources Management Transfer (TGRN) and was enforced from 2001. Local resource user associations created by-laws to outline their own goals and conservation regulations through Community-Based Natural Resource Management (CBNRM) contracts. In order to legalize GELOSE three parts have to sign the contract: (a) authorities in charge for natural resources, (b) the mayor of the administrative territory, and (c) management committee of resource users (Fritz-Vietta *et al.* 2009, 2011) Around 750 management transfer programs were signed with local communities including over 1 million ha. (CEPF 2014).

The problem related adopting GELOSE in marine resources management is that Ministry of Agriculture and Fisheries is responsible for marine resources and not the Ministry of Environment. As the Ministry of Agriculture and Fisheries is not allowed to sign the contract with the communities (Cinner *et al*. 2009; Fritz-Vietta *et al.* 2009, 2011). In addition, the community-based management initiatives often were negatively affected by lack of skills, means, and resources at governmental level (for evaluation, monitoring, and supervision), and at the municipal level for conflict resolution; or lack of organizations helping the communities to write contracts or management plans (ASCLME 2012; CEPF 2014).

Malagasy traditional social code – "Dina"

There are two types of traditional sociocultural institutions in Madagascar that are very important in both marine and terrestrial ecosystems conservation: *Fady* and *Dina* (Cinner *et al*. 2009). *Fady* is a *Vezo* taboo or prohibition for some particular activities in particular places (Cripps 2010). *Dina* is a traditional social code, that is a part of the Madagascar's legal framework coming from pre-colonial times. It became officially used and legalized by the government from 1996 (Rakotoson & Tanner 2006). It is a voluntary mechanism that is used to develop local rules and regulations to guide and control local community behavior towards natural resources use, at the same time representing traditional values and social practices in the area. *Dina* empowers local communities to manage and take responsibility for their natural resources (Rakotoson & Tanner 2006; Fritz-Vietta *et al.* 2009).

Dina is a written document officially recognized by the government and has to be signed by village president and particular stakeholders (Cinner *et al*. 2009).

Dina showed to be very useful tool to include local communities in nature conservation in Madagascar. It is especially efficient in remote villages where use or natural resources is almost impossible to control. Local people respect *dina* law since they take the big part in creating it (Fritz-Vietta *et al.* 2009). Approximately 75% of population in Madagascar lives in rural places that are ruled by social codes (Rakotoson & Tanner 2006).

2.3 Norwegian aid to Madagascar and the political crisis

Norway is one of the biggest contributors to development aid around the world. Norwegian development support makes approximately 2,6% of whole development aid globally. In 2013 Norway's development assistance reached more than 32807 million NOK and it is growing every year (NORAD 2013).

Development policy and assistance are important parts of Norwegian foreign policy. Most of the Norwegian development aid is managed by the Ministry of Foreign Affairs and Norwegian foreign missions. The Norwegian Agency for Development Cooperation (Norad) is a directorate under the Norwegian Ministry of Foreign Affairs (MFA) (NORAD 2007, 2011).

There are no doubts that Madagascar is one of the top priority places for conservation. Norway started financial support for environmental sector to Madagascar already in 1989. In 2010 it reached 9,0 million NOK (NORAD 2012). Norway is an important donor for development and environmental in Madagascar. Every project or programme makes a real difference and change for people's lives and nature conservation.

In 2009 Madagascar experienced one of the biggest political crisis and instability in the country, which resulted freeze of all bilateral assistance from Norway and most of other donor countries. Norwegian support dropped more than twice from 128,5 to 52,4 million NOK in 2009 (NORAD 2013). Unstable political atmosphere, economical crisis in the country, plus enormous locust invasion and natural disasters, in few years time made Madagascar one of the poorest countries in the world. More than 80% of population lives on less than $1,25 per day (UNDP 2013). Today, Madagascar is still recovering from falling back of some years of development. Norway is trying to restore the

development assistance that was there before the crisis. In 2013 Norway supported Madagascar with 74,2 million NOK. Most of the priorities were given to education (64%), good governance (15%), and environment and energy (11%) sectors (NORAD 2013).

Crisis of the recent years had negative effects not only on political and economic situation in Madagascar, but also on the environmental issues. Unstable and weakened governance in addition to growing poverty level increased pressure on natural resources. Nature conservation does not fall among the most urgent development goals, however in long-term time it is essential to address it seriously for improving livelihoods of the poor.

Mainly all environmental activities in Madagascar are funded through Norwegian or international non-governmental organizations that play crucial role in conducting Norwegian assistance. The World Wildlife Fund (WWF) is one of the organizations that is responsible for sustainable management of natural resources and biodiversity in the area.

2.4 Fisheries management in Madagascar

Madagascar has 5,603 km of coastline that has massive marine resources that can support millions of people with food and income. 34% of population lives within 100km of the coastline (CEPF 2014). The maritime fisheries sector can be divided into three main sectors: traditional fisheries, artisanal fisheries and industrial fisheries. Small-scale traditional fisheries are mainly located on the western part of the island. They represent about 72% of total fish production (ASCLME 2012; Le Manach *et al.* 2013). Industrial fishing developed in 1963, mainly shrimp fishing (FAO 2004). However, until today fisheries in Madagascar are poorly managed. According to Le Manach *et al*. (2013) Madagascar is the fifth poorest maritime country in the world. The biggest obstacle for conservation of marine resources is lack of robust data on stocks, catch size and economic values of resources. This lack capacity results depletion of fisheries stocks without even knowing how much is taken and what are the sustainable maximum yields. The only data available on stock assessment in Madagascar is on shrimp catch, which only shows massive decline in catches. Many studies describe that fishing activities in Madagascar are not controlled and proper management of marine resources could only benefit (ASCLME 2012; Fritz-Vietta *et al.* 2009; Le Manach *et al.* 2013).

Policies and legislations

Fishing In Madagascar was regulated already from 1920s, but the management policies were established only in 1973 with the issue of licenses for fishing vessels (FAO 2004).

Cinner *et al.* (2009) points out that in the history of establishing Madagascar's environmental policy, the main emphasis was put towards terrestrial ecosystems. As a result of that terrestrial flora and fauna are much less threatened than marine environment. This has effected negatively the development and implementation of marine policy in Madagascar. According to National Marine Ecosystem Diagnostic Analysis (2012) due to Madagascar's weak institutional capacity and lack of coordination between the fisheries and environmental ministries there is not much of information, data, and socio-economic research available in marine sector. Which makes management of fisheries very hard and no policy have been designed only for coastal fisheries. The Ministry of Fisheries and Aquatic Resources is responsible for fisheries sector, however the Ministry of Environment and Forests is responsible for environmental regulation and marine protected area planning, where the Prime Minister's office oversees Integrated Coastal Zone Management (ICZM) (Le Manach *et al.* 2013).

ICZM was established as a part of the Malagasy Environment Charter (Law No. 90-033 of December 21, 1990 with its amendments). In 2001 a guidance document was published for formulation of sustainable development of coastal areas policy in Madagascar (ASCLME 2012). Eventually it should result national, regional and local plans for promoting integrated management of coastal zones. In 2009 the ICZM National Committee was established by law 2173, but was quite ineffective. At the moment, the national Strategy is emphasizing on getting ready to implement ICZM policy (ASCLME 2012). According to CEPF (2014) in general, there is lack of proper development plan for coastal areas, which sometimes results unregulated or illegal constructions or tourism development in the villages (Nosy Be, Anakao, Andavadoaka, etc.). In addition, weak policy implementation, lack of fishermen knowledge about these policies, insufficient monitoring and patrolling in isolated fishermen villages creates 'non-regulated access to the sea' (ASCLME 2012; Le Manach *et al.* 2013; WWF 2007).

2.5 A case for this study: The Toliara region

The site for this study is located in southwestern part of Madagascar. The WWF fisheries management project called "Southern Toliara Marine Natural Resources Management" is taken as a case study (2007 – 2011). The project area extends from Soalara in the North, to Androka in the South (see Figure 3). It covers approximately 3,700 km^2 and is located between 23º34'S - 25º07'S; and 43º05'E - 44º10'E (WWF, 2007). Data collection took place in three project pilot sites villages: Maromena, Befasy, Beheloka and non-project village Ampasimahanoro from March 17 until April 14, 2014.

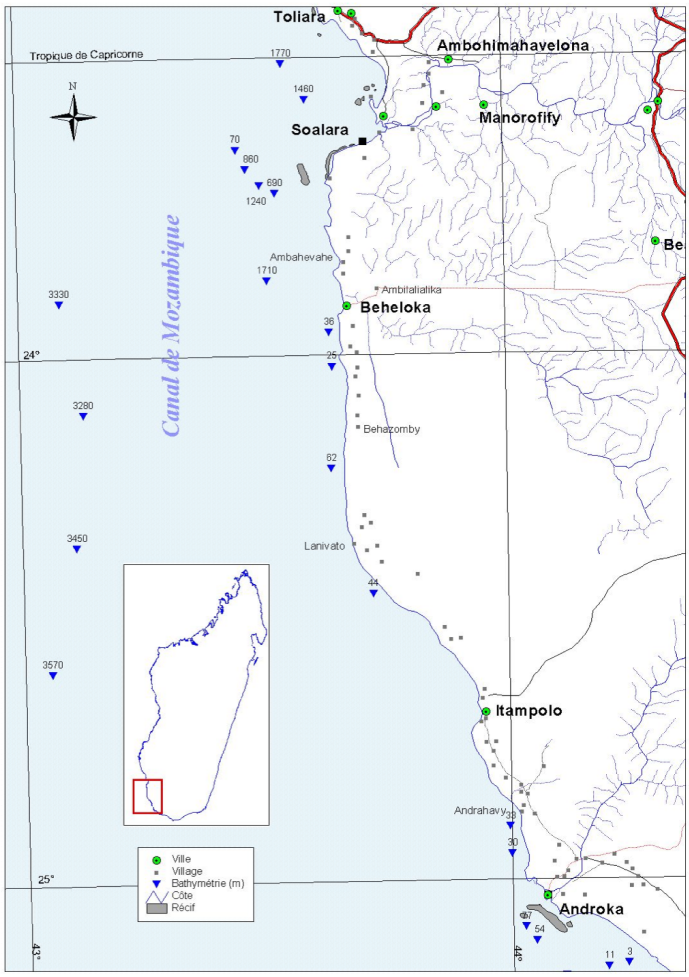


Figure 1. Map of a study area, the Southern Region of Toliara. Data collection took place in Beheloke (referred as project village) and surrounding villages. WWF project area reaches from Beheloka until Itampolo. Source: WWF 2007

The three project villages are highly isolated from bigger town Toliara (255km mud road) and from each other (around 100km from Beheloka to Itampolo). There is no proper road connection, only a mud road that is occasionally not accessible because of the rainy season. The main transportation between the villages is by the sea, however it can be limited because of the bad weather or cyclones. As an example, to go from bigger town to the nearest project village takes around 10-13 hours by local transport or truck. Going by sea can take few hours with the motor boat, but it is expensive so local people travel with their traditional rowing boats that can take a day or two, sometimes with the bad weather even five.

Ecological value

The area has a remarkable ecological value and is the third biggest coral reef system in the world (WWF 2011). It extends 300km along the coast of Toliara and consist of rich variety of marine and coastal habitats including barrier reefs, fringing reefs, mangroves, sea grass bed and shallow lagoons, that are homes to more than 6000 species (WWF 2007). One of the most unique species found here is 'living fossil' fish Coelacanth, that was believed to be extinct with dinosaurs 65 million years ago, but was found in 1938. All five marine turtle species found here are categorized as endangered or critically endangered on the IUCN Red list (Gough *et al.* 2009; WWF 2011, 2007).

Coastal communities and Vezo fishermen tribe

The area is home to the *Vezo* and *Tanalana* tribes. The *Tanalana* tribe is traditionally a farmer tribe, however over the time and climate change, they become more and more dependent on fishing. The *Vezo* is a semi-nomadic fishermen tribe that has been fishing in the area for hundreds of years. They know the sea better than land and are almost absolutely depend on sea resources for their livelihoods and survival. To be "*Vezo"* is to live and struggle with the sea, it is a way of life that makes you *Vezo* (Astuti 1995). *Vezo* use un-motorized traditional dugout pirogues of 3-8 meters, made of endemic Farafatse tree. Using motors for the boats is very uncommon in *Vezo,* only few cases are recorded in Toliara region (Laroche & Ramananarivo 1995; Jones 2012). *Vezo* practice high variety of fish techniques and fishing gear, including spears, spear-guns, hook and line, various types of gill nets. The nets can be from 100 to 800 m in length and mesh size from 15 mm to 40 mm (Gough *et al.* 2009).

Typically *Vezo* catch finfish (including sharks and rays), crustaceans (shrimp, crab), mollusks (octopus, squid) and marine turtles (Jones 2012).

Water shortage and climate change

The Toliara province is one of the driest places on the island, with semi-arid climate and very low annual rainfall. A yearly average rainfall is only 350mm, except during the cyclones when it can reach 600mm (WWF 2007). The local communities constantly struggle for fresh water supplies. Not every village has drinking water nearby, and local people are forced to dig for salty ground water in the sand or bring water from other villages. Local agriculture cannot be sustained with the rainfall any longer. Farmers are forced to search for other livelihood opportunities (Laroche & Ramananarivo 1995). The southwestern part of Madagascar is one of the most vulnerable areas to climate change on the African coast. Strong cyclones and droughts already affect food security and threaten livelihoods of local people (Le Manach *et al.* 2013).

Threats to marine resources

Approximately 50% of all fishermen in Madagascar are concentrated in Toliara province (Laroche& Ramananarivo 1995). Every year the number of fishermen and demand for fish are growing remarkably. The study carried out by Laroche and Ramananarivo in 1995, showed that unsustainable overuse of marine natural resources caused serious signs of degradation in some parts of the Toliara reef, southwest of Madagascar. If continued, these coasts will lose natural capacity to resist and to recover from further disturbances, such as mass bleaching or serious storm damage, poor benthic structural complexity, high macro-algal cover, and unusually low density of herbivorous fish. According to WWF (2007) the main causes for coral reef degradation in Toliara is: (a) heavy sediment erosion to the sea during the rainy seasons, and (b) destructive fishing activities in the area. In addition, socio-economic problems in the area add more pressure to marine resources, for example extreme poverty level, growing population, unemployment and farmers losing agricultural opportunities (ASCLME 2012; Le Manach *et al.* 2013). According to the Food and Agriculture Organization (FAO) fisheries in southern part of Madagascar might be depleted by 2020. Proper management of the reef is essential for sustaining resilience of the ecosystem and productivity of natural resources that people depend on (Gough *et al.* 2009; WWF 2011).

2.6 WWF Southern Toliara Fisheries Management Project

The project "Southern Toliara Marine Natural Resources Management" was carried out from January 1st, 2007 until December 31st, 2011 in southwestern coast of Madagascar. This project will be taken as an example of conservation activity, to see what are project impacts on local people and the environment.

The project was funded by NORAD through WWF-Norway and implemented by the Regional Representation of WWF in Madagascar and the West Indian Ocean (MWIO). Project activities are still carried out in the area by WWF Madagascar, however the intensions are to leave the place in the future so the local communities are not dependent on WWF staff work (WWF 2011).

The WWF project was carried out in collaboration with local fishermen, Fisheries Services (Service de la Pêche et des Ressources Halieutiques or SPRH), the Malagasy Fisheries Administration, collectors, retailers and the local authorities. The main beneficiaries of the project are local fisherman, and villagers including women and children living on the coast, who are the first ones to benefit from natural resources. (WWF 2007, 2011).

Project goals and purpose

The main purpose of the project was to support the traditional and small-scale fisheries in the southern region of Toliara, from Beheloka to Itampolo (Figure 1). One of the most important goals of the project is to include local people in nature conservation by giving them sense of responsibility for management of their natural resources; and to increase the awareness on environmental issues and knowledge about dynamics of marine ecosystems. The long-term goal is to allow local communities to continue benefiting from natural resources in the future. This can be achieved only if marine resources are managed properly and sustainably, due to the fact that local communities live in extreme poverty and with no control at all might deplete marine resources that they fully depend on (WWF 2007).

The fisheries management project had 4 main objectives:

1. To initiate and establish effective communication system between key stakeholders by the end of 2011.

2. To establish and improve enabling environment for the sustainable management of traditional fisheries in pilot sites by the end of 2011.

3. To actively and effectively involve Community-based organizations (CBOs) in the sustainable use and management of living marine and coastal resources by the end of 2011.

4. To develop small-scale alternative livelihood activities for creating positive socio-economic impacts by the end of 2011 (WWF 2011).

Project outputs

WWF chose four pilot sites to start the project Maromena/Befasy, Beheloka, Itampolo and Ambohibola. Before project arrived to the area local communities had non-regulated access to the sea, meaning that everybody can do anything they want using any methods they prefer. The WWF together with Madagascar National Parks MNP created Locally Managed Marine Areas (LMMAs) and Marine Reserves in the project villages from 2008. In LMMAs fishermen can go fishing but they have to respect the traditional social law *dina*. Project also created Marine Reserve that is a bit further from villages' fishing grounds. In Marine Reserve fishing is not allowed, but fishermen know about it and they agree with that since it was created together with them.

According to WWF evaluation report from 2011 the project activities achieved following goals:

- Fish catch increase;
- Slight income increase (more concrete houses and luxury goods in the houses);
- Created *Dina* (social code) and locally adapted Management Plans for marine resources in every village;
- 3 villages outside the project created their own *Dina*, thanks to successful *Dina* example from pilot sites,
- Developed database for the South West region;
- Improved communication system between Fisheries Administration, fish collectors and fishermen;
- Organized different kind of training for local fishermen (fish catch monitoring, conservation of marine resources and more);
- Established Community Based Organizations (CBOs) in all villages;

- Improvement in community mobilization, conflict resolution through local organizations, creating social activities in the village (cleaning the beach, planting trees);
- Women empowerment (through women associations work) (WWF 2011).

CHAPTER 3: Theory and literature review

Today, both *poverty reduction* and *biodiversity conservation* are global concerns that are among the most urgent and major challenges in the developing world. The Millennium Development Goals (MDGs) and The Millennium Ecosystem Assessment (MA) indicated the linkage between biodiversity conservation and poverty reduction, more than 10 years ago. MDGs established 48 goals to be achieved by 2015: goal no.1 includes a target to "eradicate extreme poverty and hunger"; goal no. 7 includes a target to "ensure environmental sustainability" (Adams *et al*. 2004; IIED 2004). Since then, a number of programs and policy frameworks around the world are based on these two objectives. However, sometimes these different objectives require very different actions. If 'development aid' and 'environmental protection' are perceived as two very different goals, as a result we have many development agencies bypassing the role of conservation in poverty alleviation, while environmental organizations do not include poverty goals in their policies. This might result one interfering with the other (Campbell & Townsley 2013).

The *ecosystem approach* is a strategy that combines both goals, by including "integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way". Used in practice could achieve the balance between nature protection and human development, as humans are integral components of ecosystems (Convention on Biological Diversity 2012). Before starting the discussion about such complex issues it is important to look at the terminology and definitions to know what exactly we are talking about.

3.1 Terminology and definitions

Poverty

When we say ***poverty*** what do we actually mean by that? Poverty can be perceived and understood in many different ways, as there can be different levels of poverty. The World Back defined "poor people" as chronically poor if they live on less than 1 dollar a day, a minimum amount to meet human's physical needs. That represents around 1,2 billion people in the world (Roe & Elliott 2005). However, such a complex phenomena like poverty shouldn't be measured only on a basis of income level. Additionally, perception of poverty is seen differently in different countries. For example in rich

countries poverty has totally different meaning than in poor countries (Suich 2012). The World Bank explains poverty as "a condition of life so characterized by malnutrition, illiteracy, and disease as to be beneath any reasonable definition of human decency" (Pearce 2005 cited in Roe & Elliott 2005). The OECD Development Assistance Committee (DAC) provides a multi-dimensional perspective of poverty by indicating five key elements of poverty: (a) economic - income, livelihoods; (b) human - health, education; (c) political - empowerment, rights, voice; (d) socio-cultural - status, dignity; (e) protective - insecurity, risk, vulnerability (Roe & Elliott 2005). Narayan *et al.* (2000) presents the findings form one of the biggest studies on poverty where poor people described poverty themselves. They also point out five main components:

(a) Basic material needs for a good life – the ability to have secure life including enough income, assets and food all the time, adequate shelter and access to goods;

(b) Health – the ability to feel well and strong, to have healthy physical environment. To have access to clean drinking water, clean air and energy to keep warm and cool;

(c) Good social relations – the ability to have social cohesion, mutual respect, to help others and provide for children, equitable gender and family relations;

(d) Security – the ability to be safe, secure access to necessary (natural and other) resources, security from natural and human-made disasters;

(e) Freedom of choice and action – the ability to control what happens around. Freedom and choice cannot exist without the presence of the other elements of well-being (Narayan *et al*. 2000; Suich 2012).

Poverty reduction means "lifting people beyond a defined poverty line – transforming them from poor to non-poor" (Secretariat of the Convention on Biological Diversity 2010, p.11). However, most of the time poverty is alleviated and prevented rather than reduced. For example, even if poverty is addressed not necessary people will transform from 'poor' to 'non-poor, or sometimes they are prevented from falling into or further into poverty (Secretariat of the Convention on Biological Diversity 2010).

Sustainable development and livelihoods

Sustainable development has its roots coming from 70's when it was first called "ecodevelopment" (Vihemaki 2007). Later, in the so-called Bruntland's commission sustainable development was described as:

> *"Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth. The Commission believes that widespread poverty is no longer inevitable. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes."* (World Commission on Environment and Development 1987).

Nature conservation and biodiversity

Nature ***conservation*** can be defined differently depending on various valuables and objectives, cultures and places. In general it represents "protection, maintenance and/or restoration of living natural resources to ensure their survival over the long term" (Roe *et al.* 2013). It can also mean "management of renewable natural resources, or protection or preservation of selected range of, often endangered, species and habitats rather than broad scale resource management". Conservation work is often associated with the work of international NGOs (Roe & Elliott 2005). Nature conservation work also aims to protect ***biodiversity*** defined as "variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other aquatic ecosystems, and the ecological complexes of which they are part: this includes diversity within species, between species, and ecosystems" (Bille *et al.* 2012, p. 2).

Protected Areas

In 2008 the International Union for Conservation of Nature (IUCN) defined ***Protected Areas (PAs)*** as: "a clear defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (IUCN 2013).

Protected areas are classified into 6 categories depending on how strict is the access to the areas and the level of natural resource utilization. The main purpose of protected areas (national parks, community conserved areas, nature reserves) is to support biodiversity, but at the same time it can contribute to people's livelihoods, especially at local level. Global network of protected areas preserves nature and services it provides (food, clean water and air, medicines), as well as mitigates climate change. It is estimated that PAs stores around 15% of terrestrial carbon (Dudley 2008; IUCN 2013). Marine areas that can meet the IUCN definition of protected areas are called ***Marine Protected Areas*** (MPAs) (IUCN 2013).

Locally managed ***Community Conserved Areas*** **(CCAs)** have been very useful mechanisms in achieving nature conservation goals in the past decades. It is defined as: "natural and/or modified ecosystems containing significant biodiversity, ecological and cultural values, voluntarily conserved by indigenous, mobile and local communities through customary laws or other effective means. They can include ecosystems with minimum to substantial human influence, as well as cases of continuation, revival or modification of traditional practices or new initiatives taken up by communities in the face of new threats or opportunities" (Govan *et al*. 2009, p. 27). There are three main characteristics for an area to be defined as CCA:

- Strong cultural or livelihood *relationship* between particular indigenous or local people and the ecosystem, species or the area;
- The indigenous people or local communities making *main decisions* in natural resource management in the area;
- It is a voluntary decision of indigenous people or local communities to participate in *conservation* of the habitats, ecosystems and species (Govan *et al*. 2009).

The communal Areas Management Programme for Indigenous Resources (CAMPFIRE) is an institutional development program from Zimbabwe from late 1980s that is one of the best-known examples of CCAs in practice, where new ways of communal organization for wildlife management were created (Frost & Bond 2007; Logan & Moseley 2002).

Another great example of CCAs would be Community-based Natural Resource Management (CBNRM) programme from Namibia. The programme is based on devolving use rights over natural resources and management authority to community institutions created in terms of national legislation. From 1998 number of conservancies (self-selected social units) and community forests were created so local people could benefit from wildlife (trophy hunting, safaris) (NACSO 2013).

Locally Managed Marine Areas (LMMA) is "an area of near shore waters and coastal resources that is largely or wholly managed at a local level by the coastal communities, land-owning groups, partner organizations, and/or collaborative government representatives who reside or are based in the immediate area" (Govan *et al*. 2009, p. 28).

Locally Managed Marine Areas are commonly used in Madagascar. In southern Toliara region with WWF fisheries management project many LMMA were created from 2007 and 2008 to include local communities in conservation activities (WWF 2007).

3.2 Livelihood Impact Assessment through Sustainable Livelihood Framework and World Bank's 'Opportunities' approaches

Ashley and Hussein (2000) concludes that, to be able to understand how conservation work or protected areas can affect local or indigenous people, poverty and local livelihoods have to be studies jointly. The best and the most commonly used tool to do so is ***livelihood impact assessment***. The purpose of impact assessment is to learn about and understand the consequences of the project to livelihoods of participants and other stakeholders. The analysis of livelihood impact assessment of the project could provide such important information as:

- *Positive* and *negative* livelihood impacts of a project on local communities;
- Explanation how and why particular stakeholders *participate* (or fail to);
- To *guide* how projects could be improved or negatives impacts reduced (Ashley & Hussein 2000).

Roe and Elliott (2005) argue that most of the official agencies study poverty by putting the biggest emphasis on financial dimensions. Suich (2012) note that many poverty analyses describe the conditions of being poor and not how and why the conditions exist. The outcomes of social processes needs to be understood within context of social institutions and systems. Ashley and Hussein (2000)

define the three key aspects that should be taken into account while studying livelihoods of poor people. First of all, food insecurity, social inferiority, exclusion, lack of physical assets and vulnerability should be addressed. Second, household poverty could be influenced by many factors, especially access to assets and influence from policies and institutions. Third, livelihood priorities vary; it is very hard for outsiders to understand the objectives of a given household or a group, and which factors are fundamental causes of their poverty.

There are plenty of methods used for impact assessment. For example: ***conventional approach, participatory approach,*** or ***livelihood approach***. *Conventional approach* studies if the project has achieved its objectives and common project goals (Ashley and Hussein 2000). *Participatory approach* also called participatory monitoring and evaluation (PM&E) came as a replacement to conventional approach. PM&E apply different methods and approaches to measure the impacts of development involvement, and includes local people, development agencies and policy makers to determine how progress should be measured and what are the results (Estrella & Gaventa 1998). *Livelihood approach* is different because of its main focus on people's lives than project results and achievements. Improvements in livelihoods are not always determined by increased income, such poverty factors like food security, social inferiority, exclusion, access to assets, vulnerability, etc. should be studied. Project impact assessment should start from studying common livelihood strategies and priorities (Ashley and Hussein 2000).

Sustainable livelihood approach is a combination of all approaches mentioned above. It includes varies methods, data types and focus on people's perceptions. It encourages sustainable development for the environment, society, economy and institution (Ashley and Hussein 2000). ***Sustainable livelihood*** is "when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Carney 1998). During impact assessment, changes in livelihoods should be measured not by quantities (income, yield) but in terms of the contribution they bring to livelihoods (Ashley and Hussein 2000).

The ***World Bank's 'opportunities' approach*** is taken additionally to fill in the 'gaps' of sustainable livelihood approach, bringing enough attention to such important elements as empowerment and transforming structures and processes (external policies and institutions) (Ashley and Hussein 2000).

Sustainable Livelihood Framework (SLF)

The SLF was developed by UK's Department for International Development (DFID) in the late 1990s as a response to narrow and limited approaches that were there before (Schreckengerg *et al.* 2010). The SLF is a tool to understand, analyze and describe livelihood factors especially of poor people from wide multi-dimensional perspective. SLF promotes development that is sustainable not only to the nature, but also sustainable institutionally, socially or economically. The main principal of SLF is being centered on people especially poor and their livelihood strategies and choices. Second principle is that the poor themselves are the most important element in identifying their own livelihoods, they know the best what matters to them, and outsiders shouldn't assume what is best for poor according to their perceptions (Ashley and Hussein 2000; DFID 1999; Pedersen & Pedersen 2010).

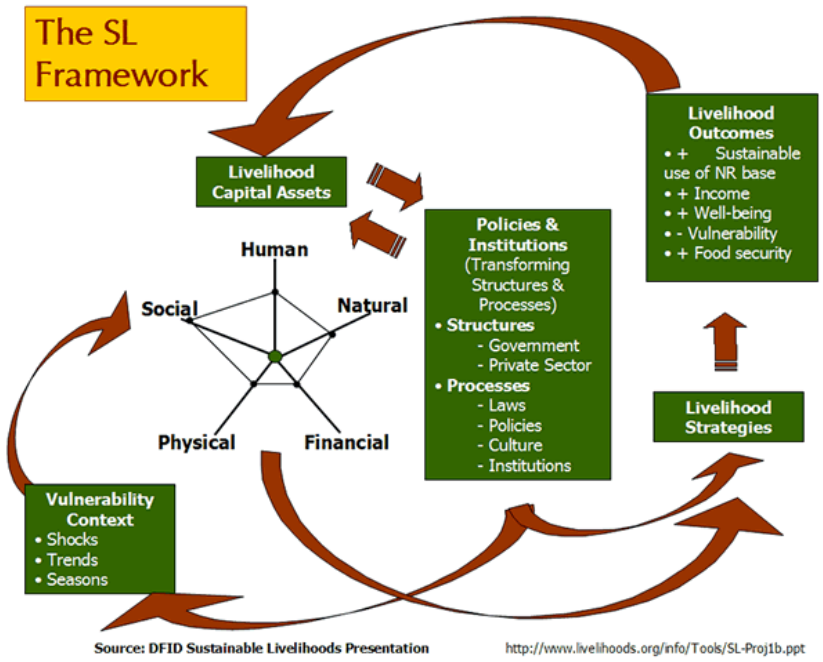


Figure 2. DFID's Sustainable Livelihood Framework diagram. Source: Schreckenberg *et al.* 2010

The SLF is centered around ***five assets*** that people build their livelihoods on and need to create a positive livelihood outcome (Figure 2):

- *Human capital* (education, formal and informal skills, health, knoweledge);
- *Natural capital* (natural resources, land, forest, wildlife, water);
- *Physical capital* (shelter, infrastructure, buildings, tools, fishing gear);
- *Financial assets* (cash income, credits, savings);
- *Social capital* (formal and informal institutions, associations, extended families, local mutual support mechanism) (Schreckenberg *et al.* 2010).

People's ***strategies*** and ***priorities*** are actions that people do for attaining their livelihoods. Strategies affect their choices in life this way changing their livelihoods. ***Livelihood outcomes*** (components of improved livelihoods e.g. more income, good health) are achievements of people's livelihood strategies. ***Transforming structures and processes*** are external influencing mechanisms for example institutions, organizations and policies that will affect the access to assets and opportunities that are available, as well as their productivity. For example, ownership rights or community agreements. The ***vulnerability context*** illustrates external environment (natural, demographic and economic) that people live in. For example: shocks and trends such as natural disasters, population trends, conflicts, seasonality of price or production, etc. These influences, directly or indirectly, affect people's lives. Unfortunately, the poorest people of the world are unable to cope with these shocks and stress, which makes them even more vulnerable. Even when the trends have positive direction (e.g. economic growth), due to lack of assets, the poorest people are often the last one to benefit (DFID 1999). All this effect people's access to assets, decisions they make and sustainability of their livelihoods. Previous studies on poverty have shown that access to assets, as well as how they are managed and used, is very important for being able to escape from poverty. Quality and quantity of the assets is important as well as possibility to transform them into productive activities (Ashley & Hussein 2000; DFID 1999).

The SLF is centered on people's lives and how they create their livelihoods, and not on resources or specific project results. However, SL approach is sometimes being criticized for some studies putting too much attention for collecting information on each asset and not understanding their impacts on livelihoods. At the same time not addressing issues of politics, empowerment, gender relations, esteem, participation and rights (Ashley & Hussein 2000; Schreckenberg 2010).

The World Bank's 'Opportunities' framework

Schreckenberg *et al.* (2010) in his review of social assessments of conservation initiatives presents World Bank's multi-dimensional 'Opportunities' framework (Table 1).

Table 1. The World Bank's 'opportunities' framework. Source: Schreckenberg *et al.* 2010

Opportunities	**Empowerment**	**Security**
Income	Governance	Health
Housing	Community participation	Social cohesion
Luxury goods	Benefits to women	Cultural traditions
Fish catch	Access and rights	
Education		
Alternative livelihoods		

The opportunities framework addresses the needs of poor peoples in three areas:

- *Opportunity* (e.g. building opportunities for poor people to increase their financial capacity, improving and creating markets, improving poor people's assets like land and education);
- *Empowerment* (e.g. strengthening poor people' s ability to make decisions that change their lives, reducing gender, race, age or social discrimination);
- *Security* (e.g. decreasing poor people's vulnerability to unemployment, economic shock, natural disasters, diseases and violence).

The opportunities framework has a lot of similarities with SLF, especially with the main assets however we have important empowerment inclusion. This framework is more emphasized on understanding how protected areas could alleviate poverty (Schreckenberg *et al.* 2010).

3.3 Literature review

During the 9th Conference of the Parties (COP) to the Convention on Biological Diversity (CBD) in 2008, it was concluded to ensure that:

*"Conservation and development activities in the context of protected areas contribute to the eradication of poverty and sustainable development and ensure that benefits arising from the establishment and management of protected areas are fairly and equitably shared in accordance with national legislations and circumstances, and do so with the full and effective participation of indigenous and local communities and where applicable taking into account indigenous and local communities' own management systems and customary use"(*CBD 2008).

In the past decades there have been raised a lot of concerns and debates regarding the social impacts of conservation or protected areas on indigenous or local communities. The history shows that it is a very complex issue and it is not always easy to combine both conservation and development needs. Often the most poor and vulnerable people are the ones that live on the boundaries of protected areas and suddenly lose their rights or access to natural resources that they absolutely depend on. For example, case from Tanzania where wildlife and marine conservation project led to forms of 'green' or 'blue' grabbing (Benjaminsen & Bryceson 2012). Ghimire and Pimbert (1997 cited in Brechin *et al.* 2003) show a study from India where around 600,000 tribal people have been displaced because of protected area establishment and management in 1993. Or rural communities relocated due to expansion of Los Haitises National Park in Dominican Republic (Geislar n.d. cited in Brechin *et al.* 2003).

What is actually more important: protection of unique and rich habitats that are almost on the limit of extinction or local people's livelihoods, that are at the same time connected to these nature ecosystems? Is it possible to combine both goals in practice?

Some researchers claim that nature conservation cannot elevate poverty because poor people loose their rights (Benjaminsen & Bryceson 2012; Brechin *et al.* 2003; Hulme & Murphree 2001); others say that poverty reduction is the most powerful instrument to conservation (Bille *et al.* 2012; NACSO 2013; Roe *et al.* 2013; Scherl *et al.* 2014).

It is now commonly agreed that creation of protected areas and conservation activities should at least 'do no harm' to local people and if possible alleviate poverty (Brockington *et al.* 2006; Hulme & Murphree 2001; Schreckenberg *et al.* 2010). Nevertheless, we still have practical examples of something opposite. Benjaminsen & Bryceson (2012) refer to two specific cases from Tanzania that shows how conservation activities can be actually misused by powerful actors (rent-seeking state officials, conservation organizations, tourism companies). The study took place in 2007-2011; it demonstrates how wildlife and marine conservation initiatives became an opportunity for 'green' and 'blue grabbing'. They argue that establishment of 'community-based' or 'win-win' conservation was the key mechanism in resulting gradual dispossession taking place in wildlife and coastal areas in Tanzania. In both cases local communities were promised that they will benefit from conservation activities (hunting quotas, fair share of revenues from safari tourism, snorkeling tours) as well as be included in management of natural resources, but in practice that was not the case, and they only lost their rights and access to natural resources. The big players like the State or foreign tourism companies where the ones benefiting (Benjaminsen & Bryceson 2012).

On the other hand, Brockington *et al.* (2006) reviewed more than 250 literature sources on protected areas and displacement of the people. They concluded that there are not many cases mentioning displacement or providing any details about it. The ones that do are normally generalizing based on a handful of cases. They also argue that it is necessary to research benefits and impacts of conservation initiatives to ecosystems not only to communities, that's what most of the impacts assessments do today.

Roe *et al*. (2013) reviewed more than 400 documents from period of 1985-2010, focusing on the ones that provide empirical evidence of conservation interventions benefiting poverty alleviation. They evaluated the *type of intervention*, the *variety of benefits* it provides, the type of *biodiversity contributing* to poverty alleviation, and the *primary beneficiaries* involved. The results are summarized for 10 conservation mechanisms and are presented in Table 2.

Table 2. Summary of poverty reduction evidence for conservation mechanisms. Source: Roe *et al.* 2013 p. 46

Mechanism	**Number of Studies** Many: >50 Moderate: 10-50 Few: <10	**Poverty reduction benefits**	**Which groups benefit?**	**Other benefits?**	**Importance of biodiversity versus biomass for poverty reduction**
Commercialization of NTFPs[1]	Many	Low	Very poor, better off	Nutritional, medicinal	Biomass
Community forest	Many	Medium	Very poor, moderately poor, better off	Community organizations	Biomass
PES[2]	Moderate	Low	Landowners	Property rights, capacity building, social cohesion	Biomass
Nature-based tourism	Moderate	High	Moderately poor, better off	Infrastructure, social services	Biodiversity
Locally managed marine areas	Moderate	High	Very poor, moderately poor, better off	Social cohesion	Biomass
Mangrove conservation	Moderate	Medium	Very poor, moderately poor	Reduced erosion, storm protection, more fish	Biomass
Protected area jobs	Few	Low	Moderately poor, better off	Multiplier effect of local jobs	Biodiversity
Agro-forestry	Moderate	Medium	Moderately poor, better off	Income stabilization	Biomass
Grasslands	Few	Low	Not enough evidence	Social cohesion	Both
Agro-biodiversity	Few	Medium	Moderately poor, better off	Global benefits to agriculture	Biodiversity

[1] NTFP: Non-timber forest products

[2] PES: Payments for ecosystem services

According to their study nature based tourism and locally managed marine areas generate the highest poverty reduction benefits (however it is not based on the highest number of studies). The CAMPFIRE program in Zimbabwe and Namibia's Communal Wildlife Conservancies are among the most successful examples (Frost & Bond 2007; NACSO 2013). Commercialization of non-timber forest products, payments for ecosystem services, protected area jobs and grasslands creation brings the lowest benefits comparing to all measured conservation initiatives. During their study they came a cross few limitations. For example, there is lack of studies researching real evidence of poverty impacts; most of the evidence for poverty reduction actually emphasize on income change not representing multidimensional nature of poverty (e.g. food security, education, empowerment); lastly, there is no uniformity in measuring the poverty indicators through all these studies (Roe *et al.* 2013).

Roe and Elliott (2005) in their study distinguish *7 hypotheses* of conservation-poverty linkages that they concluded based on the current state of evidence:

1). There is a geographical overlap between biodiversity and poverty

Roe and Elliott argue that, at the global scale geographically the poorest countries of the world are located in the Southern hemisphere, where most of the richest biodiversity is. On the smaller scale in poor countries, often the poorest people or indigenous communities tend to be living in rural areas on the boundaries with biodiversity "hotspots" (Will *et al.* 2012). However it does not necessary means that there is straightforward connection between biodiversity loss and the poor. Additional reasons could be lack of institutions, top-down management, poor governance, etc. Nearly all of the present biodiversity loos is taking place in developing countries, yet majority of developed countries already lost much of their biodiversity (Roe & Elliott 2005).

2). Poor people depend on biodiversity

It is evident that essential ecosystem services and rich biodiversity plays crucial role in the livelihoods of millions of people around the globe (Campbell & Townsley 2013). Bille *et al.* (2012) argue that biodiversity can benefit well-being and livelihoods of people in two ways. First of all, through ecosystem services biodiversity *directly* contributes to people's livelihoods (Frost & Bond 2007). However, people benefit directly from abundance and availability of some species (biomass), rather than from number of different species (biodiversity). Secondly, in mid- to long-term *biodiversity*

(variability) also plays very crucial role for well-being. For example, biodiversity supply such critical ecosystem services as: food provision and food security, fresh water, protection from natural hazards, regulation of infectious diseases, regulation of climate and air quality, provision of timber, fiber, fuel and medicines (Roe & Elliott 2005). Empirical evidence shows that especially in rural areas households strongly rely on biodiversity. Globally around 1,6 billion people rely on forest ecosystems, 75% of the poorest depend on agricultural livelihoods, and 90% of the 15 million people working in fishing are small-scale fishermen (McNelly & Scherr 2003 cited in Roe & Elliott 2005, FAO 2002). We all depend on it; however, the poorest and the most marginalized (women, children) or vulnerable people of the world tend to be directly dependent and relying on natural resources and services for most parts of their lives.

3). Poor people are responsible for biodiversity loss

Clearly poverty can influence biodiversity in negative way (over-use of resources, lack of knowledge, miss-use of power, etc.), yet it is not the only factor affecting it. These are two linked problems but not a simple casual relationship, and many things depend on circumstances, specific contexts, and external governance factors (Roe & Elliott 2005). In the Brundtland Report of 1987 *Our Common Future* is it described that often poor people are forced to over-exploit natural resources to meet their immediate needs, or they live in such environmentally degraded areas that even little disturbance might lead to permanent loss (World Commission on Environment and Development 1987). However, Roe & Elliott (2005) discuss that rich people and rich countries might also cause biodiversity loss since they have more possibilities to obtain the resources and increasing income level gradually increase consumption level. It is hard to generalize either poor people are responsible for biodiversity loos, however the governance tend to be the most crucial part here. As well it is important to mention that root causes of biodiversity loss have a lot in common with the root causes of poverty – inequality and power, aid and trade regimes, corruption and poor governance.

4). Conservation activities hurt poor people

Conservation activities, might both benefit local people but also hurt them, because the benefits sometimes are not equally shared (Benjaminsen & Bryceson 2012; Brechin *et al.* 2003; Hutton *et al.* 2005). Every case is different and it always depends on the conservation approaches used or

implementation of these approaches in practice, again governance factors are very critical here. The statement that conservation can be harmful for poor people is mainly referred to creation of strict protected areas that are often managed and enforced by military manner, as well as, indigenous people loosing their access to land and resources or being forced to move away from their homes. The 'fortress approach' has proved to be unsuccessful long time ago and local communities involvement in conservation is not a new thing anymore, however local people still lose their rights, as in Tanzanian case described earlier (Benjaminsen & Bryceson 2012; Scherl *et al.* 2004). Yet, not necessarily conservation means something negative for poor people, often they also benefit from it (through ravenous from tourism, trophy hunting or increased nature products). In some cases local people even ask themselves to protect their natural resources from "outsiders" or government and local communities establish "co-management" of natural resources or area (Brechin *et al*. 2003, Roe & Elliott 2005).

5). Poor people can undermine conservation

Some examples show that if local people are not included in conservation activities they might be against it and could even sabotage it. Including local people in conservation is one of the approaches used by many conservation organizations for example "community based conservation" or "integrated conservation and development" projects. However, some critics say that this might take away the attention from main conservation objectives. In the last years the grounds to include local people in conservation changed from being concentrating from needs-based approach to rights-based approach. Even if local people are not involved, the starting point for any conservation activities should be first of all respecting their rights to land, resources and cultural identity (Roe & Elliott 2005).

6). Biodiversity is irrelevant to poverty reduction

There is no doubt that biodiversity supports poor people by providing them food or materials without having to "pay" for it. Yet it doesn't necessary mean that it can lift poor people from poverty. The DFID study on wildlife and poverty says that wildlife-based poverty reduction interventions are only beneficial for certain groups of poor people. For example, people living close to wildlife-rich or touristic places. In addition, poor people normally only benefit from low value resources; high value resources like timber, wildlife species or landscapes are more favorable to more powerful and rich

individuals, who can invest in it first. However, Roe and Elliott (2005) also note that there is a lot of uncertainty and confusion or lack of qualitative data about the relevance of biodiversity to poverty reduction. We shouldn't mix two very important but different matters: "biodiversity conservation as a driver of poverty reduction and biodiversity as a resource for poverty prevention" (Roe & Elliott 2005, p. 10).

7). Poverty reduction activities can cause biodiversity loss

Poverty reduction interventions not necessarily mean improvements for biodiversity if specific factors are not taken into account. But can poverty reduction in fact increase biodiversity loss? Can economic development have higher negative impact on biodiversity than positive? For example, as a result of rural development we cultivate more and more land that used to be untouched, or we build more roads that can benefit isolated communities but cause big land clearance and habitat fragmentations. The Environmental Kuznets Curve (EKC) shows that environmental degradation increases with increased income until the turning point when environmental degradation decreases with increasing income. Yet, there is little evidence whether poor people negatively affect nature because they are poor, or their increasing income can increase negative affect. Such factors as governance, land tenure and access to resources make a bigger influence on people behavior, such as exploring or protecting the resources (Roe & Elliott 2005).

CHAPTER 4: Methodology

4.1 Conceptual and analytical framework

There are plenty of tools and methodologies to asses socio-economic impacts of the project. I chose two main conceptual frameworks for this study: Sustainable Livelihood Framework (SLF) and World Bank's multi-dimensional 'opportunities' approach.

The SLF is chosen because it is centered on people's lives rather than on focusing only on how much *cash* or how much *increased production* were generated by the project, additionally for the reason that well-being is not only measured or defined by increased income (Schreckenberg *et al.* 2010). I decided to put main emphasis on people's 'voices' and experiences rather than on statistics, as it is normally done during project evaluation reports. In addition, the World Bank's multi-dimensional 'opportunities' framework is used to include few aspects missing in SLF, for example empowerment and rights. 'Opportunities' approach is often used to assess how marine protected areas affect poverty level in the area (Ashley & Hussein 2000). Both frameworks supplement each other.

Ashley and Hussein (2000) present summary of the main elements of livelihood impact assessment (see Figure 3). It is important to mention that they put special emphasis on three *key themes* that have to be explored during impact assessment:

- An overview of *current livelihood* strategies, achievements and priorities;
- How livelihood strategies are *influenced by the project*;
- *Differences between stakeholder groups* (participants and non-participants).

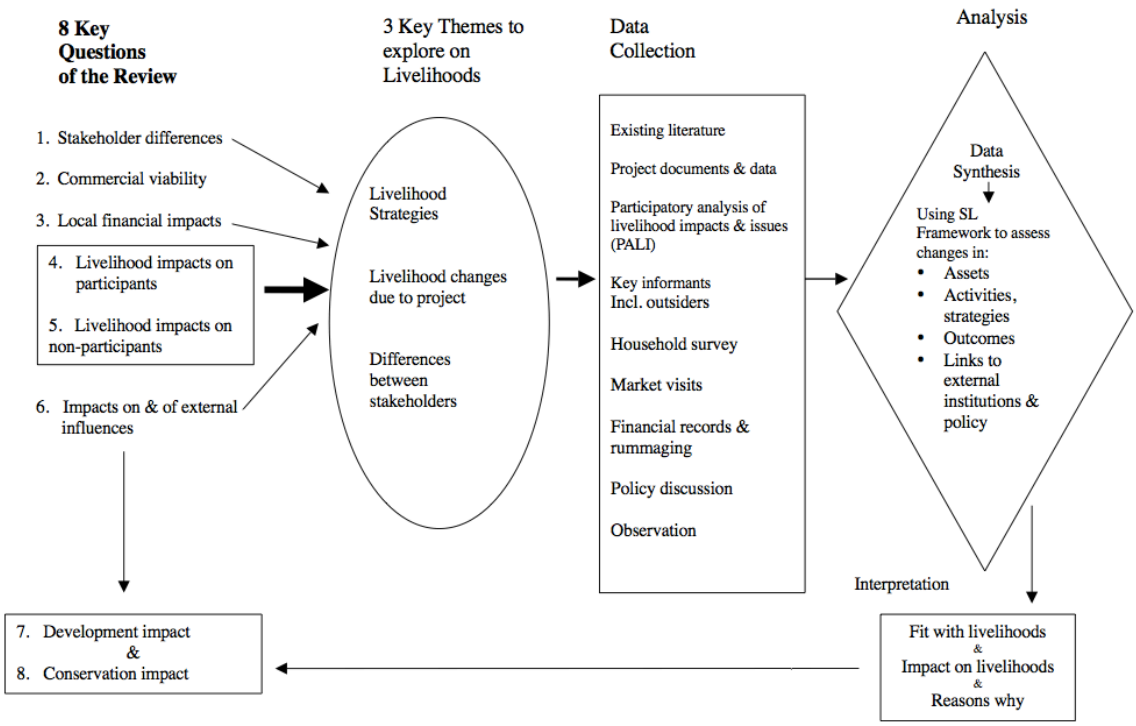


Figure 3. Summary of the process of livelihood impact analysis. Source: Ashley and Hussein 2000.

4.2 Research design and data collection

Research methods

Mixed research methods were used in this study. Quantitative and qualitative research is used for the purpose of cross-methods triangulation, to provide different kind of data and to complement each other. Qualitative research is useful at giving an overview of an issue or situation, providing in-depth understanding of the reasons, analyzing the complexity of it. Where quantitative research is important to show numerical variables or correlations between each other (Newing 2011). Both research methods are important in this study however bigger emphasis is put on qualitative data.

Data collection tools

Field visit for data collection took place in March 17 - April 14, 2014. It included visiting three project villages: Maromena, Befasy, Beheloka and one non-project (control) village Ampasimahanoro, as well as the regional capital of Toliara and Antananarivo. Most of the time I spent in Beheloka village (further referred as project village) to have a better understanding of the communities. I chose to collect most of my data from Beheloka village because it was one of the first WWF project villages, where they implemented maximum of conservation activities. I stayed in the same house with a

fishermen family, which helped me to get their trust and insight of their lives. For the first few days WWF staff helped me to organize meeting with local leaders, however after that I stayed alone with my translator that allowed me to move freely and make my own decisions with who I should talk.

Data collection included reading existing literature, project documents and data, participatory analysis of livelihood impacts, interviews with key informants, household survey (HHs), market visits, policy discussion and observation (Figure 3). Interviews with outsiders and financial records were not included because of time limits. Primary data collection included 10 interviews with key informants, 5 focus groups, 48 household surveys (HHs) and observation. Before going to the villages I had 4 meetings and interviews with WWF Marine Programme coordinators and project managers in Antananarivo and Toliara. In addition I had interviews with representatives of The Regionale of Fisheries Administration (SPRH), Marine Institute and "Copefrito" marine products collector in the area.

In the villages I started my visit by presenting myself to local authorities and getting a permission to stay in the village and to speak to the locals. Focus groups discussions were conducted as planned. In total, I performed 4 focus group discussions with men in 3 project villages and 1 in non-project village, and 1 focus group with women in the Beheloka village where I stayed most of the time. Focus groups involved from 5 to 10 people, and took around two-three hours to perform. I chose to use question guide for focus groups because it is flexible and open tool that allows me to shape the process of the discussion depending on circumstances (Berg & Lune 2012). In addition, in Beheloka I met with the Mayor of the village, gendarmes, owner of the hotel, and representative of the hospital.

Household (HH) surveys were conducted in Beheloka as well. According to the plan I was suppose to make 50 HHs. 25 in project village and 25 in non-project control village, that has similar characteristics to project village and would allow to compare participants and non-participants of the project. However due to the logistics, time limitation and illness, the final outcome is 32 HHs from project village – Beheloka and 16 from non-project village – Ampasimahanoro. The results cannot be compared between each other because of the different sample size, however we can analyze both villages on their own to see the changes in time. For household survey I used a questionnaire that I prepared in advance but had to change after few testing surveys. Many questions included categories of level of agreements (1-5), that was too complicated for most of the fishermen since they never went to school and don't know how to count. I simplified the answers by having fewer categories. HHs took around one and a half hour. Additionally to quantitative data that I collected from HHs, I gathered

plenty of quantitative data from every discussion, as participants were very eager to talk and to explain as much as possible. Observation was also an important tool that helped to capture a lot of information about their livelihoods and behavior.

Sampling approach

Beheloka village was chosen as a main base for data collection because of its convenience and accessibility. It was the only village with the possibility to find accommodation. Ampasimahanoro as non-project village was chosen for the same reasons, accessibility and similarity to Beheloka. For the focus groups I used *snowball* sampling approach because of the time limit and local leaders helping to organize it. *Convenient* sampling was used for HHs, even though in the beginning the goal was to utilize *random* sampling approach. It was impossible to organize meetings with fishermen in advance because of their unpredictable fishing time, fishermen were chosen randomly according to their availability. HHs sample represent both tribes in the area *Vezo* and *Tanalana*, different age and social groups of fishermen were also taken into consideration, as well as fish collectors and traders, to represent all stakeholders involved. It was not possible to divide participants in 3 wealth groups (rich, average, poor) because fishermen have similar life standards in the area. Both, fishermen that are involved in fisheries management project and that are not, were interviewed.

4.3 Ethical consideration and limitations of the study

While visiting these remote local villages it was very important to take into consideration all ethical matters and to show all the respect to local people. On the arrival to each village first thing I did was presenting myself and my study to village leaders. Before any interviews and discussions I have explained the reasons and purpose of my study. I did assure the confidentiality of the information they provided, and anonymity of their participation, as well as, that it was voluntary participation and that they could stop any time. Since survey involved some sensitive personal information for example income or food shortage in the family, I asked in advance if they were comfortable to talk about it. However, this kind of questions might not always guarantee honest answers.

I don't speak Malagasy or French, and this was one of the biggest limitations for data collection. For all meetings and interviews I had the same translator who was with me for almost a month.

Besides, because I am coming form very different culture and background, it might result very different interpretation of the answers or judgment of their behavior because of my different points of view. The biggest limitation for the study was probably time spent in the area. Due to financial restrains I could not stay longer than a month in Madagascar.

4.4 Methods of analysis

Based on Ashley and Hussein (2000) methodology for livelihood impact assessment table 3 was used as a guide while preparing data collection tools, analyzing and interpreting the data.

Since most of the data collected during the research is qualitative data and the sample sizes are small, I decided not to use any statistical programs for data analysis. For quantitative data, I used only the Excel program to sort out the data, for calculations and to make charts.

All raw qualitative data from questionnaires and interviews was recorded, analyzed and interpreted. I used color-coding to look for similarities and differences, for groupings, patterns and items of particular significance. This method allows to cluster key issues in the data and to move towards the conclusion (Bell 2005). When coding and analyzing qualitative data there is always a possibility that the researcher's own perceptions and values are imposed. While analyzing the data I tried to stay neutral as much as possible, without adding my own perspectives.

To ensure the validity and accuracy of the research several techniques were used, for example, triangulation – getting more than one view on a subject, and then cross checking the information (interviews, focus groups, observations).

One of the biggest limitations during the data collection and analysis was that I didn't have any baseline data from the project villages from previous years, which could be compared with my own data. I had to use questions where I asked villagers to remember how it was before the WWF project. Which means that results are not very accurate. Additionally, even though I tried to be unbiased while analyzing the data, it is not possible to avoid it fully, since I am coming from a very different culture and background and with understandings which othen are very different from local perceptions.

CHAPTER 5: Findings

In this chapter I will present the main findings of my research. The quantitative and qualitative data will be presented together. Following Ashley and Hussein (2000) conceptual framework for livelihood impact assessment, three main steps should be: (a) an overview of current livelihood strategies, (b) livelihood changes due to the project, and (c) differences between stakeholder groups (Figure 3). According that, first, a broad description of the participants will be presented as well as the description of current situation and livelihood strategies in the villages. Secondly, I will describe the most important changes of the livelihoods over the time related to the WWF project. Thirdly, the differences between participants (project village) and non-participants (non-project village) will be provided. However, it is important to remind that both villages can not be statistically compared between each other because of different sample size, due to logistic issues (time and financial limits). However, every household survey was performed as proper interview, which allowed me to collect a lot of valuable qualitative data, that is sometimes more diverse than quantitative data. The findings will be presented by the themes and topics based on SLF and World Bank's opportunity approaches.

5.1 Demographic profile of the participants

The research data information is collected through focus groups, household surveys and observation. A total of 48 random household surveys were conducted during the research. 32 HHs represent project village and 16 from control village (non-project village). The focus groups were carried out in three project villages and one control village. The project villages and the non-project villages cannot be compared statistically since they represent different and small sample sizes, however they can still present adequate information about each village on its own.

The project and the non-project village description

The project village Beheloka has a population size of around 1221 habitats according to WWF provided statistics and around 2000 habitats according to the village chief (2013); a control or non-project village Ampasimahanoro has around 1037 habitats (2014) (WWF). In both areas there have

been big increase in population size. In both villages people share very similar lifestyles, the main activities are fishing and farming. Both villages are quite isolated from bigger towns and are dependent on fish collectors who are coming here every day. The non-project village is near national park although it doesn't affect villagers too much. The biggest difference between the villages is that the non-project village has no schools inside the village (kids have to walk to another village to get to school) whilst the project village has public and private primary and secondary schools. In addition, there is no hospital in the non-project village and no availability to get drinking water inside the village. In the project village there is a small hospital, however with very limited pharmaceutics and staff availability. From 2012 the project village has drinking water inside the village.

Participants description

The V*ezo* fishermen (81%) and *tanalana* farmers (17,5%) tribes live in both researched villages. Both tribes live very close to each other and have a peaceful relationship, often marrying into other tribe. There is a common tendency of farmers switching to fishing in the last years due to lack of rain that doesn't sustain agriculture anymore. Interviews and surveys were mainly aimed at *vezo* tribe representatives because they are the main beneficiaries of the project; additionally they know sea the best and can see the changes in time. However it is also interesting to include *tanalana* tribe representatives to be able to identify how project activities affected them. In the project village 25% of correspondents were households from tanalana tribe, in the non-project village all participants of the survey were coming from *vezo* tribe.

Age

Table 3 represents age of the sample from both villages according to the gender. Generally survey participants from the non-project village are younger than from the project village, the youngest being 17 and oldest 70 years old, as for project village, 19 and 62 years old.

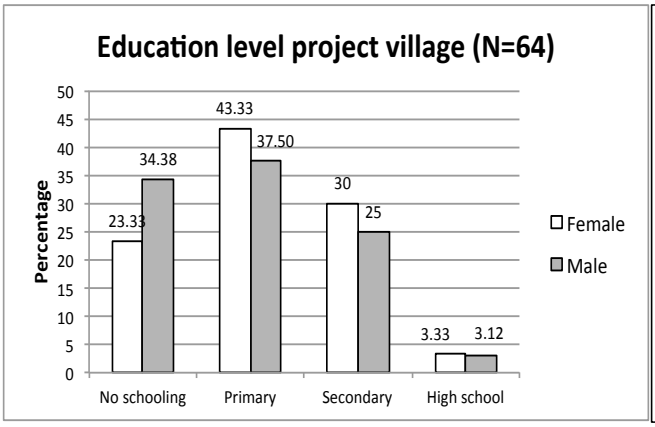
Table 3. Age of the sample from both village

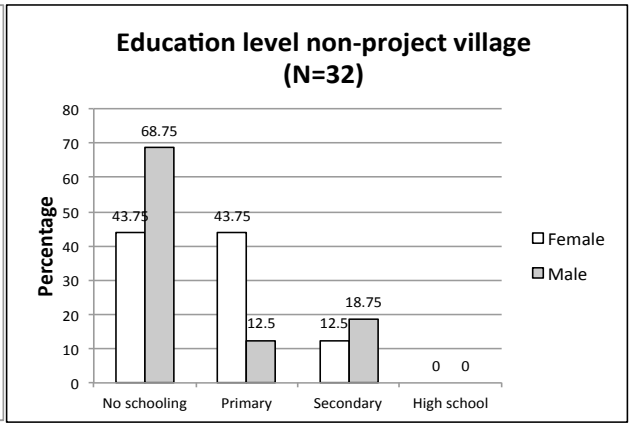
	Project village		Non-projecy village	
Male	Mean	40	Mean	34
	Mode	25	Mode	37
	Std. deviation	12	Std. deviation	13
	Range	37	Range	52
	Sample size	32	Sample size	16
Female	Mean	35	Mean	28
	Mode	40	Mode	17
	Std. deviation	11	Std. deviation	11
	Range	41	Range	33
	Sample size	30	Sample size	16

Education level

Data results show that education level is higher in project village. The majority of the participants (37,50%) have primary education, one representative of both gender has even higher education. The average years spent in school is 3,6 years in the project village and only 1,7 years in the non-project village. The majority (68,75%) from the non-project village never went to school, especially man. This could be due to no schools available in the village making it harder for parents provide education to their children (Table 4.)

Table 4. Education level of the sample from both villages





Main occupation

Regarding the main occupation of the villagers, the participants from project village tent to be more diverse. Most of the participants mentioned fishing as main activity 84,4% men and 36,7 % women. Only 6,3% have farming as main occupation even though 25% of all correspondents are from *tanalana* tribe. Other (6,3 %) stands for such occupation as teacher, tax collector, dressmaker. As a second occupation villagers mainly mentioned fish trading, house building, or algae farming.

In the non-project village 100% of men are fishermen, 16% of them mentioned farming as second occupation. The smaller sample size from the non-project village could have resulted limited data about the population, that doesn't represent real picture. None of the survey participants were from the *tanalana* tribe (Table 5).

Table 5. Main occupation of the sample from both villages

Project village	**Male**		**Female**	
	Frequency	Percent	Frequency	Percent
Fishing	27	84,4	11	36,7
Farming	2	6,3	3	10,0
Fish collecting/Trading	1	3,0	5	16,7
Household work	0	0,0	9	30,0
Other	2	6,3	2	6,7
Total	32	100,0	30	100,0

Non-project village	**Male**		**Female**	
	Frequency	Percent	Frequency	Percent
Fishing	16	100	4	26,7
Fish collecting/Trading	0	0	5	33,3
Household work	0	0	6	40,0
Total	16	100	15	100,0

5.2 Differences between stakeholder groups in livelihood impacts

While studying livelihoods it is important to distinguish between different groups with various needs and strategies. The same project might have very different impacts on different groups of people. Identifying different stakeholder groups can show who is affected and how, or provide comparison between them, it can also ensure that every group is included in the study. I distinguished stakeholder groups according to their involvement: primary stakeholders, secondary stakeholders and relevant stakeholders (table 6).

Table 6. Stakeholder groups and key informants interview during the study. Source: Ashley and Hussein 2000.

	Involvement	**Members and Key informants**
Primary stakeholders	People who directly depend on the reef for a living and who make direct use and benefit of natural resources	*Members:* - Fishermen - Women - Children *Key informants:* - The village management committee members (in all visited sites) - Mayor of the commune in project and non-project village - Focus groups with fishermen and women
Secondary stakeholders	People who do not use reef and its resources directly, but make use of products and services from the reef Have specific interests in the problems	*Members:* - Collectors & Retailers - Exporting companies - Hotels & Restaurants *Key informants:* - Copefrito (Fisheries products collector company) - Local fish collectors and traders - Hotel owner in Beheloka
Relevant stakeholders	Organizations with direct responsibility for managing marine resources and activities related to reef, or with an	*Members:* - Regional and local authorities - NGO's - Other institutions *Key informants:*

	interest in the primarily or secondary stakeholders Have the most knowledge or competence to deal with the problem	- MWIOPO Marine Program coordinator WWF, IFS program coordinator WWF - Project Manager WWF - The Regional of Fisheries Administration (SPRH); - Marine Institute - The local communities CBOs (Community Based Organizations); - The police

5.3 Current situation and livelihood strategies in the study area

In order to see the impact of any kind of activity it is important to know current situation of livelihoods in the project villages. Therefore to see the impacts of the project, I will concentrate on changes in time (before and after the project), and differences in livelihoods and environmental conditions in the project village and the non-project village (control village). Finally I will see if there are any changes in people's attitudes and behavior towards environmental issues, since it is one of the most important indicators for successful nature conservation. As well as comparing behavior and attitudes change in the project village and the non-project village.

The findings will be grouped according to themes and topics based on SLF and World Bank's opportunity approaches. Only the most important findings will be presented that are relevant to research questions.

5.3.1 Household

Based on the research data and observations the local communities in study area live in extreme poverty. Non of the households have running water or electricity in the house, only better living households have generator to produce electricity for rare occasions. Due to the village being so remote not many can get fuel for everyday use. Most of the houses in the village are built of wood and straw materials, based on the survey results around 60%. Roughly 30% of the houses in the village are made of better materials: iron or cement.

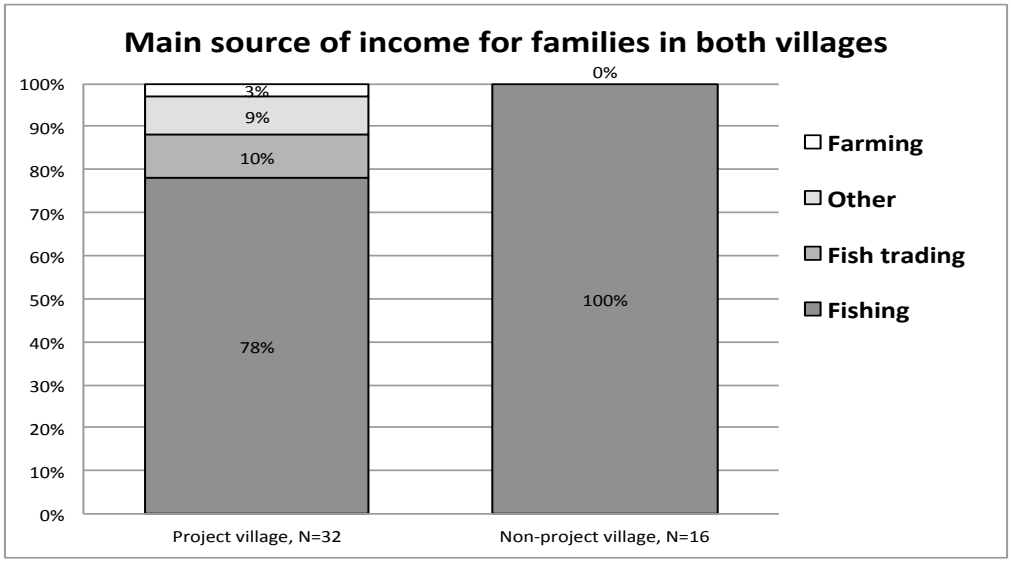
From the observation most of the houses look very basically equipped with almost no furniture inside. People have only basic things like beds and tables, majority of the houses don't even have chairs. Some of the households (around 25%) have such luxury goods like generator, TV, SD player, radio, etc.

It is common in the village to have many children in the family. Some families have up to 12 or more kids. On average according to the survey people have around 5 kinds in the family.

5.3.2 Income and livelihoods

Income opportunities in the area are very limited. Since it is a coastal village, fishing is the main, sometimes the only source of income for the household.

Table 7. Main source of income from both villages



In project village 78% of correspondents mentioned fishing as a main source of income for the household. 10% mentioned fish trading and collecting, 9% other (teacher, tax collector, dressmaker) and only 3% named farming as main source of income (Table 7). 100% of households from non-project village have fishing as main source of income. It is very small sample used, still it demonstrates the importance of fishing in the area.

As a second source of income for the household farming was chosen the most often (28%), fishing was selected by 20% of correspondents, sea farming 12%, fish trading and collecting 12%. Non-project village shows higher dependency on fishing, 100% of the households stated fishing to be main

source of income for the family, as a second source of income fish trading (56%) and keeping animals (44%) were the only chosen options.

Since most of the villagers have very low education level or never went to school it was almost impossible to collect data on monthly income. Asked about their income they looked confused because majority of them don't even know how to count or how much they earn per month. Additionally, fishing is very seasonal activity, varying depending on the weather, place, materials and so on. During the high season daily income can be 10 times higher than in a low season. The income also depends on what type of fish you catch (calamari, octopus, shrimps), how often you go fishing, where do you sell it, how efficient you are. Prices on fish vary as well. The price for 1 kg of fish is around 0,50 USD; 1,20 USD for 1kg of calamari, selling to collectors coming to village. On average one fisherman can get from 2-7 USD a day. During the high season with good luck fishermen can make around 30-100 USD a day (December-March). Some fishermen occasionally catch sharks that can give a profit of 11-27 USD per catch. Some women practice algae farming that can provide around 40-70 USD income per month, although it is hard and seasonal activity. Algae farming is new activity in the village for this reason it is not visible in table 7. Almost all households mentioned that kids additionally collect seashells, even though it brings very low income (0,07-0,20 USD per kg) and collectors only accept it in big quantities 300kg. Some families managed to switch from being fishermen to fish collecting for higher income. However in time growing number of collectors makes it harder to compete resulting decrease in income. Farming didn't bring much income in the last years. Because of lack of rain farmers cannot grow enough food for sale, they have hardly enough to eat for themselves.

It was also very hard to calculate average expenses of the household; it varies a lot depending on how big is the household and how many kids are in the family. On average for the most basic everyday expenses (food, water, fuel) a household spends around 1-4 USD a day. Additional expenses are school fees and fishing materials.

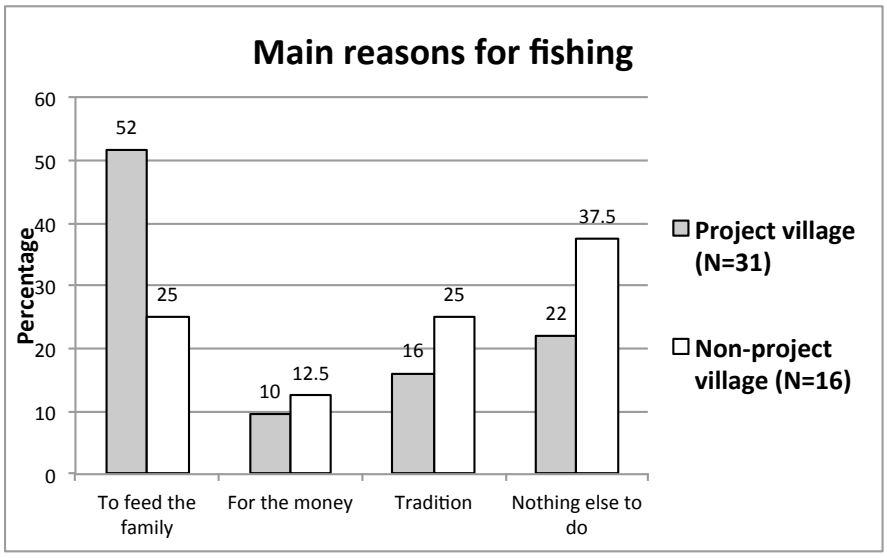
5.3.3 Fish catch and fishing methods

Fishermen communities in southern Toliara totally depend on the sea and their everyday fish catch. They go fishing almost every day from 1-3 times a day. In the project village 86% of fishermen go fishing every day, in non-project village 100% of fishermen go fishing every day.

It is also interesting to look at the reasons why they go fishing, which could show their motivation or dependency on fishing. Table 8 shows that one of the main reasons for fishing in project village is

for food (52%) and next the most common reason is no other livelihood alternatives available in the area (22%). Fishing is not only main source of food but also a strong tradition, 16% in project village and 25% in non-project village mentioned it as a main reason for fishing. Interesting to notice that fishing for money was least chosen as in both villages.

Table 8. Main reasons for fishing from both villages



On average the fisherman can get around 4-10kg of fish per day (2-6kg using only hook, around 20kg using net), 2-5kg of octopus, 1-4kg of calamari.

In the recent years the numbers of fishermen are increasing very fast. Almost all farmers became fishermen since they are not able to feed their families anymore from agriculture. According to WWF report in 2013 average fishermen income was more than twice higher than farmers. In addition, there is a lot of people immigrating form inland to coastal areas because of the climate change and lack of rain. All of this results in increasing competition between fishermen and pressure for natural resources. More than half (54%) of the survey participants said fishing has become more difficult now (87,5% in non-project village). The most common reasons mentioned for being more difficult to fish is increasing number of fishermen and fish moving to different places.

Fishing materials and methods

Fishing materials and methods influence a lot upon the size of the catch. Most of the fishing techniques are traditionally used from generation to generation. Not many new methods reach this remote area. Most of the fishermen use very old and sometimes damaged fishing materials. Often they

have to make it themselves (spears, wooden guns) because they cannot afford to buy new ones. Some materials are so old that they sometimes have to risk their lives when fishing. For example old diving masks, unfortunately they don't have other alternatives, because they have to feed their families.

5.3.4 Health and diet

Many people mentioned that in the last 3 years there has been a food crisis in the area that made life of the local people even harder. Farmers can't grow food anymore; in the market you can hardly buy anything. Even if you have money there is not much you can buy except for rice or maize. The main daily diet consists of fish and rice, in addition to maize, cassava and different kind of beans. There are almost no vegetables available. Local people's diet totally depends on fish. 88% in the project village and 100% in the non-project village eat fish every day. The possibility to eat fish everyday is a good thing; but some of the families can't even do that because they have to sell fish to get income to buy rice.

Meat consumption is considered to be a luxury here. Most of the people (around half of participants) said they eat meat only few times a year during the special events (e.g. New Year Eve or birthdays). More wealthy people eat meat once or few times a month. Even the *Tanalana* tribe (farmers) can't afford to eat meat very often. When asked about food shortage, most of the correspondents mentioned that it happens but rarely, mainly because of the cyclone when they can't fish. Unfortunately it seems that for some families food shortage is not an unusual thing.

Availability of proper health service is another issue in the villages. There is a small hospital in the project village however many villagers complained that they use the same medicine for all the diseases. In case of a serious illness one has to go to bigger town. In general sanitation is very bad in the area. The local coffee from the shop always taste a bit salty here. It is very unusual to use toilets in the village, people normally go to the bush or to the beach.

5.3.5 Governance and institutions

The main governance in local villages is managed by village mayor and president who are responsible for taking care of different kind of issues and making decisions, yet bigger decisions (e.g.

building schools or hospitals) are made by authorities in Toliara. People can come directly to village leaders with any kind of concerns, or they can address it through associations.

The WWF project created a number of community based organizations (CBOs) and fishermen associations related to natural resources management and nature protection. The project staff organizes meetings and trainings for CBOs members. Association members are representatives of different families that are chosen by the villagers themselves. During the meetings they discuss all sorts of issues and problems. More than half of survey correspondents are members in some kind of fishermen associations. They have meetings 1-4 times a month with representatives of WWF and villagers. The new CBOs seems to be well integrated into previous traditional power structures, probably because old leaders of the village were also included in associations, plus these new associations have different responsibilities. The members of CBOs represent each family in the village, which guarantee that everybody is involved.

After creation of Locally Managed Marine Areas in the project villages more specific legal rules and restrictions were needed. The local *dina* – traditional social law was created for nature protection that included local traditions and practices. This is one of the most respected and followed legal mechanism in Madagascar and is very useful and powerful in project villages.

5.3.6 Conservation activities and fishermen rights for resources

Today all WWF project villages have Locally Managed Marine Area created from 2008. The main part of the coast is protected by some fishing rules and restrictions stated in local *dina*, and small part of the sea is left as reserve for conservation purposes whit no human activities allowed. All restrictions and rules were created together with local communities by re-introducing traditional system of local *dina*. None of the rules would be allowed if local people wouldn't approve it.

Now, because of WWF conservation project fishermen are not allowed to use harmful fishing activities (destroying coral reef, using poisonous trees) and there are some restrictions for fishing (closure period for some species during their reproductive time, size of fish, or size of fishing net holes). A lot of trainings and teachings were organized by project staff to include villagers themselves in conservation activities and to give them knowledge and understanding why it is important.

5.3.7 Women's empowerment

One of the activities of WWF project was the establishment of women associations in the village. There are 2 women associations in project village, involving around 140 women. The aim of these associations is to generate extra income and activities for local women, so they can become more independent from their husbands. The project supported women associations with the amount of money to start it. Afterwards any woman could join the association by paying a small entrance fee, for the possibility to get micro-loan to start a business or for any emergency needs. Some of the women from association explained that this was the only opportunity for them to get so needed amount of money to buy scales to become fish traders. Women from association also participate in such activities as planting trees or cleaning the village. 96% of correspondents in project village mentioned women are more independent now, and 82% said they have more rights. Majority of the women that started their small business (e.g. small shop or buying fish from fishermen and reselling it to collecting company) started it in the last recent years (after the project started).

5.3.8 Vulnerability context

Different kind of factors like natural disasters, economic shocks or seasonality affect the assets of the people and sustainability of their livelihoods (Pedersen and Pedersen 2010). I will describe external environment and major vulnerability factors that affect livelihoods of the people in the WWF project area.

First of all, project area is located in one of the driest places in Madagascar. Local people constantly struggle for water. Besides, villagers mentioned that there is less and less rain every year. Farmers becoming fishermen increase competition for fish, but the biggest increase in number of fishermen is due to growing population and immigration from inland villages. According to village Mayor, in project village population increased 14,5% from 2012 to 2013. On average there are more than 5 children in the family, some of them have more than 10 kids.

Additionally, fishing is very seasonal activity. Fish catch and fish prices are quite unstable. At the same time sea storms might stop fishermen being able to fish for few days, resulting in no protein food available for the family. Madagascar is occasionally experiencing cyclones and big storms that can be also dangerous and destructive. Villagers mentioned that is a normal thing for them from time to time

to loose their homes because of the storms. This place being so remote makes it almost impossible to get urgent help if needed.

5.4 Changes in study area in the last 5 years in both villages

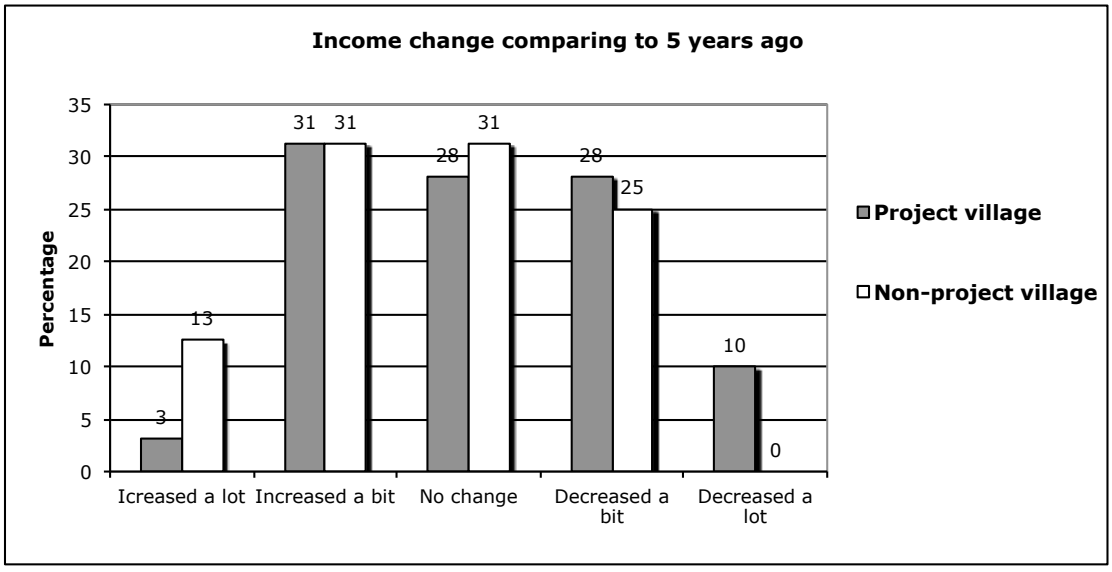
The description of current situation and livelihood strategies in the villages represent only a static and narrow picture of the facts, further attention is needed to look at the changes in time related to the project.

There was no baseline data available from the project village before the WWF project. Therefore I had to ask villagers to remember and compare how it was 5 years ago. This is only based on peoples' memories and perceptions. In this chapter I will look at one of the most important changes that happened over a time span of around 5 years.

Income

There is no big predominance on any side in the project village regarding the income change. 33% of the survey correspondents in the project village said income has "increased", 28% said it "didn't change", and 38% said income "decreased" (Table 9). Where in the non-project village majority 44% of correspondents said income "increased", 31% said it "didn't change", and 25 % said it "decreased".

Table 9. Income change in both villages comparing to 5 years ago



Farmers mentioned that normally they grow food to eat and sell fish for income, but for the last 3 years there was no good harvest so they had to eat the fish instead of selling it. According to the fishermen, the main reasons why their income decreases, is because the price of fish is decreasing. Besides, number of fishermen is growing very fast creating competition for fish. Many fishermen also mentioned that lack of rain affecting availability and place of fish.

As presented earlier there are not much income opportunities available in the area. Most of the men in the village either go fishing or collect and sell the fish. Only few have different occupations like building houses, making clothes, being a teacher or tax collector. These people will always have a higher income because of their exceptional skills. However even between the fishermen there are the ones that live better then the others. Fishing is an activity that depends on many other factors, for example, fishing skills, fishing materials, or even the weather. According to the villagers you can live a good life, if you go fishing everyday - 3 times a day, one can make a good living. From my observations I noticed that young fishermen catch much more fish than the old ones, also if you know special techniques to catch big fish, you can make a good living.

Luxury goods

One way of capturing the income change in the area is to see people's ability to buy luxury goods. Only 25% of all visited households in the project village had such luxury goods as generator, TV, CD player, et cetera. Regarding the changes in being able to buy more luxury goods: 50% of correspondents mentioned there is "no change" comparing to 5 years ago. 36% agreed that they could buy more luxury goods now, and 14% said they "couldn't buy more" in the project village. Nevertheless it is interesting to notice that 90,5% of all correspondents that owned such items like TV, CD player etc. bought it in the last 1-6 years, the period after the project started. Majority of the people asked about luxury goods refer to such items as beds, plastic chairs and plastic dishes, which demonstrates the level of poverty in the village.

In the non-project village on average only around 13% of households had electronic luxury goods. Asked about the change, 25% agreed they "can buy more" luxury goods now, 50% said there is "no change", and 14% disagreed they can buy more.

Health and diet

More than half of survey correspondents said the availability of food and variety of their daily meals has improved in both villages. Yet most of the people also mentioned crisis in the last few years that certainly affected most of the families. Even if you have money there is not much food you can buy in the market lately.

71% of the survey correspondents in the project village and 75% in the non-project village replied that the health of their families has improved. It is most likely due to better access to hospitals (97% agreed in the project village and 63% in the non-project village) and improved water supply (100% agreed in the project village and 63% in the non-project village). One of the biggest improvements for the health of the local people was providing drinking water in Beheloke village (project village). WWF Switzerland and Solar Spar Foundation financed the building of solar powered desalination and water treatment plant in 2012. It is the only option to get safe drinking water in this village since ground water is salty and it needs to be treated. Before the project people were drinking salty water or had to bring it from other villages. Safe drinking water availability in the village attracted more teachers and doctors to the village.

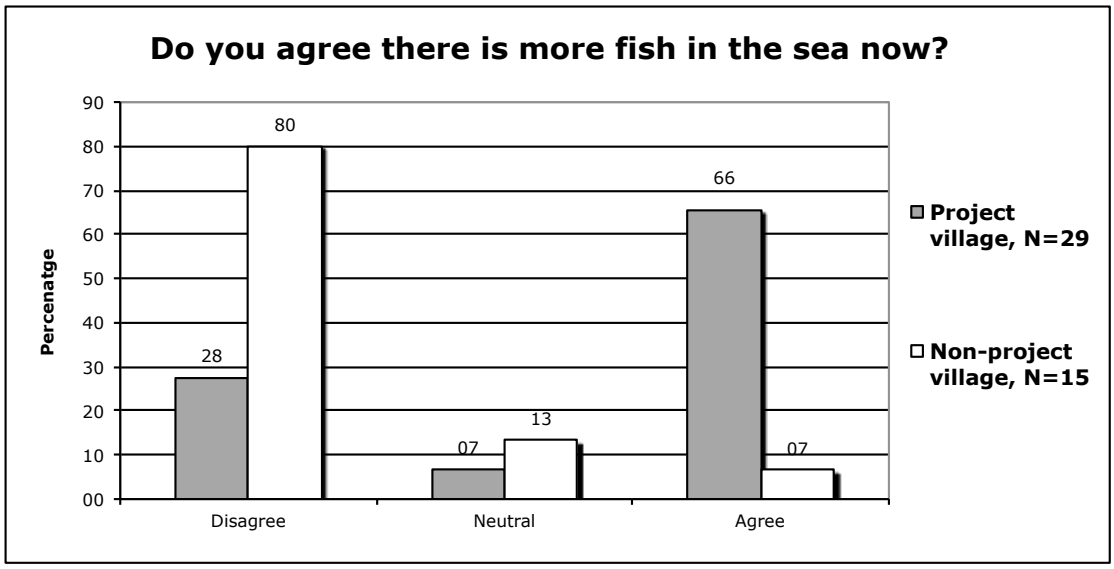
Fish catch

It is hard to measure change in fish catch because of different influencing factors, for example season, weather, place, tools and skills used for fishing.

According to survey interviews, some fishermen say they catch more fish now others say less. 48% of the fishermen in the project village and 44% in the non-project village said they catch “less fish” now comparing to 5 years ago. 14% of fishermen in the project village and 19% in the non-project village said they catch “the same” amount of fish. 38% of fishermen in both villages said they “get more” fish now. However not all participants of the survey in the project village answered this question (only 22 out of 32). One of the main reasons mentioned for decrease in fish catch was: increased number of fishermen, climate change, or fish moving to different places. Fish catch increase was mostly due to sea protection and closure periods for fishing, as well better fishing materials and techniques.

However, asked if there is more fish in the sea now, not taking into consideration the amount they catch or if it is more difficult because of competition, there was quite different response (Table 10). 66% of fishermen from the project village agree that there is "more fish" in the sea now, especially after closure period for fishing. Almost opposite response in the non-project village, 80% disagree there is more fish now, and only 7% agree.

Table 10. Level of agreement on if there is more fish in the sea from both villages



Fishing techniques

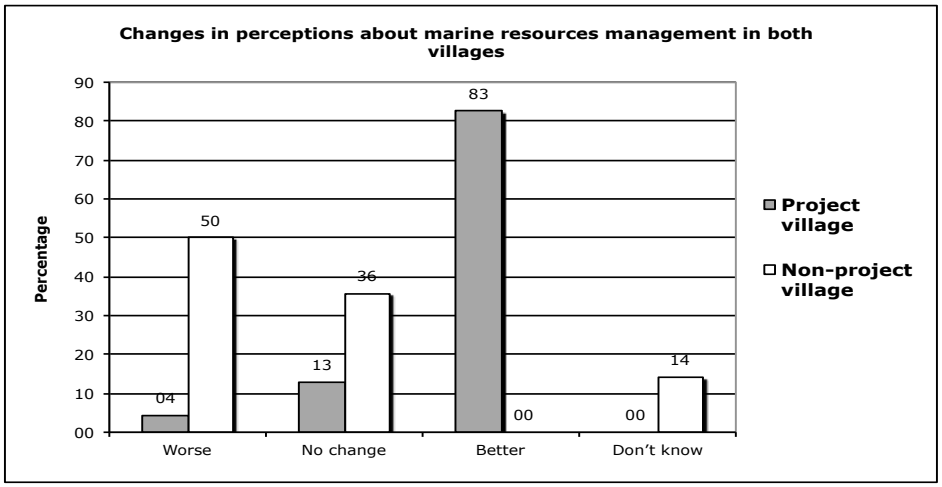
During the last years fishing techniques and methods also changed. Some years ago not many fishermen had nets because they are expensive and you have to change them almost every year. Today almost every fisherman in both villages has a net; they buy them together in a group. The change happened probably because average income increased so they can invest in better materials, but also because number of fishermen increased, competition makes it harder to go fishing. The WWF project also introduced some new, more efficient fishing techniques to increase efficiency of fishing. For example, "palangi" a special way to catch only sharks or big fish (special hook system attached and left in the sea), special nets, lines with more than one hook, et cetera. Additionally, the WWF project created new income opportunities for women such as algae farming and sea cucumber trading.

Conservation activities

One of the biggest changes that happened in the area in the last years was creation of marine protected areas and establishment of local *dina* for conservation purposes. Earlier everything was allowed, for example such harmful fishing activities as destroying coral reef with the hammer, using poisonous trees to kill the fish in the sea, or catching marine turtles that are endangered. Today there is a big differences between both villages regarding illegal fishing activities (see Table 13, page 55).

Asked about the changes in natural resource management there is obvious difference between the villages (Table 11). In the project village 83% of fishermen said marine resources are managed "better" now, and only 4% said its managed "worse". Where in the non-project village 50% said its managed "worse" now, 36% said there is "no change", and no one said that its managed "better".

Table 11. Changes in perceptions about marine resources management in both villages



Community participation

Creation of associations and community-based organization (CBO's) the project villages was very useful tool to distribute conservation activities and responsibilities among the villagers. During the trainings organized by project staff they learn such things as: why it is important to preserve the ocean, why they shouldn't practice illegal fishing activities, or what are more efficient fishing techniques that they could use. More than half of fishermen from the survey said they learned new fishing techniques from the project. In the non-project village there is no CBOs or associations.

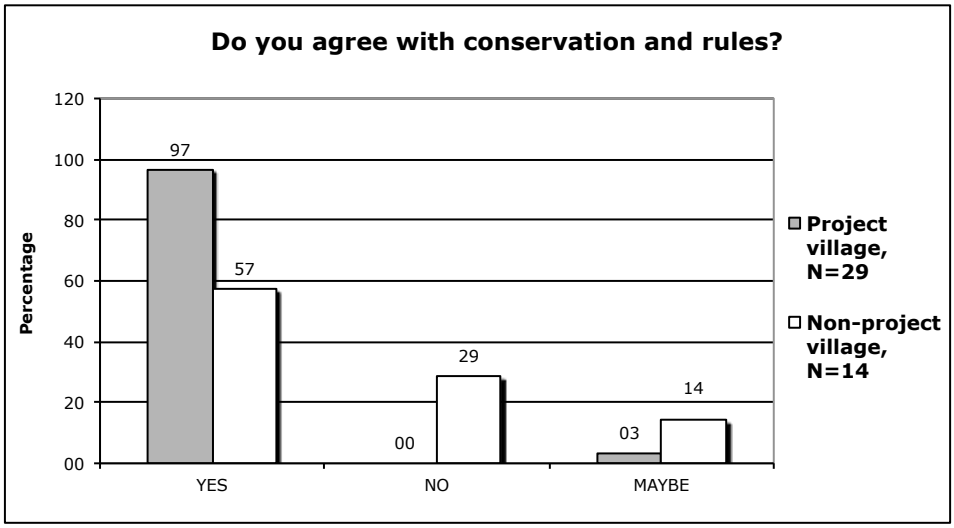
Rights for natural resources

It was interesting to observe that fishermen in the project village are very happy to have *dina* in the village as well as protected area. From all interviews and focus groups meetings only few fishermen mentioned they would like to have less fishing rules.

Since it is a sensitive question, I had the same questions asked in different time to see if the answer would change. Asked if there are too many rules for fishing in the project village 83% said they "disagree", and 17% "agreed". In the non-project village 73% said they "don't know", meaning that they don't much about rules.

However asked if they agree with conservation and rules for fishing or they would prefer to have no rules at all, 97% in the project village said "yes" to conservation (Table 12). Yet, asked if they have enough rights for the sea all correspondents (100%) agreed with that. In the non-project village 57% said "yes" to conservation, and only 29% said "no".

Table 12. Level of agreement about conservation and rules in both villages



5.5 The biggest difference in both villages regarding people's attitudes and behavior change

In the project village everybody were somehow influenced by the project, directly or indirectly. For that reason it was interesting to include a control village that wasn't directly participating in the project and can represent the non-project group, to see if there are any significant impact differences.

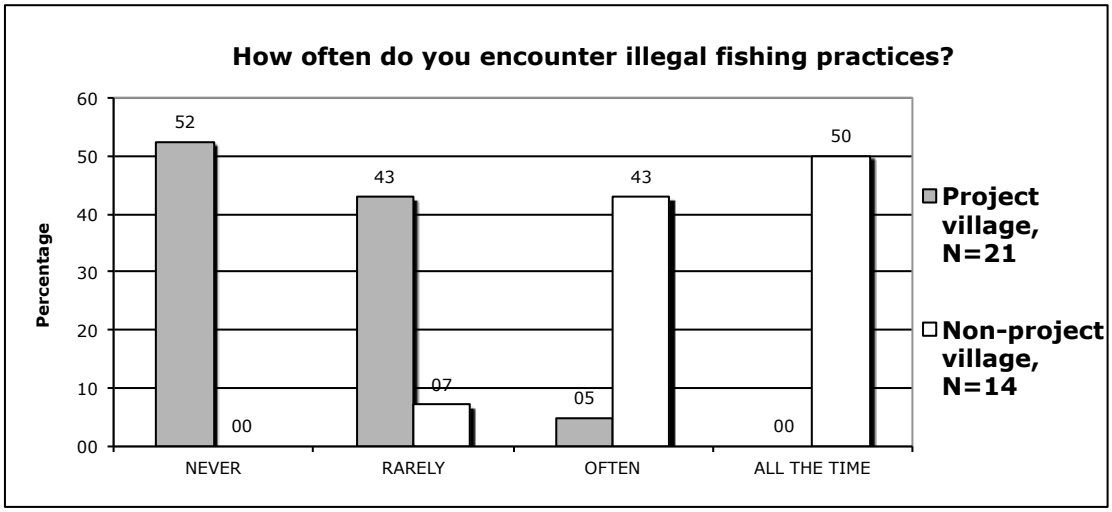
In this section I will describe the main differences between both villages related to behavior change among fishermen, as well as, changes in general ecological conditions of the coastal areas. However, since the sample size is very different from data collection due to logistics and time limits. 32 HHs from project village and 16 from non-project village, it is hard to compare them between each other, but they can still give some insight information on its own.

The project and the non-project villages are quite similar in livelihood activities and strategies. Both villages are inhabited by *vezo* and *tanalana* tribes, that live here for hundred of years trying to survive in this harsh environment. Today, one of the biggest differences between the villages is nature conservation and marine resources management activities. In the non-project village there are no local *dinas* or restrictions on fishing whatsoever. Local fishermen can practice any fishing activities. The project village, on the other hand, managed to change quite a bit over the period of more than 6 years since the WWF project started.

Illegal fishing practices

In the non-project village fishermen don't even see destructive fishing activities as a problem or something that could affect negatively future marine resources. Table 13 demonstrates different level of illegal fishing activities in both villages. It shows clearly that in the non-project village it is quite normal thing to practice harmful fishing activities. However, from the interviews it is also obvious that they would like to have conservation in their village, 57% agreed (see Table 12). They heard from other villagers about the benefits and positive outcomes of the project. In the project village fishermen said they almost never see illegal fishing practices.

Table 13. Illegal fishing practices in both villages



General perceptions about changes in ecological conditions of the coastal areas

There is not much research available on ecological conditions of coastal areas in the study area and the change over the time. Regardless of that, I wanted to see fishermen's opinions and views on changes in the sea. Despite them being traditional uneducated fishermen they are still one of the best experts of the sea.

Asked about their perceptions on changes in general ecological conditions of the sea there was also quite different response. Table 14 and table 15 demonstrate that the conditions are considerably better in the project village. However, it's based on perceptions and it's hard to know if fishermen in the project village are not saying this because they want the project to continue or because I am an outsider.

Table 14. Changes in following ecological sea conditions in the project village

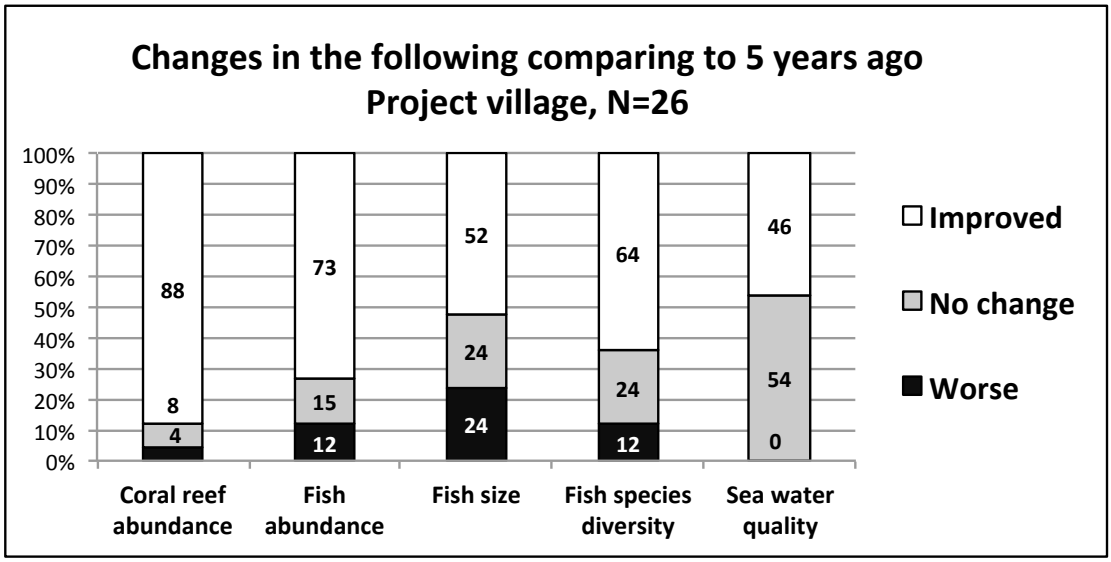
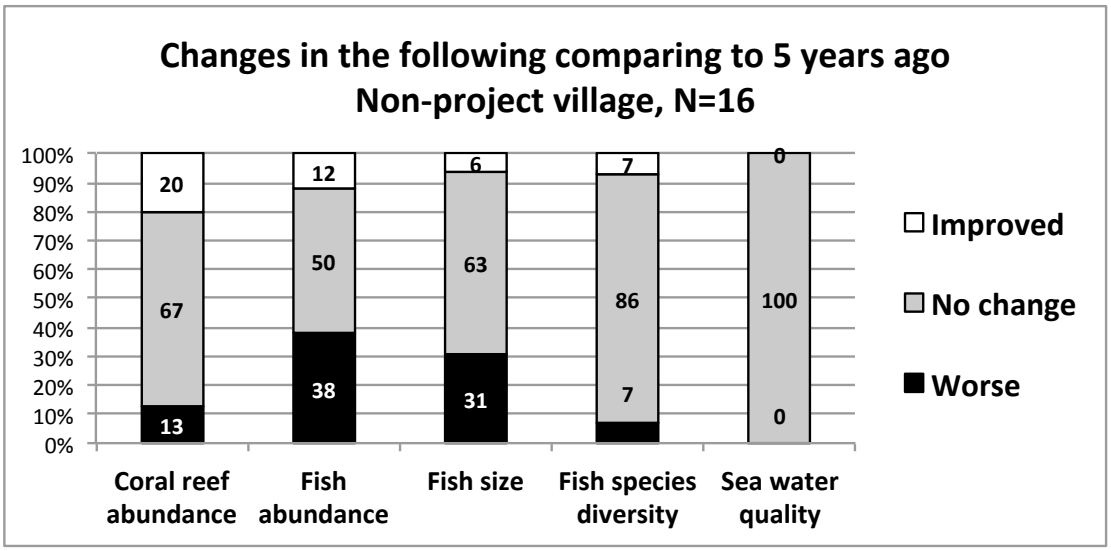


Table 15. Changes in following ecological sea conditions in non-project village



Community participation in conservation activities

One of the biggest changes in the project village after establishing protected area was local communities involvement in conservation activities. All fishermen (100%) in the project village said they were "not involved" in marine resource management before the project (Table 16). Almost

everyone (96%) said they participate "more" in marine resource management now than before. In the non-project village 100% fishermen said they "disagree" they are involved in marine resource management in any way (Table 17).

Table 16. Level of agreement about involvement in resources management in the project village

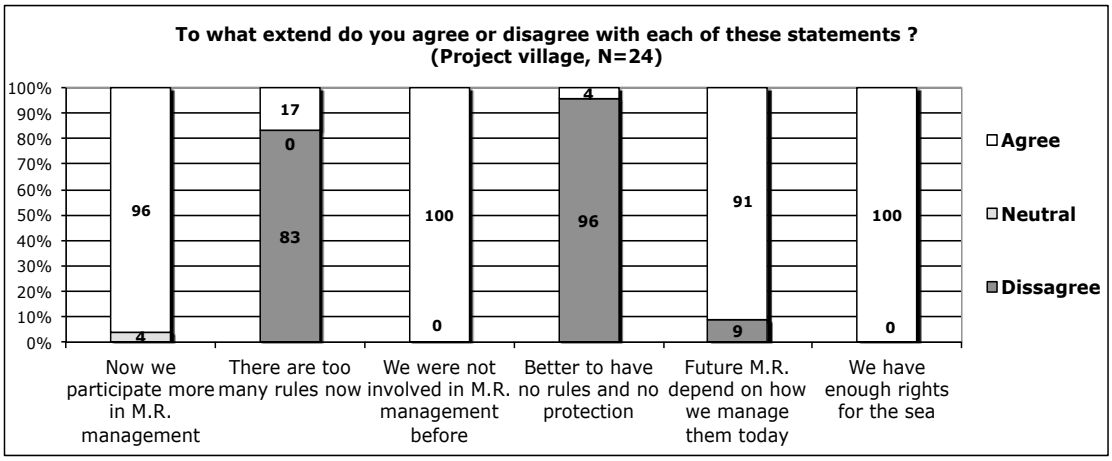
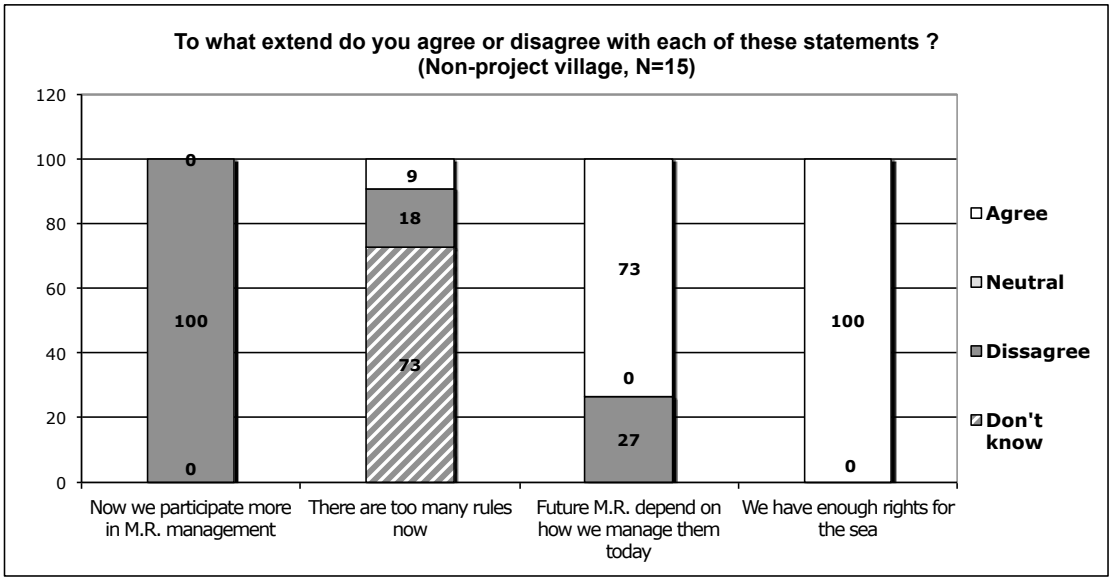


Table 17. Level of agreement about involvement in resources management in the non-project village



Sanitation

Additionally, there has been quite a difference in level of sanitation in participant and non-participant villages. It is not common to use toilets among the villagers but WWF staff recommended to build them and explained why. In the non-project village not many use them. In the project village there is WWF water desalination project from 2012 that provides safe drinking water, where in the non-project village locals still have to bring it from other villages. 91% of correspondents from the project village mentioned that sanitation "improved" in the last 5 years. Only 27% in the non-project village said sanitation has "improved", and 73% said there is "no change".

CHAPTER 6: Discussion

It is important to mention some difficulties and limitations of the study during the whole process (fieldwork and analysis). First of all, due to time limitation and logistics I spent more time in the project village than in the non-project village. The sample size of HHs from both villages is quite different; therefore I was not able to statistically compare the villages. Still I collected a lot of interesting quantitative and quantitative data from non-project village, which showed interesting facts and differences between them.

Since I am the foreigner and outsider it definitely affected the response of the villagers. Most likely they can't be totally open with a person that they see for the first time. Additionally, during the first few days of my research WWF staff helped me to organize some of the meetings, it could also influence some of the answers. In some cases they probably just told me what "I wanted to hear".

Besides, some of the questions in the questionnaire are quite sensitive, for example illegal fishing activities. It is hard to say how open fishermen can be talking about it in the project village (because of the restrictions). Therefore in the non-project village they can openly talk about it because there are no restrictions on fishing and they have nothing to hide.

One more limitation of the study is that I am coming from very different culture and environment. Even if I want to stay neutral, without adding my values and perceptions, it is impossible to do. Our background will always stay with us. Also since I didn't speak the local language, I could have missed some important information due to translation process.

Additionally, there was lack of cooperation by some stakeholders. For example during the visit in fish collector company I didn't get much useful information, they were not answering asked questions but talked about something else, and couldn't provide any data about fish catch.

6.1 Earlier studies from Southern Toliara

Laroche and Ramananarivo carried out a study in 1995 in Southern Toliara, Tulear Bay (around 30 km from project zone). They found out that over the last 15 years all fishermen reported decrease in their catch in weight and in the average size of fish caught. Coral reef was heavily destroyed and affected by human activity in the area. They came to the conclusion that management strategies for traditional fisheries are urgent here and regulations would help to stabilize the pressure, but most importantly what is needed is educational program for fishermen to understand the benefits of conservation. Besides, control of the environmental damage and creation of marine parks is needed to keep species abundance (Laroche & Ramananarivo 1995).

Anther study from Blue Ventures and WWF MWIOPO (Madagascar and Western Indian Ocean Program Office) from 2009 showed similar results. In 4 villages that today are project villages coral reef study showed serious signs of degradation. Fisheries management through better fishing methods and restrictions is crucial in the area, and has proven to be successful restoring biodiversity. They concluded that creation of protected areas would be a great solution, as well as involving and educating local fishermen (Gough *et al.* 2009).

To my knowledge there were no marine parks or protected areas in study area before the WWF project re-introduced *dina* system and created Locally Managed Marine Areas and Reserves from 2008.

There has been a long debate and contradicting opinions about if community based conservation actually benefits local people or not. There is a growing concern that strict conservation policies and programs clash with poverty reduction goals, by limiting local people's rights and access to resources. However, at the same time rapid environmental degradation, depleted natural resources and extinction of species demand for an urgent action before irreparable damage to nature is done (Adams *et al*. 2004; Bille *et al.* 2012; Secretariat of the Convention on Biological Diversity 2010).

Its not an easy task to combine two such a different goals, one successful strategy might work in one place, but can be a total disaster in another. Nature protection can become a constraint to development or a tool for improving local people's livelihoods (Adams *et al*. 2004; Will *et al.* 2012).

6.2 WWF final project evaluation report

In 2011 WWF project staff carried out final fisheries project evaluation. In this chapter I will compare results from WWF evaluation with my study findings, 7 years after project was started.

In general project considered to be quite successful. Even though this project was rather complex and it's not easy to work in this part of Madagascar because of difficult accessibility and unstable political situation almost all project goals were achieved.

- ***Fish catch***

According to the Catch per unit effort (CPUE) data production average has increased for almost all marine products (Table 18). The biggest changes are seen in lobster (11 times), octopus (3 times) and squid (2,6 times) catch. This could be due to closer periods that doesn't allow fishing activities in particular time of a year, which allows higher reproduction of the species (WWF 2011).

Table 18. Production average in project village in 2009 and 2011. Source WWF, 2011.

Catch	kg /day/fishermen in 2009	kg /day/fishermen in 2011
Octopus	3,4	11,1
Squid	2,7	7,2
Lobster	0,9	10,4
Sea cucumber	9,4	13,2
Fish	8,5	10,3

Because of the marine protected area and conservation activities in project villages, fish collectors (buyers) don't buy any of these species during the closed period (introduced from 2008), as well as, it is confirmed that they don't buy small size animals during open fishing period. Even if local fishermen catch these species during closure time for family consumption, this new regulation surely makes a positive impact on the size of the species (WWF 2011).

According to my study results, there were some contradictions in response regarding the changes in fish amount in the sea and fish catch. For that reason I had control questions to double check the

answers. As mentioned in the findings the majority of fishermen (54%) said it has become more difficult to catch fish now and there is less fish in the sea (48%). Yet only 22 out of 32 answered last question, which could show limited results. Asked if there is more fish in the sea, not taking into consideration the amount they catch, there was quite different response. 66% of fishermen from project village agree that there is more fish in the sea now, especially after closure period for fishing. 73% of fishermen said fish abundance improved after the project.

Asking fishermen in project village about their fish catch is tricky. If fishermen have any interest for the project to continue because they could benefit from it (e.g. trainings and education, participating in CBOs) it might influence their answers. In addition, for me being an outsider definitely can impact their response and level of openness.

Perhaps the amount of fish increased because of conservation activities but the amount of fishermen also increased due to immigration and population growth. Competition and climate change (no rain, fish moving to other places) could make it harder to catch fish. One fisherman mentioned that some years ago only few fishermen had nets, now almost everyone has it. It makes it easier to catch fish, but if everybody starts doing it at the same time, it could also decrease general efficiency. Although, after comparing the age of the participants and their perceptions on changes in fish catch, 60% of participants mentioning they catch less fish, were around 58 years old. This shows that getting older could make it harder to be efficient in fishing (not because there is less fish in the sea).

Unfortunately, it was not possible to get any data on fish catch from private fish collecting company Copefrito due to competition between companies. The director of the company failed to answer any questions, and the whole interview and the company looked a bit shady.

- ***Income and livelihoods***

According to WWF report there have been slight income increase in project village. For example, increased number of new concrete houses built in the village or new household devices bought after the project. It can be argued that since fishing is the main activity of the local population, increase in fish catch will directly affect income of the fishermen. Yet the casual relationship between income change and project activities is still hypothetical (WWF 2011).

WWF fisheries management project introduced some new more efficient fishing techniques and materials. They also created new alternative income opportunities for women: algae farming and sea

cucumber collection. As well as, creating women associations that gave a change for many women to take micro-loans to start their own small business (e.g. opening small shop, collecting fish and reselling it to collector company). All of this should help to generate more income for the households, however it is almost impossible to know for sure, since there are a lot of other influencing factors, for example political crisis and instability in 2009 and lack of rain in the last few years. This certainly affected the whole country as well as local villages in southern Toliara (WWF 2011).

According to my research majority of the households (38%) experienced decrease in income, and 34% experienced increase (see Table 9). However it was very hard to measure income change in the households since there was no baseline data available before the WWF project. There is no dependency on occupation or tribe in relation to increase or decrease in income. As well as education level is not related to income change. However, age shows to be important variable in income change. All correspondents that mentioned income "decreasing a lot" were older than 50 years old.

However this is based only on people's perceptions and depending on different circumstances even the same people can answer this question differently at different time. Some of the correspondents could see this question as an opportunity to "show" that they don't have enough income, expecting some help from the project. For example, some of the fishermen said that project should provide them with new fishing materials because they cannot afford it.

Often people might not even notice changes in their income, one of the ways to check it is to look at their ability to spend money, or ability to buy luxury goods. 90,5% of all correspondents that owned such items like TV, CD player etc. bought it after the project started. Maybe it's a coincidence or maybe it's a link between increase in income due to increase in catch (Table 18). Although, almost all households that had such luxury goods were mainly fish traders or had a different occupation than fishing. This shows that the ones that mostly benefit from increased fish catch are fish traders and collectors. However for a simple fisherman to become a fish trader one would need to save some money to buy the equipment. According to my data, some fish traders started this activity after they could save some money from good fish catch. Others had the same opportunity but they didn't use it.

- ***Community participation and local governance***

One of the main goals of the WWF fisheries management project was to establish participatory management of living marine and coastal resources in collaboration with local fishermen so it would be sustainable in long term. However, including local people in conservation can be a serious challenge, especially in small and isolated villages like these project villages, where much is based on traditions and taboos. The WWF project fully included local fishermen in conservation activities. First of all by creating local social law – *dina*, which was created together with local fishermen. Newly created *dina* was approved and recognized by Tribunal, Local and Regional Authorities and Regional Fisheries Administration. Three more villagers created local *dina* outside of the project area, after they heard how useful it is (WWF 2011).

There were also positive improvements on the local governance and community mobilization, for example created at least 7 active associations and community based organizations (CBOs) in project villages. The WWF project evaluation also shows that local associations contributed to social conflict resolution, by respecting traditional authority structure and involving representatives of all families. CBOs also improved communication system between local fishermen and Fisheries Administration (governmental institution) (WWF 2011).

After my research I came to the conclusion that including local people in conservation activities was probably the most important factor of this project that made it so successful. A number of conservation projects fail to achieve conservation goals because they don't include local people. Local people in the project village really feel that they were included in the project and conservation activities from the beginning (creating local *dina*) and during the whole process. After the focus groups interviews and surveys it became very clear that people respect the *dina* and they are happy to have it the village.

Creation of fishermen associations and CBOs is one more outcome of the project that helps to involve people by sharing the responsibilities of natural resource management and rules enforcement. A lot of people got directly involved in conservation and awareness raising activities. This gave them strong sense of responsibility and participation. Local fishermen felt very proud to take this important role, especially when protecting the sea, since they feel they own the sea. CBO leaders still have regular meetings with WWF staff and the villagers. The original WWF fisheries management project

was finished in December of 2011 but they still try to continue with some activities of the project, for example regular visits and trainings. These community meetings made the communities stronger and more united, helping solve also other issues (conflicts, common decisions). Before the project there was no associations or groups meeting to discuss anything. There is a big difference between the project and the non-project village in a level of participation in marine resources management. In non-project villages there is not even one fishermen association or committee.

- ***Illegal fishing practices and changed in behavior***

According to the WWF project evaluations in project villages illegal fishing and destructive fishing activities were reduced tremendously. In Beheloka it fell by 75% between 2009 and 2010. Also perceptions and behavior from the locals towards conservation have changed, they see it as something positive that is important for their future (WWF 2011).

The results from my research showed that fishermen in the project village don't practice harmful fishing activities anymore; at least they say so. It was hard to observe it since I didn't go fishing with them, but I could see for example that they don't use light in the night. Although it would be even hard to practice it because everybody accepts conservation and they want to continue that way. In project village 52% of fishermen said they never see illegal fishing and 43% said they see it rarely. Where in non-project village it's totally opposite situation, 43% said they see it often and 50% all the time (see Table 13). It's hard to really know the level of illegal fishing activities in project village because it's something forbidden, so they can't talk about it openly. Where in non-project village people have nothing to hide, so they can be honest.

Fish collectors play important role in regulating illegal fish practices, because officially they are not allowed to buy small size fish or to collect some species in closed period.

- ***Fishing regulations and fishermen rights***

As described earlier Madagascar's marine policies and legislations were developed very late mainly putting all emphasis on terrestrial ecosystems (Cinner *et al.* 2009). The director of the Marine Institute mentioned that policies didn't change much from 1965; fishing regulations also didn't change

in 40 years due to political crisis. The Fisheries Administration is responsible for that however nothing is changing.

All this and weak institutional capacity, lack of cooperation between fisheries and environmental ministries resulted a situation where there is almost no data available on fish stocks, fish catch, or any socio-economic research (National Marine Ecosystem Diagnostic Analysis 2012). It makes very hard to regulate and control the fisheries without even knowing the change over time. In general fisheries legislations in Madagascar are very weak and not implemented in practice. For example, in non-villages there is non-regulated access to the sea, even if there are legal legislations they are not known or controlled in these remote villages (ASCLME 2012; Le Manach *et al.* 2013; WWF 2007).

The results from my study show that official fishing regulations don't reach small villages in southern Toliara region. The local fishermen do not know them and there is no monitoring or patrolling.

During my visit in the project village Beheloka I had opportunity to translate the local *dina*. It mainly describes forbidden fishing materials and techniques, threatened species, and restrictions on fishing. For example, it is forbidden to use poisonous trees, fishing with light in the night, using very big nets (connecting few nets), using nets with small holes. If someone in the village has visitors they take responsibility for their guests. The *dina* also describes closure period for fishing for some species (lobster, octopus, kingfish). It is forbidden to catch, sell or buy sea turtle. If someone visiting in the village will catch sea turtles they will be banished from the village and reported. It is also not allowed to touch or destroy coral reef. For breaking any of the rules a person will have to pay a fine.

It would be normal to think that with the new changes regarding fishing rules and restrictions local fishermen in the project village would feel that they lost their rights for the sea. However, asked few times (with control questions) they didn't experience that they lost any rights. Probably, because they felt that they took part in all decisions from the beginning. 100% of fishermen form project village agreed that they have enough rights for the sea, and 96% said they prefer to have conservation and rules instead of non-regulated access to the sea how it was before the project. If conservation is managed well, with involvement of local communities, not necessarily local people loose their rights. If the people agree with sustainable management of natural resources it can be beneficial for both people and biodiversity

- ***Environmental education and awareness***

It's not only that WWF fisheries management project introduced marine protected area and some restrictions on fishing. Most importantly the project provided knowledge and trainings to fishermen that have very low education level and no other possibilities to learn about management or dynamics of the sea. Most of these fishermen never went to school. It would be embarrassing for them to go to school because school is for children, but now they have a change to learn something new. The WWF project provided training sessions in leadership, advocacy, simplified management, conservation and awareness raising techniques to the leaders of committees and teachers from primary and secondary schools (WWF 2011).

One of the biggest differences that came to my attention between the project and the non-project villages is their understanding and perceptions about the environmental issues. For example, in the non-project villages they don't even see destructive fishing activities (using poisonous trees, destroying coral reef, catching small fish) as a problem or something that could affect negatively future marine resources. In the project villages they seem to understand the importance of conservation. But almost everybody, even fishermen who are not in CBOs, they still explain how conservation is important if they want to have fish in the future. Education is one of the most powerful tools in changing people's perceptions and habits. In time changed perceptions can impact our choices and behavior, leading to stopping harmful activities for example.

Interesting to note that education level is higher in the project village than in the non-project village (see Table 4). This probably also plays an important role understanding why conservation is important and behavior change.

- ***Improvements for the environment***

The WWF evaluation showed that in project villages there have been some improvements on the health of the reef ecosystem, for example the appearance of some fish species like Angarera (*Haemulidae*), Atendro (*Liza macrolepsus*), Ambatsoy (*Serranidae*), Lovo (*Serranidae*), Fianakoho (*Chaetodontidae*). Overall conservation efforts of the project should make a positive impact on

biodiversity. For example fishing restrictions or fish collectors not even collecting small size fish or specific species during closure period (e.g. octopus, lobster) (WWF 20011).

Probably all of this was the reason for very different findings from both villages in my study. In the project villages fishermen described much better conditions of the coral reef (88% said improved), fish abundance (73% improved), fish species diversity (64% improved), seawater quality (46% improved). In non-project village fishermen didn't see much change, coral reef (67% no change), fish abundance (50% no change), fish species diversity (86% no change), seawater quality (100% no change) (Table 14 and table 15). However, it's hard to know how honest were fishermen in answering these questions. Maybe they are afraid to tell the truth in the project village because I am an outsider or they could lose benefits the project, maybe in the non-project village fishermen don't care so they are totally honest. But one is clear, fishermen in the non-project village also want to have conservation and *dina* in their village. Staying with fishermen family for few weeks in their house helped me to gain their trust and acceptance. My perception was that people in the project villages were very honest and open.

- ***Women's empowerment***

In the last years there have been some positive changes regarding women becoming more and more independent in the project villages. The project created women associations in the village brought a real change. Traditionally women do not go fishing themselves, only collecting small fish, shells and seaweed on the coast, which doesn't generate much income. Creating extra income possibilities is crucial in such areas. Many women managed to start their own small business, for example, opening a coffee shop, buying scales so they can become fish collectors. They buy fish from fishermen on the beach that just come from the sea and sell it to fish collecting company that comes once a day to the village, making a little income. The WWF project also introduced algae farming and sea cucumber collection that is new to the area. Women received training and materials to start this activity.

96% of correspondents in project village mentioned women are more independent now, and 82% said they have more rights. Even though it was answered by husbands during the survey, from focus group with women I came to the same conclusions. Women being able to generate some income

naturally become more independent. Women are happy about it, but also are the husbands. Additionally, because of the possibility to get water from water desalination building in the project village, women have more time to spend on the household or income activities.

6.3 Private fish collectors

During my field study I experienced some difficulties getting any data from fish collecting company Copefrito, quite obviously there was lack of cooperation.

Fish collecting companies play an important role in local villages in Southern Toliara. Since these villages are very remote (approximately 9-11 hours drive one way from Toliara) there are no other opportunities for local fishermen to sell fish unless collectors come to the village. The Copefrito comes everyday to the project villages to collect the fish. It is the largest seafood collector and exporter company in south-west of Madagascar.

The WWF fisheries management project established collaboration with Copefrito to improve the communication system between fishermen and collectors. The WWF also initiated algae farming activities for women in project villages. They organized logistics, material supplies to start up the activity, and arranged feasibility studies. Copefrito provided technical support, trainings for local people, and afterwards collection of the product. Trained algae farmers have to sign a contract with collector to ensure the sustainability of this activity. The data received from WWF shows that in 2013 in Beheloka village the Copefrtio collected at least 1096 kg of algae (paying 0.15USD for kg). The WWF receives some data on fish and other marine products from Copefrito, however the cooperation is not very friendly.

Since Copefrito is the biggest private collector company in the region they can easily regulate the prices for fish. Local fishermen in study area receive 3 times less for fish than what they would get selling it in Toliara (because it is very remote villages and Copefrito is interested to keep the price low). The local fishermen are aware of that but they don't have a choice.

While visiting Copefrito and talking to director of the company I was very disappointed because they fail to present any statistics or data on fish catch, as well as, to answer any important questions. Probably the Copefrito doesn't want to reveal how much they are paying to local fishermen in study area. They want to control the market and don't want others to know how much they are paying for

fish. Additionally, in case they are buying forbidden fish species in closure period, any provided data could reveal that. The state Fisheries Administration stated that the Copefrito company falsifies the statistics of the annual fish catch to benefit from it, but there is not much they can do to private company. During my visit I felt like they are hiding something and don't want to cooperate. WWF staff mentioned that collaboration between them and Copefrito is very complicated. For example, the Copefrito didn't want to provide villagers with material during the algae farming introduction, they believed that the WWF had to provide it.

6.4 The importance of the local dinas

Dina showed to be very powerful and useful tool to include local communities in nature conservation in the project villages. It is a link between local fishermen and the authorities. It is especially efficient in remote villages where use or natural resources is almost impossible to control. The traditional fishermen accept *dinas* because they wrote the regulations themselves. As one fisherman expressed himself: "if *dina* would be coming from the office in Toliara (big town), we wouldn't accept it". According to them now they have an order in the village, it protects their natural resources from destruction, but also don't allow newcomers to exploit it. If somebody doesn't follow local *dina* everybody in the village would know about it and one could lose the opportunity to stay in fishermen association or ability to join one, plus one would have to pay a fine. Fine is an official punishment for breaking the *dina*, however not many has paid these fines. The question is, how much they do practice it in reality? However all fishermen had very positive feedback towards *dina*. Fishermen from non-project village said they want to have *dina* in they village as well because they sow the benefits of it in project villages.

The study from Rakotoson and Tanner (2006) in Nosy Ve, north from Toliara (far from project zone) showed that even if local *dina* intends to protect marine resources, yet it doesn't always include all relevant Malagasy law, even if normally the local *dinas* are created according to national legislations. For example, there is a common law that doesn't allow use of fishing nets with holes size smaller than 25mm, however in local *dina* from Nosy Ve it is not included. The *dina* is an additional source of law, which may not include all aspects of current national law. However since it is social local law fishermen first of all know about it, and second of all accept it. According to 1996 Law,

which established community management of natural resources, the government granted management rights to Vezo fishermen who depend on fish resources (Rakotoson & Tanner 2006).

6.5 Negative impacts of the WWF project

Nature conservation projects involving local communities participation might have many challenges on the way. It involves a lot of people, a lot of arrangements, and a lot of new changes for the communities. Sometimes it might not be so easy for traditional communities to change. I would like to look at the negative impacts of the WWF fisheries management project.

Restrictions and limitations on fishing

One of the main unintended negative impacts of the project to local fishermen are restrictions and limitations on fishing. Because of the conservation in the area fishermen can't practice harmful fishing activities anymore and there is closed period for fishing. However, it didn't seem to be a problem in any visited project villages. In the end, all this restrictions are for the benefit of local people and sustainability of marine resources. Conservation is like an investment in the future, it requires some sacrifices or limitations on natural resources use in the beginning but in long term it normally pays off.

New power structures and distribution

The project also introduced new power structure in the village. With creation of new CBOs a lot of new leadership positions were created (presidents or managers of CBOs) in addition to traditional system (village chief or village mayor). This can create conflicts for power in the community. I didn't see any indications during my study that this is the case. However, due to short stay I could have missed some important power dynamics in the village.

Nevertheless I noticed that different benefit distribution between the tribes (fishermen and farmers) created some anger in farmers' tribe, that they are not equally included in project activities.

6.6 Conclusions

The overall purpose of this study was to identify the role of conservation and community based management for improvements of local people's livelihoods, and to see if community approaches for conservation really works. This study is from isolated tribal communities, which totally depend on marine resources for their livelihoods. Sustainable use of their resources depends on the decisions they make today in their local *dinas*.

Some studies and projects show that in some circumstances, when projects are mismanaged or power misused, local people are the most vulnerable in losing their rights and access to natural resources, which they depend upon. For example, there are cases from Tanzania where wildlife and marine 'community-based' conservation projects led to forms of 'green' or 'blue' grabbing (Benjaminsen & Bryceson 2012). On the other hand, there are studies that show that community-based natural resource management can be successful for conservation and also for livelihood improvement. Well-known examples are CAMPFIRE program in Zimbabwe and Namibia's Communal Wildlife Conservancies (Frost & Bond 2007; NACSO 2013). These are good examples showing that community approaches for conservation can work and that local people benefit when they become custodians of the resources, which are important for their livelihoods.

Why can in some cases community-based conservation be a disaster whilst in other cases it can be a great success? Every case is unique and specific. The WWF fisheries management project in Madagascar is a great example of successful community based natural resource management combined with conservation.

Important reasons for success in this project are the interventions being completely accepted by the local communities. Their full participation via the WWF project was leading up to conservation and sound management from the beginning. First of all, restoring and introducing the traditional decision making system of local *dinas* as a marine resource management tool was very important. In addition, the WWF project provided much needed education and training related to sustainable use of natural resources vital for local peoples livelihood. Local marine protected areas, seasons closed for fishing, etc. were introduced and accepted. Via relevant education and training local people now understand and appreciate why it is important to protect natural resources for themselves and for future generations. Benefits from conservation must be immediate and significant.

The study shows that local people are motivated to participate – leading to behavior change and decrease in illegal fishing practices. Even though some restrictions and rules on fishing were introduced, the local fishermen accepted them because it was felt that they were the ones who had the rights to decide, which made them very proud. The *dinas* and associated conservation activities made the community stranger and more united.

However, the study also showed striking differences between villages where WWF had worked and the non-project villages. In the non-project villages without *dinas* and where no education and training related to sustainable use of natural resources was available, fishermen still practice illegal fishing activities and don't even understand why conservation is important for their future.

In order to improve the livelihoods of these communities, it is important to diversify livelihood and income opportunities. This is already happening to some extent, e.g. women's roles in algae farming and sea cucumber trading. Including all stakeholder groups and especially the most vulnerable ones is important. Better collaboration between fish collectors and fishermen could increase benefits for fishermen (e.g. stabilizing fish prices). The possibility for local fishermen to bring fish to town markets themselves would increase their income. An official database on fish catch could improve regulations of marine resources, harvesting and secure sustainability. New knowledge, more education and good local governance relevant for sustainability of livelihoods for traditional communities can help to change them with the changing world.

REFERENCES

Adams, W.M. (2009) *Green Development: Environment and Sustainability in a Developing World*, 3rd ed., London and New York: Routledge

Adams, W.M. Aveling, R., Brockington, D., Dickson, B., Elliot, J., Hutton, J., Roe, D., Vira, B. & Wolmer, W. (2004) 'Biodiversity Conservation and the Eradication of Poverty', *Science*, Vol. 306, (5699) pp. 1146-1149

ASCLME (2012) *Madagascar: National Marine Ecosystem Diagnostic Analysis.* Contribution to the Agulhas and Somali Current Large Marine Ecosystems Project (supported by UNDP with GEF grant financing). Unpublished report. [Online], Available at http://www.asclme.org/reports2013/National%20MEDAs/MEDA%20Madagascar/_MadagascarMEDAProof.pdf, (Accessed: October 11, 2014)

Ashley, C. & Hussein, K. (2000) 'Developing Methodologies for Livelihood Impact Assessment: Experience of the African Wildlife Foundations in East Africa', *Sustainable Livelihoods*, Working Paper 129, UK: Overseas Development Institute

Astuti, R. (1995) 'The Vezo are not a Kind of People. Identity, Difference and 'Ethnicity' among a Fishing People of Western Madagascar', *American Ethnologist*, 22 (3), pp. 464-482

Bell, J. (2005) *Doing your Research Project. A Guide for First-time Researchers in Education, Health and Social Science*. 4th edition. UK: The Bath Press

Benjaminsen, T.A. & Bryceson, I. (2012) 'Conservation, Green/Blue Grabbing and Accumulation by Dispossession in Tanzania', *The Journal of Peasant Studies*, 39:2, pp. 225-355

Berg, B.L., & Lune, H. (2012) *Qualitative research methods for the social sciences*. 8th edition, USA: Pearson International

Bille, R., Lapeyre, R. & Pirard, R. (2012) 'Biodiversity conservation and poverty alleviation: a way out of the deadlock?', *S.A.P.I.E.N.S* 5.1, Vol. 5 (1) [Online], Available at http://sapiens.revues.org/1452, (Accessed: December 11, 2013)

Brechin, R.S., Wilshusen, P.R., Fortwangler, C.L. & West, P.C. eds. (2003) *Contested Nature: Promoting International Biodiversity Conservation with Social Justice in the Twenty-first Century*, London: Earthccan

Brockington, D., Igoe, J. & Schmidt-Soltau, K. (2006) 'Conservation, Human Rights, and Poverty Reduction' *Conservation Biology*, Vol. 20, No. 1, pp. 250-252

Campbell, J. & Townsley, P. (2013) Biodiversity Conservation and Poverty Alleviation: Exploring the Evidence for a Link, *in:* D. Roe, J. Elliott, C. Sandbrook & M. Walpole eds., *Biodiversity and Poverty in Coastal Environments, in Biodiversity Conservation and Poverty Alleviation: Exploring the Evidence for a Link*, Great Britain: John Wiley & Sons, pp. 100-113

Carney, D. ed. (1998) *Sustainable Rural Livelihoods: What Contribution can we make?* London: DFID

CBD, Convention on Biological Diversity (2012) *Ecosystem Approach*. [Online], Available at: https://www.cbd.int/ecosystem/ (Accessed: May 07, 2015)

CBD, Convention on Biological Diversity (2008) 'Conference of the Parties to the Convention on Biological Diversity', *COP 9 Decision IX/18*, Bonn

CEPF Critical Ecosystem Partnership Fund (2014) Ecosystem Profile: Madagascar and Indian Ocean, Final Draft for Submission to the donor Council English Version, [Online], Available at: http://www.cepf.net/SiteCollectionDocuments/madagascar/EcosystemProfile_Madagascar_EN.pdf, (Accessed: October 11, 2014)

CEPF Critical Ecosystem Partnership Fund (2004) *Portfolio Review, Madagascar. Madagascar and Indian Ocean Islands Biodiversity Hotspots*. [Online], Available at http://www.cepf.net/Documents/final.madagascar.portfolioreview.pdf, (Accessed: May 07, 2015)

Cinner, J.E., Wamukota, A., Randriamahazo, H. & Rabearisoa, A. (2009) 'Toward Institutions for Community-based Management of Inshore Marine Resources in the Western Indian Ocean'

Marine Policy 33, pp. 489-496

Cripps, G. (2010) *Feasibility Study on the Protection and Management of the Barren Isles Ecosystem, Madagascar*. Blue Ventures Conservation Report

DFID, Department for International Development (1999) *Sustainable Livelihoods Guidance Sheets*. [Online], Available at: http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf (Accessed: May 07, 2015)

Dudley, N. ed. (2008) *Guidelines for Applying Protected Area Management Categories*. Switzerlans: IUCN

Estrella, M. & Gaventa, J. (1998) 'Who Counts Reality? Participatory Monitoring and Evaluation: a Literature Review, *IDS Working Paper 70*. Brighton: IDS

Fabricius, C. & Collins, S. (2007) 'Community-Based Natural Resource Management: Governing the Commons', *Water Policy* 9, Supplement 2, pp. 83-97

FAO (2004) *Review of the State of World Marine Capture Fisheries Management: Indian Ocean,* prepared by Soumy, M. [Online], Available at: http://www.fao.org/docrep/009/a0477e/a0477e0x.htm#TopOfPage (Accessed: May 07, 2015)

FAO (Food and Agriculture Organization) (2002) *The State of the World Fisheries and Aquaculture*, Rome: FAO

Ferraro, P.J., Hanauer, M.M. & Sims, K.R.E. (2011) 'Conditions Associated with Protected Area Success in Conservation and Poverty Reduction', *PNAS*, 108 (34) pp. 13913-13918

Fritz-Vietta, N. V. M., Ferguson, H. B., Stoll-Kleemann, S. & Ganzhorn, J. U. (2011) Conservation in a Biodiversity Hotspot: Insights from Cultural and Community Perspectives in Madagascar, *In*: F. E. Zachos & J. C. Habel eds., *Biodiversity Hotspots*, Springer Berlin Heidelberg, pp. 209-233 [Online], Availabe at http://link.springer.com/chapter/10.1007/978-3-642-20992-5_12# (Accessed: May 07, 2015)

Fritz-Vietta, N.V.M, Rottger, CH. & Stoll-Kleemann, S. (2009) 'Community-based Management in two Biosphere Reserves in Madagascar – Distinctions and similarities: What Can Be

Learned from Different Approaches?' *Madagascar Conservation & Development*, Vol. 4 (2), pp. 86-97

Frost, P.G.H. & Bond, I. (2007) The CAMPFIRE in Zimbabwe: Payments for wildlife services, *in:* S. Wunder, S Engel & S. Pagiola eds., Ecological Economics: *Payments for Environmental Services in Developing and Developed Countries*, Amsterdam: Elsevier B.V. pp. 776-787

Garder, C.J., Nicoll, M.E., Mbohoahy, T., Oleson, K.L.L., Ratsifandrihamanana, A.N., Ratsirarason, J., Rene de Roland, L., Virah-Sawmy, M., Zafindrasilivonona, B. & Davies, Z.G. (2013)'Protected Areas for Conservation and Poverty Alleviation: Experiences from Madagascar' *Journal of Applied Ecology*, Vol. 10, pp. 1365-2664

Gibbs, G. (2007) *Analyzing Qualitative Data. The SAGE Qualitative Research Kit*, UK: MPG Printgroup

Gough, C., Harris, A., Humber, F. and Roy, R. (2009) *Biodiversity and Health of Coral Reefs at Pilot Sites; South of Toliara WWF Marine Resource Management Project MG 0910.01*, Blue Ventures Conservation Report

Govan, H. et al. (2009) *Status and Potential of Locally-Managed Marine Areas in the South Pacific: Meeting Nature Conservation and Sustainable Livelihood Targets through Wide-spread Implementation of LMMAs*. SPREP/WWF/World Fish-Reef base/SRISP

Hanski, I., Koivulehto, H., Cameron, A. & Rahagalala, P. (2007) 'Deforestation and Apparent Extinctions of Endemic Forest Beetles in Madagascar', *Biology Letters*, Vol. 3 (3), pp. 344-347

Hoegh-Guldberg, O. (1999) 'Climate change, coral bleaching and the future of the world's coral reefs', *Marine and Freshwater Research* Vol. 50 (8), pp. 839–866

Hughes, T.P. et al. (2003) 'Climate Change, Human Impacts, and the resilience of Coral Reefs', *Science* Vol. 301 (5535), pp. 929-933

Hulme, D. & Murphree, M. eds. (2001) *African Wildlife & Livelihoods: The Promise & Performance of Community Conservation*, Great Britain: James Currey Ltd

Hutton, J., Adamns, W.M. & Murombedzi, J.C. (2005) 'Back to Barriers? Changing Narratives in

Biodiversity Conservation', *Forum for Development Studies*, No. 2, pp. 342-370

IIED International Institute for Environment and Development (2004) *The Millennium Development Goals and Conservation Managing Nature's Wealth for Society's Health*, edited by Roe, D., London: Russel Press

IUCN, International Union for Conservation of Nature (2013) *What is a Protected Area?* [Online], Available at: http://www.iucn.org/about/work/programmes/gpap_home/pas_gpap/ (Accessed: May 07, 2015)

Jones B. (2012) *Socio-Economic Monitoring: A Baseline Assessment of the Fishing Villages of the Kirindy-Mite MPA*, Blue Ventures Conservation Report

Laroche, J. & Ramananarivo, N. (1995) 'A Preliminary Survey of the Artisanal Fisheries on Coral Reefs of the Tulear Region (Southwest Madagascar)' *Coral Reefs*, Vol. 14, pp. 193-200

Leisher, C., van Beukering, P. & Scherl, L.M. (2007) 'Nature's Investment Bank: How Marine Protected Areas Contribute to Poverty Reduction', *The Nature Conservancy*. [Online], Available at: http://www.nature.org/initiatives/protectedareas/files/mpa_report.pdf (Accessed: October 11, 2014)

Le Manach, F., Andrianaivojaona, Ch., Oleson, K., Clausen, A. & Lange, G. (2013) *Natural Capital Accounting and Management of the Malagasy Fisheries Sector, A Technical Case Study for the WAVES Global Partnership in Madagascar*, The World Bank

Logan, B.I. & Moseley, W.G. (2002) 'The Political Ecology of Poverty Alleviation in Zimbabwe's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE)', *Geoforum*, Volume 33, Issue 1, pp. 1-14. [Online], Available at: http://www.sciencedirect.com/science/article/pii/S0016718501000276# (Accessed: May 07, 2015)

Malleret-King, D., Glass, A., Wanyonyi, I., Bunce, L., Pomeroy, B. (2006) *Socio-economic Monitoring guidelines for coastal managers of the Western Indian Ocean*, SocMon WIO. CORDIO East Africa publication (Version 1)

Myers, N., Mittermeier, R.A., Mittermeier, C. G., da Fonseca, G.A.B. & Kent, J. (2000) 'Biodiversity hotspots for conservation priorities', *Nature* (403) pp. 853–858

NACSO (2013) *Namibia's Communal Conservancies: A Review of Progress and Challenges in 2011*, Windhoek: NACSO

Narayan, D., Chambers, R., Shah, M.K. & Petesch, P (2000) *Voices of Poor. Crying Out for Change*. Berlin: Oxford University

Newing, H., Eagle, R. & Watson, C.W. (2011) *Conducting Research in Conservation. A Social Science Perspective*, London and New York: Routledge

NORAD Norwegian Agency for Development Cooperation (2007) *Norwegian Aid Works – but not well enough. The Results of Norway's International Development Cooperation*, Norway

NORAD Norwegian Agency for Development Cooperation (2011) *Norad's Strategy towards 2015: Results in the Fight against Poverty,* Norway

NORAD Norwegian Agency for Development Cooperation. *Norwegian Aid Statistics*. 2013 [cited October 15, 2014]. Available at http://www.norad.no/en/tools-and-publications/norwegian-aid-statistics

Pedersen, E. K. & Pedersen, M. L. (2010) *The Sustainable Livelihood Approach, From a Psychological Perspective*. Denmark: University of Arhus

Rakotoson, L. R., & Tanner, K. (2006) 'Community-based Governance of Coastal Zone and Marine Resources in Madagascar' *Ocean & Coastal Management*, Vol. 49, pp. 855–872 [Online], Available at http://www.sciencedirect.com/science/article/pii/S0964569106001141, (Accessed: October 15, 2014)

Rasambainarivo, J.H & Ranaivoarivelo, N. (2006) *Madagascar: Country Pasture/Forage Resource Profiles*, Food and Agriculture Organization of the United Nations (FAO): Rome

Roe, D., Elliott, J., Sandbrook, Ch. & Walpole, M. eds. (2013) *Biodiversity Conservation and Poverty Alleviation. Exploring the Evidence for a Link.* Conservation Science and Practice, No. 12, UK: John Willey & Sons

Roe, D. & J. Elliott (2005) *Poverty-Conservation Linkages: A Conceptual Framework*. London: Poverty and Conservation learning group, IIED

Scales, I.R. ed., (2014) *Conservation and Environmental Management in Madagascar*, USA: Routledge

Scherl, L.M., Wilson, A., Wild, R., Blockhus, J., Franks, P., McNeely, J.A. & McShane, T.O. (2004) *Can Protected Areas Contribute to Poverty Reduction? Opportunities and Limitations*. Gland, Switzerland and Cambridge, UK: IUCN

Schreckenberg, K., Camargo, I., Withnall, K., Corrigan, C., Franks, P., Roe, D., Scherl, L.M. & Richardson, V. (2010) *Social Assessment of Conservation Initiatives: A review of rapid methodologies*, Natural Resource Issue No. 22. London: IIED

Secretariat of the Convention on Biological Diversity (2010) *Linking Biodiversity Conservation and Poverty Alleviation: A state of Knowledge Review*, Canada: CBD Technical Series No. 55

Suich, H. (2012) *Conceptual Framework: Poverty*. Directorate of the Ecosystem Services for Poverty Alleviation (ESPA). [Online], Available at: http://www.espa.ac.uk/files/espa/ESPA-Poverty-Framework.pdf (Accessed: October 11, 2014)

UNDP United Nations Development Programme (2013) *Human Development Report 2013, The Rise of the South: Human Progress in a Diverse World*. New York: United Nations Development Programme

Vihemaki, H. ed., (2007) *Contextualizing Natural Resource Management in the South*, Helsinki: Interkont books, [Online], Available at: http://www.valt.helsinki.fi/kmi/english/publications.htm, (Accessed: October 11, 2014)

Westernam, K., Oleson, K.L.L. & Alasdair, R.H. (2013) 'Building Socio-economical Resilience to Climate Change through Community-Based Coastal Conservation and Development: Experiences in Southern Madagascar' *Western Indian Ocean J. Mar. Sci*. Vol.11, No. 1, pp. 87-97

Will, R.T., Brandon, K., Brooks, T.M., Gascon, C., Gibbs, H.K., Lawrence, K.S., Mittermeier, R.A., & Selig, E.R. (2012) 'Global Biodiversity Conservation and the Alleviation of

Poverty', *BioScience* 62 (1) pp. 85-92

World Bank (2009) *Handbook on Poverty and Inequality*, prepared by Haughton, J. & Khanker, S. R. Washington: The International Bank for Reconstruction and Development/The World Bank

World Commission on Environment and Development (1987) *Our Common Future*. Oxford: Oxford University Press

WWF (2011) *Southern Toliara Marine Natural Resources Management Final and External Evaluation Report*, prepared by PhD Ranaivomanana, L. WWF-Norway

WWF (2007) *Southern Toliara Marine Natural Resources Management Proposal for Annual Plan*, WWF-Norway

APPENDIXES

Appendix 1 – The survey

Date of survey
Household number
Village name

0. Main materials of the house recorded without asking

A.	WALLS	B.	ROOF
1	Bamboo	1	Bamboo
2	Wood	2	Wood
3	Corrugated iron	3	Corrugated iron
4	Brick/cement	4	Brick/cement
5	Other, specify	5	Other, specify

Section 1: Household

1. Members of household

No	1. Gender	2. Age	3. Education	4. Years in school	5. Occupation	6. Second work
1						
2						
3						

No 3: 1-No schooling, 2-Primary, 3-Secondary, 4-University, 5-Other(specify)

Section 2: Income

2. What is your (all) family's major activities and average source of income?

	Activity	Amount MGA	Unit: 0-week, 1-month, 2-year
1			
2			
3			

3. Did your income in general changed after the project (5 years ago)? (one answer)

1. Income increased a lot	2. Income increased a bit	3. Didn't change	4. Income decreased a bit	5. Income decreased a lot

4. Please indicate your family's average expenses.

	Cost category	Amount MGA	Unit: 0-week, 1-month, 2-year
1	Food		
2	Fuel, batteries		
3	Housing (rent, cleaning materials)		

4 School fees
5 Transport
6 Water
7 Fishing gear
8 Luxury goods
9 Clothes
10 Other (specify) (alcohol, medicine)

Section 3: Luxury goods

5. Could you indicate whether your household has the following items [a], and if yes, when you obtained these [b]?

		a. Present in the household 0 = No, 1 = Yes	b. How long ago purchased (Years)
1	Running water inside the house		
2	Electricity		
3	Radio		
4	TV		
5	Watch or clock		
6	CD player		
7	Boat without motor (how many do you have?)		
11	Generator		
12	Furniture		
10	Mobile phone		
11	Other luxury goods (specify)		

6. Can you effort to buy more luxury goods now than before the project (5 years ago)? (Choose one answer)

1. Strongly agree	2. Slightly agree	3. Slightly disagree	4. Strongly disagree	5. Didn't change

Section 4: Fish catch

7. How much in general do you collect fish or sea food per day? Is there any season?

8. Compared to 5 years ago or after the project did the fish catch changed?

1. I catch less fish	2. I catch the same amount of fish	3. I catch more fish	4.	5.

9. What fishing techniques do you use?
10. Did fishing techniques changed after the project? Do you use the same fishing

techniques?

11. How often do you fish or collect seafood? How many hours? (Choose one answer)

1. Every day
2. Every two days
3. Every three days
4. Once a week
5. Twice a week
6. Every two weeks
7. Once a month
8. Never

12. Can you indicate 1st and 2nd most important reasons why you go fishing?

	a. 1st most important	b. 2nd most important
1. I enjoy fishing		
2. I really need the fish to feed my family		
3. I need the money from the fish I sell		
4. Tradition: my family has always fished. Fishing is my life!		
5. Nothing else to do for living here		
6. Other, specify		

13 do you catch/ have enough fish?

14. Have fishing or collecting seafood became easier or more difficult to practice since the last five years, or has there been no change? (Choose one answer)

1. Fishing has become easier	2. No change	3. Fishing has become more difficult

15. What do you think is the main reason for this change? Please indicate the 1st most and 2nd most important reasons.

	a. 1st most important	b. 2nd most important
1. Because fishing availability has changed (quantity and size)		
2. Because I am more/less efficient		
3. Because there are much more fishermen now (competition)		
4. Because I use better/worse materials or techniques		
5. Because fishing areas are depleted/in better condition now		
6. Because I can/can't effort to buy more fishing equipment		
7. Other, specify		

16. Can you indicate to what extent you agree or disagree with each of these statements

	Tick one option for each statement	0	1	2	3
1	There is more fish in the see after the project (compared to 5 years ago)				
2	There is less fish in the see after the project (compared to 5 years ago)				

Unit: 0 - Don't know; 1 – Disagree; 2 – Neutral; 3 - Agree

17. Do you agree about rules about fishing and conservation of the sea, or you prefer total freedom for fishing?

Section 5: Education

18. Do all the children between the age of 6 and 15 in your household attend school? And, if not, why not?

1 Yes, they all go to school
2 No, because we cannot afford the school fees
3 No, because we need the children to help out at home/at work
4 No, because the school is too remote
5 No, other reason (specify)

19. Would you prefer your children to be fishermen or go to school?

20. Statements on Education: Can you indicate to what extent you agree or disagree with each of these statements compared to before the project (5 years ago)?

	Tick one option for each statement	0	1	2	3
1	It has become easier for our children to go to school				
2	We are now better able to afford school fees				
3	My family has learned new and practical skills to earn an income (about marine resources)				
4	It is important for my children to attend school				
5	My children have become more aware about our culture and traditions				
6	The chance of going to school is the same for boys and girls				

Unit: 0 - Don't know; 1 – Disagree; 2 – Neutral; 3 - Agree

Section 6: Environmental awareness and actions

21. Do you know about Dina? Who made it?

22. How often do you encounter people using illegal fishing practices (for example poisonous trees, fishing in marine reserves, etc or find evidence that people have recently used illegal practices in the area? [*Choose only one*]

1 Regularly
3 Rarely

2 Occasionally 4 Never [*skip following question*]

23. How is illegal fishing compared to before the project (5 years ago)?

1 Decreased substantially 4 Increased somewhat
2 Decreased somewhat 5 Increased substantially
3 Remained the same 6 Don't know

24. In your opinion, how has the quality of the following components of the marine environment in your area changed during the last 5 years?

	1. Increased	2. Remained stable	3. Decreased	4. Don't know
1 Live coral abundance				
2 Fish abundance, availability				
3 Fish size				
4 Fish species diversity				
5 Water quality				
6 Possibility to sell fish				
7 Price for fish				

Section 7: Alternative livelihoods

25. Comparing to before the project (5 years ago) and now, is there any change in natural resources and sea management?

1. Managed worse now	2. No change	3. Managed better	4. Don't know

26. Do you think community is stronger and united with Dina or not?

Section 8: Community participation and rights

27. Please indicate if you ever participated in any community meeting related to marine natural resources management or reef in general?

YES……. NO…….If YES how many times?.....
What kind of meeting…….

28. Are you members of any community associations? Which?

29. Please indicate to what extent do you agree or disagree with each of these statements compared to before the project (5 years ago)?

	Tick one option for each statement	0	1	2	3
1	I feel that now we participate more in marine resources management and decision making				
2	There are too many rules for fishing, I would like to have less				
3	We were not involved in managing marine resources before				
4	It is better to have no rules for fishing and no protection				
5	Future marine resources depend on how we fish/manage today or on the sea?				
6	Do you have enough rights for the sea?				
7	Do you agree that coral reef protects coast from waves and destruction?				

Unit: 0 - Don't know; 1 – Disagree; 2 – Neutral; 3 - Agree

Section 9: benefits to women

30. Please indicate to what extent do you agree or disagree with each of these statements compared to before the project (5 years ago)?

	Tick one option for each statement	0	1	2	3
1	There are more benefits to women now				
2	Women have more rights				
3	Are they more or less independent				
4	Women can produce more income (does your wife makes an income?)				

Section 10: Health and Diet

31. How often does your family eat fish and meat?

	1. Every day	2. Every two days	3. Every three days	4. Once a week	5. Every two weeks	6. Once a month	7. Never
Fish							
Meat							

32. Do you have any food shortage now and 5 years ago?

33. Did your family's fish/seafood diet changed after project started (5 years ago)?

1. Eat less fish	2. No change (skip following question)	3. Eat more fish	4. Don't know

34. What is the 1st most important and 2nd most important reason that your family's diet of fish/seafood had changed?

	a. 1st most important	b. 2nd most important
1. We get more/less fish		

2. Price for fish decreased/increased
3. We changed eating habits (other food)
4. Its harder … to fish
5. We have to sell more/less fish

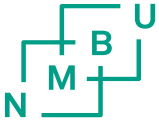
35. Statement on Health: Can you indicate if there is any change in this areas?

	Tick one option for each statement	**0**	**1**	**2**
1	The availability of food/fish			
2	Your family access to medical services and hospitals			
3	The health of your family			
4	The variety of your daily meals			
5	Water supply and cleanness			
6	Access to markets			
7	Sanitation (toilets, etc.) **(Do you have a toilet?)**			

Unit: 0 – Worse; 1 – No change; 2 – Better;

36. How did the project in general affect your life?

1. Influenced positively 2. Influenced negatively 3. Didn't influence at all 4. Don't know



Norwegian University
of Life Sciences

Postboks 5003
NO-1432 Ås, Norway
+47 67 23 00 00
www.nmbu.no