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# DIPLOMARBEIT

Titel der Diplomarbeit

„Rural Water Management in Papua New Guinea –  
Expectations towards Implementing Bodies“

Verfasserin

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angestrebter akademischer Grad

Magistra (Mag.)

Wien, 2013

Studienkennzahl lt. Studienblatt:

A 057 390

Studienrichtung lt. Studienblatt:

Individuelles Diplomstudium Internationale Entwicklung

Betreuerin ODER Betreuer:

Univ. Prof. DI Dr. Willibald Loiskandl

Gefördert von der Universität Wien



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## Acknowledgements

Above all, I want to thank my wonderful parents for their tremendous encouragement, patience and motivation, but most of all for giving Sam and me such a wonderful, warm home. It is a place which gives you back power and energy and it makes you feel you can outlive everything. You both keep us grounded and we feel incredibly thankful for your support and love.

Special thanks go to the wonderful NARI team. Without their great support and assistance the whole research stay would not have been possible. I also would like to thank my supervisor Dr. Loiskandl and also Dr. Ruffeis for their advices and wonderful support. The many fruitful discussions we had, not only enriched my thesis immensely, but also me personally and professionally.

I am very grateful for each and every one of the Kopafu and Kerepia Community for their great efforts and incredible openness. You made me feel like being part of the community and you let me be part of your families, too. Your strong bonding within the community should be a role model for many western-style families. Thanks for spending your time with me and making this thesis possible.

However, without friends life is not complete. And without my wonderful friends all around me, I do not know where I should have taken the power from. Your encouragement and kind, supporting words made me so often feel incredibly fortunate. Kapo, you know you are more family than friend and Jana, your support by methodical questions was beyond everything. Kiitos!

Last, but by no means least, Sam and Johannes. Having a big brother is wonderful, but it means nothing compared to having you as a brother. For me your great openness and radiant friendliness have always been pointing the way ahead. You are one of the most important persons in my life and I love you very much! Johannes my heart, I do not know what I would have done the last year without you. Your never ending efforts kept me calm when thoughts ruined my sleep and let me find solutions, even when it seemed that there are none anymore. Your love gives me incredible strength and a great feeling of belonging to someone. No other than you!

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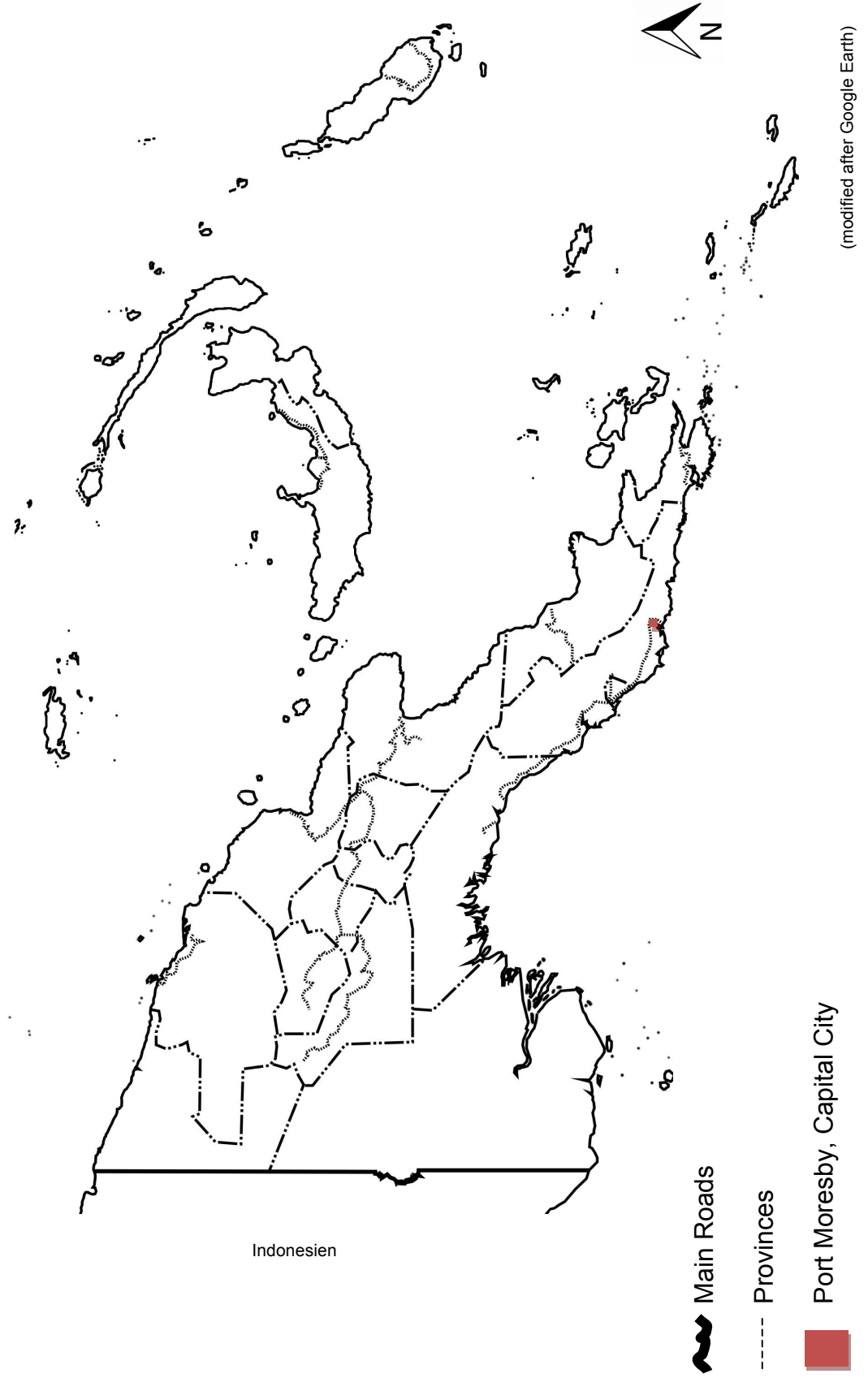
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## Acronyms

ADB	Asian Development Bank
ARD	Agricultural Research for Development
ASTI	Agricultural Science and Technology Indicators
BOKU	University of Natural Resources and Life Sciences, Vienna
BTI	Bertelsmann Transformation Index
CC	Climate Change
DAC	Development Assistant Committee
DARD	Department of Agriculture and Rural Development
DASF	Department of Agriculture, Stock and Fisheries
EU	European Union
FPDA	Fresh Produce Development Agency
GNI	Gross National Income
GNP	Gross National Product
GT	Grounded Theory
GWP	Global Water Partnership
HDI	Human Development Index
IWRM	Integrated Water Resource Management
JICA	Japan International Cooperation Agency
MDG	Millennium Development Goals
MAL	Ministry of Agriculture and Livestock
MP	Prime Minister
NARI	PNG National Agricultural Research Institute
NGO	Non-Governmental Organisation
NZAID	New Zealand Agency for International Development
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PNG	Papua New Guinea
PRA	Participatory Rural Appraisal

RRA	Rapid Rural Appraisal
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WSSD	World Summit on Sustainable Development
WHP	West Highland Province
WHO	World Health Organisation

# Papua New Guinea



# **1. INTRODUCTION**

Climate change has become a highly discussed topic in the development discourse. The imposed risks humanity is facing due to climate change are often devastating, even more so if the people lack sufficient methods and techniques to mitigate the problems. As Courke/Harwood (2009) pointed out, problems caused by Climate Change are not uncommonly a threat to people's livelihoods.

Also the UNDP (United Nations Development Programme) proclaims to integrate climate change and the problems caused by it into national development strategies. It is estimated that an increasing number of development organisations and institutions set their prime objective of development projects to help people mitigate the risks imposed by the climate change (UNDP 2012). This also happens nowadays in Papua New Guinea (PNG), a country suffering from problems caused by climate change in a tremendous way and where the local communities are forced to adapt to changed environmental circumstances (cf. Courke/Harwood 2009: 71f).

## **1.1. RESEARCH INTEREST**

Starting point for this thesis is the "Western Pacific EU ARD Project" implemented by the Papua New Guinea National Research Institute (NARI) in 2011. This program aims to foster adequate technologies for persons living in smallholder farming communities in western pacific countries. One part of the project comprises the melioration of the rural water resource management. The main focus of the research will be towards the water management related tasks performed during the implementation of the project especially in Papua New Guinea.

An important issue is thereby the question of passing down knowledge. Starting from the premise that when problems occurred in former times, men and women would go to the elderly and get advice on what to do. Nowadays, especially the younger generations tend to prefer strategies provided by “western-style” institutions. I argue that the change of passing down knowledge leaves young generations to be on their own when problems occur and can lead to conflicts within the community. Furthermore, it is interesting to know if the presence of development organisations and institutions not only cuts through this knowledge transfer, but also makes the communities dependent on the presence of these organisations and institutions to help when problems occur in general nowadays, as the young generation rather listens to a “western-style” advice than to the elderly in their own community.

Within the communities, NGOs (Non-Governmental Organisations) are often seen as an alternative to the state. Benson (2011) points out that there people in the communities and donor agencies often have different expectations. This mismatch creates problems and the development project cannot finish successfully. I argue that the biggest problems are the high expectations of the local communities towards the implementing organisations to compensate not only for a fatal state but also to know the answer to every problem.

Seeing many development projects being implemented, inhabitants from local communities involved in the project very often seem to adopt to a certain „hand-out-mentality“. The feeling arises that the people of local communities become passive about their problems as, due to the great number of organizations, „someone“ will come and „help“ with their problems anyway. However, not the individuals of the community should be blamed for this phenomenon. It is seen more like a side effect of development cooperation, which not seldom have become a „big business“.

The main focus of the thesis is to understand changes in the perception of water management in two farming communities in PNG due to “western-style” development strategies and thereby aims to analyze societal dynamics and



adaptations caused by the implementation of the “Western Pacific EU ARD Project”.

The aim of this thesis is to work out the main expectations people living in smallholder farming communities in Papua New Guinea (PNG) have towards implementing bodies and especially towards the NARI within the on-going research project. It is not intended to give recommendations towards the implementing body as to how to address those living in the communities. Rather than contributing to verified knowledge, it is the aim to raise awareness of the internal dynamics of certain communities they are working with.

With this background and presumption, the following research questions arise:

## **1.2. RESEARCH QUESTIONS**

- a) Does the community have some special traditional water management strategies? Is there a certain knowledge, which has been passed down from generation to generation and if so, how has this knowledge been passed down? Did the new technologies brought into the country by development agencies dispel traditional ways of water management?
- b) How does the community observe climate change problems? Does the community appoint special watchmen to look for signs of changing climate patterns or for occurring problems which have never been observed in this area before?
- c) How do people in the community and especially the younger generation deal with the clash of traditional knowledge and “western-style” strategies to mitigate climate change related problems? Do people consider NGOs or other organisations and institutions implementing development projects in PNG to be of “western-style”?

- d) As young people within a community are not seeking advice of older people in the community anymore, have they therefore developed incredibly high expectations towards the implementing bodies to compensate for the insufficient service of the government in ensuring adequate living standards?

### **1.3. HYPOTHESES**

Considering the four main research questions, the hypotheses of the theses will be the following:

- a) The communities have special traditions of water use which have been passed on by demonstrating and explaining them to the younger generations. Due to new technologies, these traditional ways of water management have been buried in oblivion.
- b) People in the communities do not know much about the problems caused by climate change. They notice new problems arising, but blame the overall socio-economic situation of Papua New Guinea or a deficiency of governmental service for these problems.
- c) People in the communities, especially young people, are highly affected by “western style” influences. As many development agencies represent the “western style”, young people rather seek the advice of development agencies than that of experienced individuals within the community especially in terms of problem-solving-strategies.
- d) People in the communities have extremely high expectations towards implementing bodies of development projects, as these organisations and institutions compensate for the insufficient service of the government and national structural instability.

## **1.4. STRUCTURE OF THE THESIS**

To answer these research questions and to prove the leading hypotheses, the structure of the thesis will be established as follows. The first chapter will give a theoretical overview of the thematic. This will be managed by first looking at the risen critiques of development cooperation and what possibilities can be noticed to evaluate the success of development cooperation projects. Within this, the different bodies of development-cooperation will be highlighted. This will be followed by an analysis of the “Integrated Water Resource Management” approach as one option to raise awareness of mainstreaming community-based development into the development discourse. It therefore will be also necessary to look at the problems and misperceptions community-based development indicates. Furthermore, before turning to the research results an introduction to the research area, Papua New Guinea will be given. The socio-economic factors as well as a short overview of development cooperation in PNG will be presented. Chapter two closes by looking at water management in PNG and as a leading factor in agriculture and the most important aspects of agriculture in PNG are explained. The research results will be presented in chapter three, along with an introduction to the project and the main implementing body NARI. The concluding chapter will discuss the research results and will also give an outlook for points of interest in prospective researches in this area.

## **1.5. METHODOLOGICAL IMPLEMENTATION**

The following chapter will describe the method used to answer the research questions. It is important to know what lies behind the methodological implementation of this thesis in order to help to understand the whole research sufficiency and to emphasize the difference to other qualitative research methods.

This thesis is not concerned with testing already preconceived theories or concepts, which is normally the case when working with qualitative research methods. The aim is trying to work as closely as possible with the people of the

communities involved in the project. It also means not only to look at what they think, but to look at their actions. Therefore, I want to work with the research methods of Grounded Theory (GT), as Strauss et al. (1996: 92ff) emphasise it. The aim of this method is to generate hypotheses based on revealing the differences and causes of people's actions.

The research approach of Grounded Theory (GT) was developed by Anselm Strauss and Barney Glaser in the U.S. in the 1960s. Of specific characteristic in the GT are the cyclical research and the "theoretical coding". Possible indicators of underlying phenomena will be searched in the data material. In the meanwhile, codes will be matched with the text passages. Later on, the codes will be grouped into categories and connections among themselves will be filtered afterwards. This should reveal a complex network of relationships which will then result in a theory. It is very important not to produce a description of the collected data. The aim is to identify causal relations based on the collected data (cf. Glasser/Strauss 1998: 13ff; Strauss/Corbin 1996: 12ff).

#### **1.5.1. Survey instruments and population**

Grounded Theory does not determine a special method of data collection. According to GT, every kind of data can be evaluated. For the research interest of this thesis, a mix of narrative interviews and observations has been chosen. Observations will give an overview of the existing methods in the local water resource management, will allow working out how the communities deal with the resource water and will show their actual behaviours in their daily routine. The interviews will provide an insight into their mind-sets to therefore draw conclusions about certain patterns of motivation and intentions.

Furthermore, the interviews will hopefully give better answers to the research questions regarding the general perception of problems within the communities. It will be interesting to evaluate how the problems of climate change affect and influence decision-making processes within the communities.

In order to obtain the maximum variation possible in the results, the surveys will be done in communities facing different water problems, respectively. Which factors will really guarantee variation and which aspects will be the leading key points during data interpretation cannot be said beforehand, as it is one of the characteristics of the GT that the data starts to be analysed already during the research stay, as the research focus may shift and further interviews might have to be adapted to these changes (cf. Charmaz 2006: 97).

The narrative interviews will be conducted with various actors of different ages and sexes from the two involved communities. If further details are needed or seem to help to get a better understanding of the situation, other local communities will be consulted. The idea is to take the first interview and start analysing the data right away. It therefore let indicators of phenomena reveal which can be again analysed afterwards.

### **1.5.2. Field Approach and Access**

The survey took place in a two-month research stay in Papua New Guinea. Permission was obtained via the project manager in order to have the possibility of being able to select interviewees differing in age and in gender. If possible, the interviews were conducted in local languages with the support of a person involved in the project.

- The **narrative interviews** will be recorded as audio files and transcribed, using the Grounded Theory methods to evaluate them anonymously afterwards.
- The **Observations** will be noted down in handwritten notes during the whole research stay. Later on, they will be transcribed and analysed according to the GT, as well.

### **1.5.3. Grounded Theory**

#### **Coding**

As mentioned before, “theoretical coding” is one of the specific characteristics of the GT. As Charmaz points it out:

*“Coding means categorizing segments of data with a short name that simultaneously summarizes and account for each piece of data”  
(Charmaz 2006: 43).*

GT distinguishes between the initial coding, the focus coding, the axial coding and the specific “theoretical” coding.

The initial and focused coding is the first thing to be done. Line by line, a text passage will be analysed and the dimension of a term should be defined. By doing so, contrasting pairs will be revealed. The axial coding is one of the next big steps. The huge amount of data will be sorted, synthesized and organized into categories. These categories will undergo an analysis to specify the condition under which individuals act differently; this is the “theoretical coding”. The aim of “theoretical coding” is to find all possible examples to this phenomenon (Charmaz 2006: 9; Muckel 2011: 345; Strauss/Corbin 1996: 88).

#### **Theoretical Sampling**

One of the last major steps in working with the GT is the “theoretical sampling”. It is about forming hypotheses for each of these possible phenomena verified in the “theoretical coding” process. With these hypotheses, the research again goes into the field and finds prove for the hypotheses (cf. Charmaz 2006: 103).

### **1.5.4. Quality Assurance**

The methodological framework of GT provides structured and comprehensible work. All steps are documented and made transparent. To guarantee high

quality results, permanent reflections about my role as researcher, as well as discussions about my preconception through consulting my academic advisor and professors will be made. But as Strauss et al. point out, it will never be possible to find all the phenomena based on the data. For all the remaining inadequacies, the responsibility stays at the researcher (Strauss/Corbin 1996: 89).

## **2. THEORETICAL APPROACH**

In the following chapter, a short overview of the theoretical background of development cooperation will be given. The background will be embedded in an analysis about the critiques on development projects in order to emphasise the difficulties of development cooperation, followed by outlining the different bodies within development projects. At the end of the chapter, new approaches within the development discourse will be presented and the Integrated Water Resource Management (IWRM) approach, as an example for community-based development, will be introduced.

### **2.1. DEVELOPMENT COOPERATION**

Headlines in Newspapers like “Wie die Entwicklungshilfe Haiti schadet” (Die Zeit, 2013) or „Schlecht entwickelte Hilfe“ (Der Standard, 2011) very often let development cooperation come into big critique.

Looking at the statistics, this fact can also be seen. More than a decade of “development”, meaning the systematic effort to use political and economic means to reduce poverty and to limit the unequal allocation of national and global wealth, has shown little impact. According to the MDGs (Millennium Development Goals) Report of the year 2008, 1.4 billion people live in conditions of extreme poverty in the developing regions, which means that they have to live on less than 1.25 US-Dollar a day (cf. Schicho/Nöst 2006: 43; MDG Report 2012).

This even though every year, 100 billion of US-Dollar in form of Official Development Assistance (ODA) is used by national and international Development Agencies for various types and different targets within development cooperation. The net ODA flow in the year 2010 was 128.7 billion



US-Dollar, with the United States as the main donor which indicates the figure billion (cf. Nuscheler 2008: 5; OECD 2010).

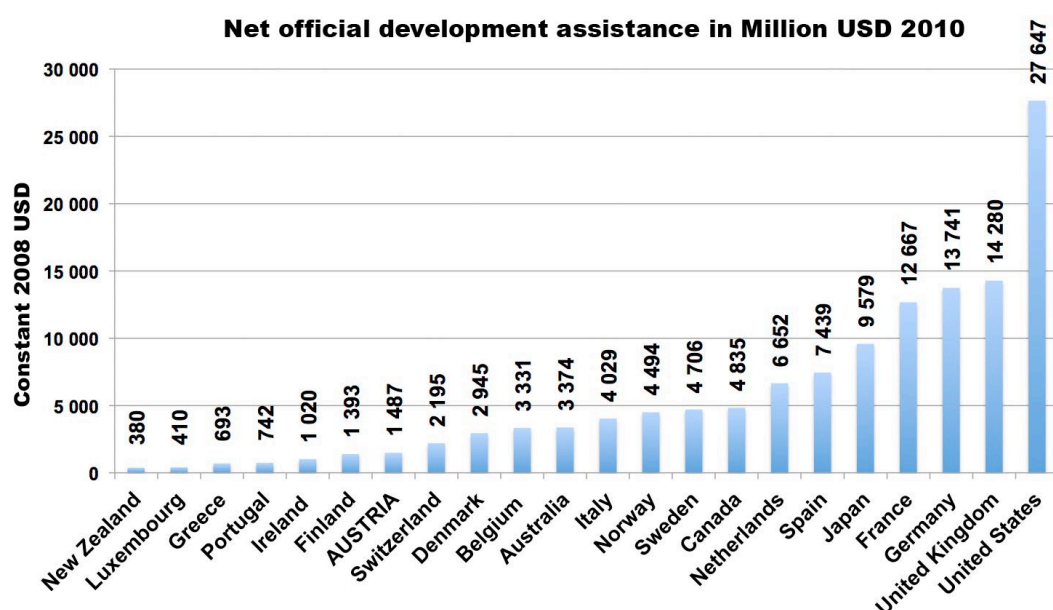


Fig 1: United States ODA (OECD 2010)

The term Official Development Assistance (ODA) has been implemented by the Development Assistance Committee (DAC) for all the member states of the OECD. Members of the DAC include 22 countries of 30 OECD countries and the European Commission (EC) (cf Nuscheler 2005:479ff).

The DAC defines ODA as “those flows to countries and territories on the DAC List of ODA Recipients and to multilateral institutions which are:

a) provided by official agencies, including state and local governments, or by their executive agencies; and

b) each transaction which:

- is administered with the promotion of the **economic development and welfare of developing countries** as its main objective; and
- is **concessional in character** and conveys a grant element of at least 25 per cent (calculated at a rate of discount of 10 per cent)” (OECD 2013).

Within the years of the development discourse, it has been searched for a way to allocate the effectiveness of aid. As one of the goals of the UN is to raise the ODA flows of the OECD countries to 0.7 per cent of their Gross National Product (GNP) in order to meet the Millennium Development Goals (MDGs) and almost none of the countries meet that goal, many development agencies and institutions had to defend their approaches and work within development cooperation (cf. Nuscheler 2008:5).

### **2.1.1. Points of critique**

As Nuscheler points out (2008: 5), one of the main problems regarding development cooperation is the term of “development aid” still used not only but especially in the “normal” public society. The problem impacting this understanding are the high expectations which implicit such a term. If these expectations are not fulfilled, the legitimacy of development agencies is of course the first to be “attacked” (cf. Nuscheler 2008: 6).

In Nuscheler’s report “Die umstrittene Wirksamkeit der Entwicklungshilfe” (The Controversial Effectiveness of Development Aid), he emphasises that the critiques of failed development cooperation in the last decade cannot be underlined that easily, although he admits that many good intentions and many thoughtful concepts only helped marginally and even provided more harm than good in some cases (cf. Nuscheler 2008: 6f).

Most of the critique about the efficiency of development cooperation is too “generalised”, as he further continues (Nuscheler 2008: 7). Most of the critique on development cooperation has been towards development agencies and institutions working in Africa. As the statistic of the OECD below shows, ODA flows to Africa have been raised constantly since 1960 but Africa is still one of countries with the poorest people (cf. World Bank und UN 2013).

### Net official development assistance over 50 years, 1960-2010

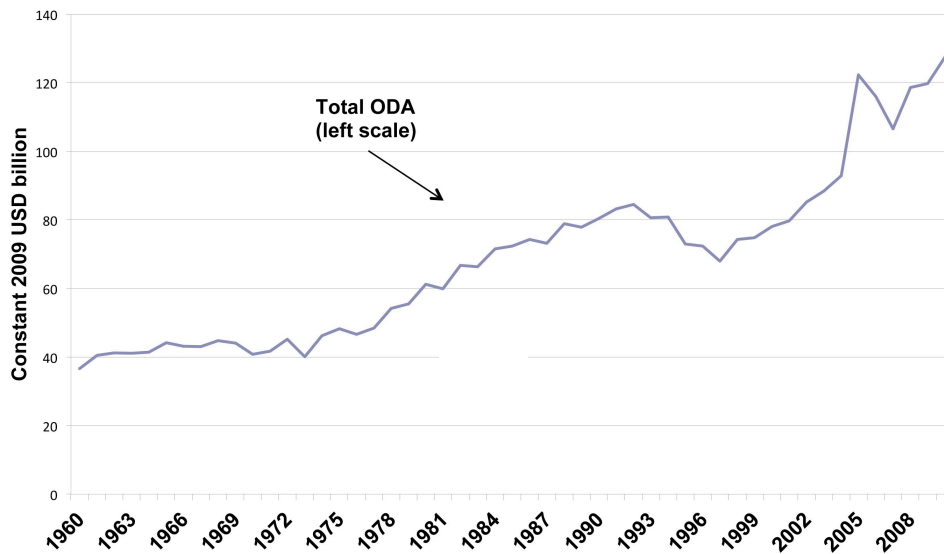


Fig 3: ODA flow to Africa since 1960 (OECD 2010)

It is here to argue that Africa is a special case apart, as the circumstances in which development cooperation have to operate are beyond difficult compared to those in other regions of the world (cf. Nuscheler 2008: 7).

Besides this, Nuscheler emphasises some more important aspects to be taken into account when talking about the connection between ODA (Official Development Assistance) flows and efficient development cooperation (cf. Nuscheler 2008: 8):

- a) 128.7 billion US-Dollar in the form of ODA (Official Development Assistance) for example in 2011 might seem a huge amount of money. But, if compared to the many people living in the recipient countries and distributed over the years, it is more like a “drop in the ocean” than anything else.
- b) The amount of money coming from the ODA (Official Development Assistance) flows does not always end up right where the people are. A

huge amount of the total money cannot be transferred correctly via these resources due to administrative problems or protracted decision making processes of the recipient countries or will stay in the donor countries for administrative purposes or consultants.

- c) The numbers in the statistics of ODA flows might be very impressive if no distinction is made. The ODA flows have many different intended purposes. It is important to look at these different purposes and to distinguish between these uses before making a statement about the inefficiency of development cooperation.
- d) Most of the debates about the inefficiency of development cooperation include only organised multilateral operations from international organisations and the organised bilateral operations from specific states. It does not include the many Non-Governmental Organisations (NGOs) and church-based aid organisations, which mostly contribute in a completely different way than other institutions and organisations.

### **2.1.2. Criteria of Efficiency**

Analysing the impact and monitoring the success of development cooperation has always been very important for every organisation and institution working in the development sector. Most of the institutions and organisations have their own people in charge of the evaluation of the implemented projects. However, evaluating the efficiency of development operations with neither quantitative nor qualitative methods is not easy (cf. Nuscheler 2008: 9).

First of all, the efficiency of development depends on what kind of “development” is the overall objective of the operation. As Nuscheler points out (2008: 10), development economics have a different focus than cultural anthropologists and cultural anthropologists have a different focus than international or national development authorities. Economics would call development aid for sufficient when a country shows better economic growth.

Cultural Anthropologists would call development aid for sufficient if local people experience empowerment due to strengthening of local political influence.

If a development economist would only assess economic growth as a goal to measure “development”, the efficiency of development cooperation would have to be evaluated as a huge success in many countries. However, widely and even empirically proven, the qualities of political-institutional circumstances have a major impact of the economic development in countries and developing cooperation can never be efficient without “good governance”<sup>1</sup> (cf. Nuscheler 2008: 11).

### **2.1.3. Bertelsmann Transformation Index (BTI)**

The Bertelsmann Transformation Index (BTI) is the only instrument to measure the efficiency of development cooperation, which takes into account the possibility of political empowerment of the local people. The BTI analysis the political system and provides therefore also information about the capabilities but also the limits development cooperation in a country can have (cf. Nuscheler 2008: 12).

Furthermore the BTI also analysis how much of political participation is possible. This is very important as some politicians are not willing to work with agencies from outside of the country. If they are not working together with development cooperation agencies many development project can never succeed (cf. Nuscheler 2008: 12).

The different definition on what “development” means, shows how complex the evaluation of the efficiency of development cooperation is, as the organizations operate in very complex systems and many indicators would be necessary to measure all aspects of these multidimensional systems. But still, even the World Bank works with high diversified indicators, so there is neither a lack of

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<sup>1</sup> “Good Governance” is a postulated concept established in the late 90ies from the World Bank and later on from the whole donor community to promote accountability, constitutionality and legal security from the governance (cf. Nuscheler 2005: 625).

sufficient data nor a lack of experience of problem analysing. It is more about a lack of transparency of the outcomes and a lack of political intent to draw the necessary conclusion (cf. Banerjee qtd. Nuscheler 2008).

It can therefore be said that it is wrong to judge the efficiency of development cooperation only by looking at the income and outcome of the ODA (Official Development Assistance) towards the economic growth of a country. Development Cooperation is a very complex system. Statements in Newspapers, like the ones shown at the beginning of this chapter, which claim the inefficiency of development cooperation, can therefore not be taken too seriously. As nevertheless, there are instruments like the Bertelsmann Transformation Index (BTI) which take into account the overall possibility to have political influence. However, it is the responsibility of the development cooperation implementing organisations to draw the necessary conclusions of the results of such instruments like the BTI.

## **2.2. STAKEHOLDERS IN THE DEVELOPMENT DISCOURSE**

As shown in the previous chapter, the BTI (Bertelsmann Transformation Index) does not only help to measure the efficiency of development cooperation, it also emphasises the importance of a participatory approach of all participants (cf. Nuscheler 2008: 12).

Before looking at the concept of participatory approach, the following part of this chapter takes a closer look at the actors within the development cooperation.

### **2.2.1. Project Beneficiaries**

As emphasised before, in the past decades, the participation of previously excluded groups has become more and more important. Benefits of development cooperation should go directly to the inhabitants, like e.g. smallholder farming communities. At the time when more benefit for the local

people were claimed, the term “project beneficiaries” has been implemented (cf. Oakley 1995: 4).

As this kind of participation approach should highlight a rather active process of all the parties involved in the practice, instead of making it a top priority to get a share of the project’s benefit, the term “community” replaced the term “project beneficiaries”. For many years, the term “development community” as delineation of the different parties involved in the development cooperation has been used by many development agencies uncritically (cf. Paul qtd. Oakley 1995: 4).

### **2.2.2. Community**

Only in recent years, the term “community” has had to be used rather cautiously, as it might implicate a homogeneous group of development parties. However, a “community” is never a homogeneous group, as every person of a community will have different interests and needs, not to mention the existing differences due to age, sex, marital status, profession and social or ethnic group the person belongs to (cf. Nelson/Wright 1995: 14f).

The term “community” is usually used by researchers or other parties of a development project, as it is easier to interact with a unified group than with different parties within the development project. However, as Nelson et al. (1995: 15) emphasises, interacting with a group of people will always lead to the preference of one interest over the other, which will lead to shifts in power between the people engaged in the development project.

The term “community” will therefore often disguise power relations which have to be examined and discussed carefully, as the term is more a construct from the outside than a voluntary self-identification of the collective group, as Nelson et. al point out:

*„Community is a concept often used by state and other organizations, rather than the people themselves, and it carries*

*connotations of consensus and „needs“ determined within parameters set by outsiders“(Nelson/Wright 1995: 15).<sup>2</sup>*

One way to circumvent this problematic is to give different categories of people, such as women, young people, the elderly or men, private space to think and to discuss their ideas, suggestions and concerns. In a forum they can later on present their ideas and perspectives to the other people, but as Nelson et al. also mention, even though these activities will help to show other categories of people one's own point of view, it is still not easy to find a consensus for the whole group (cf. Nelson/Wright 1995: 15).

### **2.2.3. Stakeholders**

However, since the 90ies, the term “stakeholders” has been used to underline the participatory approaches in the development discourse. This term should entail a more active involvement in the development process by having a “stake” within the project process, rather than being passive beneficiaries and waiting for the outcome of the project process (cf. Oakley 1995: 4f).

According to the World Bank, “stakeholders” are defined as “those parties who either affect or are affected by the Bank's actions and policies” and are divided into the following three different categories:

- a) **Borrowing Stakeholders**, namely the government which is borrowing funds from the World Bank,
- b) **Primary Stakeholders** are the marginalized people who expect to benefit from operations by the World Bank and
- c) **Secondary Stakeholders**, such as NGOs or other institutions, bodies and organisations which are interested in the World Bank's supported

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<sup>2</sup> The author of this thesis uses the term “community” all the time in this thesis and is well informed as to which paradox this implicates. Nevertheless will the author remain the right to use the term community and takes full responsibility for this.



policies and programmes. These include also the bodies which are linked directly to the Primary Stakeholders (cf. World Bank qtd. Oakly 1994: 4).

### **2.3. NEW APPROACHES IN THE DEVELOPMENT DISCOURSE**

Another important keyword in community driven development is the Participatory Rural Appraisal. To alleviate the effects of implementing development projects which do not correspond with the communities' interest, participatory approaches have been the keyword since the 80ies in between the implementing organisations and the locals. At the beginning of the 1980s, participatory approaches, especially the PRA (Participatory Rural Appraisal), which came after the RRA (Rapid Rural Appraisal), have ever since taken a vital role in the development discourse (cf. Hickey/ Mohan 2004: 5ff).

In the centre of the attention in the PRA approach is the local community. The idea is to give the local community the possibility to understand their own situation and to work out problem solving strategies on their own. This is supported by an interdisciplinary team which has to collect information about natural and human resources in the community and about the daily lives of the community members (cf. Chambers 954ff; Nelson, Wright 1995: 51).

Another approach also focussing on taking into consideration the local needs and possibilities is the Integrated Water Resource Management approach. As the aim of this thesis is to understand changes in the perception of water management within local communities, a closer look at this approach will be given in the following passage.

#### **Integrated Water Resource Management**

Water is not a static resource with constant deposit. It not only varies in availability from region to region, but also its availability changes from season to season within a region and with it, a constant change of the water demand

occurs, as there will always be periods of high and periods of low needed supply. In times of climate change, more extreme weather events have been noticed and due to these, changes in precipitation (cf. UN 2008).

The problem within this context is that most countries already have adequate infrastructure to overcome these changes of water availability and water demand. They also already have sufficient means to mitigate climate change imposed risks regarding the water supply or infrastructure for waste-water treatments or water recycling. However, there are a lot of countries which do not even have the infrastructure and governments sometimes cannot even guarantee sufficient water supply or unpolluted water for its population (cf. UN 2008).

In 2002, the World Summit on Sustainable Development (WSSD) therefore called countries not only to implement the Integrated Resource Water Management (IWRM) approach, but also to craft water efficiency strategies in order to:

- a) “Meet development goals<sup>3</sup>, such as reducing poverty, increasing food security, fostering economic growth, protecting ecosystems
- b) tackle specific water challenges, such as controlling flooding, mitigating the effects of drought, expanding the access to water and sanitation, and addressing increasing competition for water and water scarcity” (GWP 2008: 3).

However, having a sufficient water management means much more. The challenge is to find a good balance between providing sufficient water for livelihoods, as mentioned above, but also to maintain the resource base of water itself like surface water and groundwater (cf. Global Water 2000).

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<sup>3</sup> Development Goals are 8 main goals to achieve until 2015. The approach is highly supported by the UN (cf. Nuscheler 2005: 575).

As the UN points out: “Water is a key driver of economic and social development while it also has a basic function in maintaining the integrity of the natural environment and it is imperative that water issues are not considered in isolation.” (UN 2008) and therefore has to be seen in a greater context. Making investments in water infrastructure alone is not enough. Water is part of the greater ecosystem. The degradation of ecosystems and the loss of biodiversity will also mean a loss of human well-being (cf. GWP 2008).

Depending on the country, water is managed in many different ways. Sometimes, water for agriculture and industry or for domestic use is managed separately. Sometimes it is managed only by the governments or on a provincial basis. The private sector also very often plays a vital role in providing water service. There are also the individual citizens and communities who very often do not have any possibility to express their concerns and demands. With the IWRM, all the fractions will have to come together to develop a plan regarding their resources and needs. This approach will also give the local people in the communities a possibility to express their concerns and opinions, which might otherwise be overheard very easily (cf. UN 2008). As the UN points out:

*“The traditional fragmented or purely sectorial approach is no longer viable and a more holistic approach is essential” (UN 2008:*

Many countries have difficulties in seeing how using IWRM and water efficiency strategies should be helpful in improving the livelihoods and in supporting a sustainable ecosystem. The problem is that Integrated the Water Resource Management approach is conceived to be an approach within a long term process rather than offering results immediately after the implementation (cf. GWP 2008)

The approach of IWRM and the water efficiency strategies do not provide strict guidelines, as their aim is only to provide countries with knowledge on how to start with IWRM. Each country must set their goals on basis of their resources

and needs, as every country has different problems to face regarding water management (cf. GWP 2008; UN 2008).

Experiences in IWRM will be evaluated, monitored and passed down throughout the world by global coordination and should therefore contribute to a holistic approach towards sustainable water management, which includes most of all the people in the communities (cf. UN 2008)

### **3. PAPUA NEW GUINEA**

To begin with the case study of two smallholder farming communities, a short overview of the socio-cultural, agricultural and economic factors and the development cooperation in Papua New Guinea (PNG) will be given in the following chapter.

#### **3.1. SOCIO-CULTURAL AND ECONOMIC FACTORS**

Papua New Guinea has an estimated population of around 6.7 million (2010); 87.5 % of the country's population is living in rural areas (WHO 2011).

According to the WHO, the economy of PNG (Papua New Guinea) had expected a great push during the 90ies due to the major mining and petroleum projects going on in the country. But since the 90ie a greater economic or social development success still has not taken place, as macroeconomic instability and negative economic growth were noticed. So the prediction of a great push due to the mining sector did never come. (cf. WHO 2011).

Reasons for this bad economic growth were the external contribution factors, the development in commodity prices and the therefore bad trade conditions. Internal factors impeding economic growth could also be determined, such as inappropriate policy regimes, fiscal failures and national instability. In recent years, the economic growth in PNG has been more stable and even shows slightly positive trends. However, the growth cannot be traced back to an improved internal performance, but to the rising prices of mining products on international markets. Nevertheless, the WHO emphasises that since 1990, the living standards for Papua New Guinea's population went down due to the economic situation and state a failure in providing sufficient public service (cf. WHO 2011).

### 3.1.1. Population growth

One of the most challenging factors for the development in Papua New Guinea is the steady growth of the population. As the statistic below shows, the total population growth between the years 1980 and 2000 rose from 3.0 million to 5.2 million people.

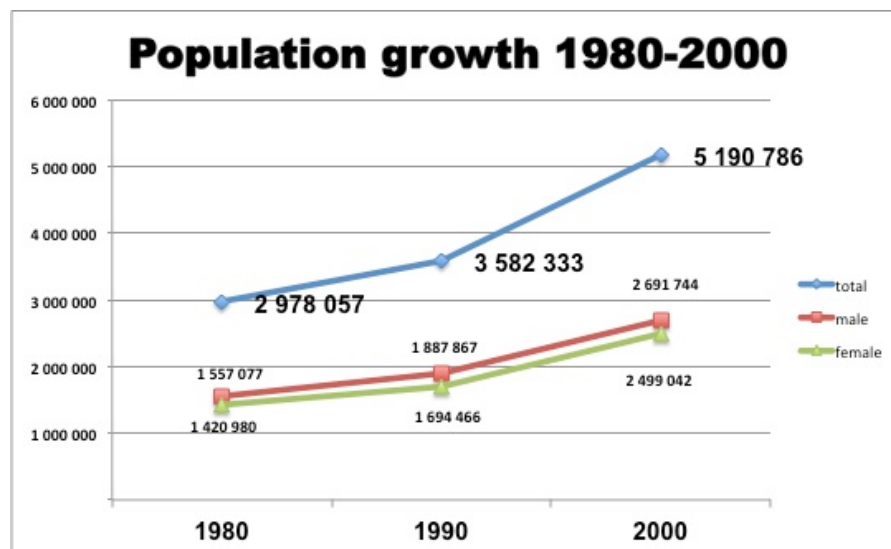


Fig 4: Population Growth PNG (NSO 2002)

Scientists predict an average rate of growth of about 2.5 % per year. At this rate of increase, the total population will double around every 30 years, which means an increase of the population of approximately 105 000 people every year. Taking into consideration the already existing internal problems and the depraved public service, this problem will be one of the most challenging problems for Papua New Guinea (cf. Courke/Harwood 2009: 28; NSO 2000)

### 3.1.2. HIV/AIDS

Another major problem in connection with internal challenges is the HIV/AIDS problematic. The WHO declared Papua New Guinea to have a HIV/AIDS epidemic in 2003. There are many experiences of HIV/AIDS problems in other parts of the world. These experiences show that the loss of people due to a HIV/AIDS epidemic have a major effect not only on the food and cash crop production, but also on the wellbeing of children, especially in regions where

there is an already existing labour shortage due to migration, to name only one source of danger (cf. Courke/Harwood 2009: 31; WHO 2011).

Public health service is very poor in Papua New Guinea. According to the WHO, the major provider of health service in PNG are traditional healers, a small, modern private sector, enterprise-based services like the mines, church-based institutions and of course the government, although 80 % of the health service is provided by the church and the same is therefore an important factor in providing health care service, especially in rural areas. Church-based institutions also run five of the seven nursing schools, as well as all the community health worker training schools (cf. WHO 2011).

### **3.1.3. Poverty**

As Courke et al. (2009) point out, people facing a lack of sufficient essential goods, a lack of material goods or natural resources, a lack of cash or capital and who are therefore unable to pursue daily life adequately are considered as living in poverty. Poverty is also very often associated with social exclusion or dependency on other people or institutions and organisation.

Most of the data used to “measure” poverty is via comparing the level of income or also the level of economic growth. However, these types of measures do not make adequate claims about the living standards the inhabitants of a country live in. In order to find a more adequate measuring system, the Human Development Index (HDI) was introduced in 1990 in the Human Development Report (cf. Nuscheler 2005: 190; UNDP 2013).

The UNDP defines the HDI as “a summary measure for assessing long-term progress in three basic dimensions of human development:

- **life expectancy**
- **access to knowledge**, measured by

- mean years of schooling for the adult population, which is the average number of years of education received in a life-time by people aged 25 years and older and
  - expected years of schooling for children at school-entrance age, which is the total number of enrolment rates, as well as
- **Gross National Income (GNI) per capita**, expressed in constant international dollars converted using purchasing power parity (PPP) rates (UNDP 2011).

To put this into context, the HDI value of Papua New Guinea has increased from 0.324 to 0.466 in the years between 1980 and 2012, as the figures below show. Although the UNDP points out that the rankings and values of previously published reports should be compared with the data of the current report with caution due to changes in methods and in the underlying data throughout the years (cf. UNDP 2011).

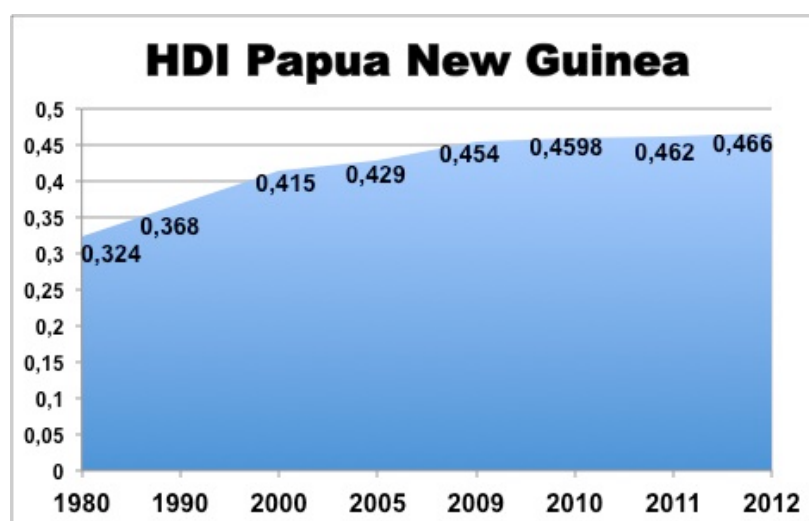


Fig 5: HDI PNG 1980-2012 (UNDP 2011)

Even though the figures show a slightly rise of the HDI index, Papua New Guinea is still among the “low human development group and below the average of 0.683 for countries in East Asia and the Pacific” (UNDP 2011).



### **3.2. DEVELOPMENT COOPERATION IN PAPUA NEW GUINEA**

According to the OECD statistics of 2011, Papua New Guinea receives 449 million US-Dollars in the form of Other Development Assistance (ODA). Australia is therefore the major development partner of PNG. But there are other major external agencies providing loans or grants like the Asian Development Bank (ADB), United Nations agencies, including the WHO, as well as the Japan International Cooperation Agency (JICA) and New Zealand (NZAID). According to the WHO, smaller contributions have been made also by the United States Agency for International Development (USAID) and the World Bank. European Institutions provide 35 million ODA flows and are therefore the third strongest donor of gross ODA (cf. WHO 2011).

The concept of integrated rural development has already been analysed in Chapter xx. Also, Papua New Guinea has been a recipient of a great number of projects within the integrated rural development approach. Nevertheless, a full evaluation if the projects succeeded or failed in trying to achieve their goals has never been done. There are assessments which have been taken, but these are merely mid-term evaluations or assessments which have been done immediately in the closing stage and of data which are therefore not really representative (cf. Courke/Harwood 2009: 473).

#### **East Sepik Rural Development Project, 1977–1984**

One development project which should be introduced in this context is the “East Sepik Rural Development Project”, which was carried out from 1977 to 1984 and was the first big development project within the rural development approach in Papua New Guinea (cf. Courke/Harwood 2009: 474).

The total cost of the project was 14.87 million US-Dollars, which have been provided in the form of a loan from the Asian Development Bank. The aim of the project was to improve social service and infrastructure for people living in the rural area of the Sepik Province. The activities included an intensification of

buffalo farming and inland fisheries, agricultural research, the construction of a school and an agricultural college (cf. Courke/Harwood 2009: 474).

Most of the objectives have already been framed in the “land settlement schemes”, which have been implemented between 1950 and 1970 as a major part of the Australian administration’s economic development strategy in PNG. Their objective was to raise the agricultural production by buying land and giving it to land-short farmers for them to use the land to grow subsistence crops, but also to intensify monocropping oil palm for sale. Dependent on how much money the government put into the “settler”, the more they had influence on the farming process of the inhabitants of rural areas (cf. Courke/Harwood 2009: 469;474).

The East Sepik Development project failed. The lists of the reasons for the fail of the first rural development project in PNG are almost infinite, even though this project should have brought along a great transformation of the socio-economic position of those people. They range from poor planning and monitoring, failure in appointing staff or in the training of local staff and the inclusion of too many consultants from different foreign companies, which made control and coordination very difficult, to problems stemming from the fact that the research had been carried out after the implementation and not before or during the project phase and made the first rural development project in PNG end like a disaster (cf. Courke/Harwood 2009: 474).

In 2004, a workshop was held on rural development projects which had been, with the exception of the previously described project, very successful. It came to the conclusion that the most successful development projects are projects which are small, low budget and, most important of all, were rather focused on the development of the communities in the provinces than on the development of the whole province. Furthermore, the participants of the workshop also came to the conclusion that development projects have to focus on transforming local politics and economies (cf. Courke/Harwood 2009: 474).

### **3.3. AGRICULTURE IN PAPUA NEW GUINEA**

Papua New Guinea is known as the country in the world with the most traditional and indigenous people. One would also think that their way of agriculture and water management is also still very traditional and unchanged for the last thousands of years.

Although PNG is extremely wealthy on natural resources like oil and minerals, agriculture is very important for PNG, especially for the people living in rural areas, as they do not see much of the wealth its natural resources bring (cf. Courke/Harwood 2009)

About 85 % of the people living in PNG produce their own food. Agriculture is therefore one of the most important aspects to look at when trying to understand local communities. The most important food in PNG is Sweet potato, Bananas and Taro, including Chinese taro. 61.2 % of the total population define Sweet potato as their most important food (NARI 2003: 2).

#### **3.3.1. History of Agriculture**

The first settler arrived in New Guinea 50 000 years ago. The inhabitants had to face a totally different climate at that time than they do now and New Guinea was not an island, but was attached to Australia and Tasmania. At this time, people were already domesticating some plants, but agriculture as a selected measure had not yet been invented. Evidence for agricultural activities started around 7000 years ago. The domestication of animals like pigs, chickens, but also dogs started with the arrival of the Austronesians. In the late 1400s, traders, missionaries and explorers brought plants to all around the world, but it took until 1870 before any “foreign” plant had been introduced by explorers. Some of the plants imported around 1870 are Cassava, Lima, Tobacco and the Sweet potato (cf. Courke/Harwood 2009: 10ff).

### **3.3.2. History of Agricultural Research**

Agricultural research in PNG began in the late 1920s. Originally there were only two main research centres focusing on the research in the field of agriculture. . In the 1950s the Department of Agriculture, Stock and Fisheries (DASF) introduced various different types of crops and livestock from Australia and Asia and began to take over the main research in this field. Between 1950 and 1970 the research was divided into two groups: research on cash crop and research on food crop. In 1986 and 1987 most of the research conducted was research on commodity products. The main institutions involved were the PNG Oil Palm Research Association (OPRA), the Cocoa and Coconut Research Institute (CCRI), the Coffee Research Institute (CRI) and Ramu Sugar. The Department of Agriculture and Livestock (DAL) took over the part dedicated to research on food crops, alternative cash crops, and livestock. As DAL was “constrained by lack of funding and trained personnel, bureaucracy, weak management and infrastructure, and ineffective linkages with extension services and farmers”, NARI was established in 1996 and launched in 1997 (Ghodake/Sitapai qtd. Stads et.al 2005: 2).

### **PNG National Agricultural Research Institute (NARI)**

NARI is a publically funded research organization which was launched in 1997. Its main aim is to “conduct and foster applied and adaptive research” (NARI 2013). In 2002 NARI was brought under the Ministry of Higher Education, Research, Science and Technology of Papua New Guinea. Its headquarter is located in the Morobe province, in Lae but NARI also has five other regional centres, which are located all over PNG. NARI can provide research in:

- “any branch of biological, physical and natural sciences related to agriculture;
- cultural and socioeconomic aspects of the agricultural sector, especially of the smallholder agriculture; and
- matters relating to rural development and of relevance to PNG” (NARI 2013).

As a lot of rural families and communities in Papua New Guinea depend on agriculture for their livelihoods, NARI sees itself as a facility to promote “innovative” agricultural development by sharing knowledge and information about their research in order “to accomplish enhanced productivity, efficiency, stability and sustainability of the smallholder agriculture sector in the country” (NARI 2013).

As NARI emphasises the importance of including smallholder farming communities into the research project in order to improve welfare by developing their farming practices, it adopted the “Agricultural Research for Development” (ARD) concept (cf. NARI 2013). Agricultural Research for Development is a global concept of linking research and development.

NARI explains this concept as follows: “core of this new concept is the notion of “farmer first” or being responsive to the real and perceived needs of the various farming communities in their biophysical and socio-economic and cultural environments” (NARI 2013).

Given the fact that in many countries the ARD concept is hard to implement as many NGOs and small farmer organizations lack a strong and representative institutional structure to hold against large research centres, NARI is doing an excellent job in reacting to the needs of smallholder farming communities and promoting agricultural research at the same time (cf. Adolph 2012).

### **3.3.3. Agriculture Environment**

When considering agriculture and trying to understand the environment in which it takes place, it is most important to estimate the opportunities and limitations presented by nature. It is important to know which environment suits which crop and which agricultural practices will help under which conditions. Researchers often use an “agricultural environment map” containing reliable information about altitudes, as an alternative for temperature, soil water deficit, which states the likelihood of drought, based on a soil water balance from climate stations

and inundation, which shows the degree of flooding (Courke/Harwood 2009: 95).

#### **3.3.4. Traditional Agriculture**

As presented before, the inhabitants of PNG have hundreds of years of experience in cultivating agriculture and have found special agricultural practices to adjust to certain environments. The following passage will give a little overview of some traditional agricultural methods within communities in PNG.

##### **Drains and Slopes**

One major method to grow vegetables or other agricultural products in saturated soil is that of making drains around the fields. It is also a way to increase the production in poorly drained soil (Courke/Harwood 2009: 260). This drains can be seen very clearly on the picture below. Another way to escape the fact of too much soil water is to plant agricultural products on slopes (cf. NARI 2003: 5).



**Fig 6: Fields with "Drains" (Source: B.K.)**

### **Mixed crop gardens**

Especially in the highlands provinces, the intensity of land use is very high. As every community only has a specific space of land at hand, people plant mixed species especially in smaller gardens. Mixing species means mixing up to 15 food crops of different species, with the exception of sweet potatoes, which are usually grown separately on bigger fields.

Other special agricultural methods in PNG are “**deep holing**”, where holes of up to 2 m deep are made and plants are planted at the top of this hole in order to grow tuber to an extraordinary length, “**stakes**”, where large bunches of the plant are propped up or tied to stakes so that breaking the main stem is not possible anymore, or using skins and pulp from coffee berries, ash from fire wood and animal manure as “**fertiliser**” (Courke/Harwood 2009: 260ff).

However, as climate change causes some serious problems for communities in PNG, the traditional agricultural methods are not sufficient enough anymore to bear against the impacts the climate change is causing. Nevertheless have communities in PNG found some ways to fight against these impacts and have used their resources to either find alternatives or to modify already existing agricultural methods. Before elaborating on traditional ways of coping with climate change imposed problems, a short overview about the climate change in PNG will be given.

#### **3.3.5. Climate Change and PNG**

The unique geographical position of PNG makes PNG a very vulnerable location for the effects of the climate change. The most important climatic influences to PNG are the El Niño and La Niña phenomena (cf. WaterPNG: 382).

## The Southern Oscillation Cell

The Southern Oscillation Cell is a complex system of high and low pressure system leading to and being fed by ocean currents. In this thesis only a simplified model is described to get an overview and understanding of cause and effect.

In the western pacific warm surface water leads to a low-pressure system, humid air rises, it cools and loses humidity (rain) while rising, in the upper atmosphere. The now dry and cold air moves east. It sinks in the high-pressure system in the eastern part of the pacific. Here the air is drawn westward by the western low-pressure system, this leads to the trade winds. These winds are the motor for westward flowing surface currants. This is the normal process of the Southern Oscillation Cell.

During an el Niño year the surface water of the central pacific sustains higher warming, which leads to a decrease in strength of the western trade winds and a low-pressure system builds up in the central pacific. Dry air descends from the upper atmosphere in the high-pressure system now forming over PNG and Australia. This cause unusual dry conditions which leads to drought.

A simplified schematic graphic of the el Niño phenomena can be seen bellow.

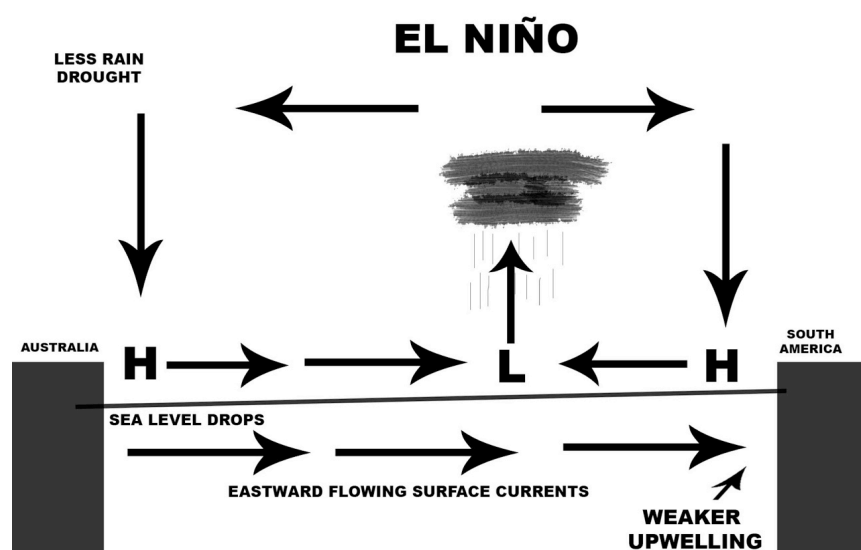
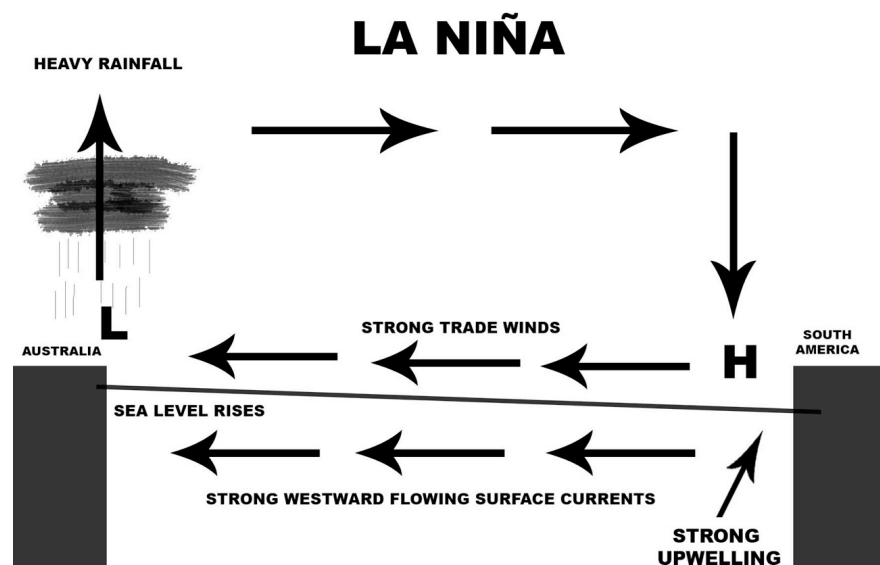


Fig 7: Schematic graphic of El Niño



During a la Niña year, due to colder conditions in the eastern pacific, stronger trade winds build up and lead to stronger surface currents which results in displacement of the western pacific low-pressure system. The low-pressure system now builds up closer to the coast of Australia and PNG. As a result of this phenomenon high precipitation than usual will occur in PNG, leading to floods and landslides. The schematic graphic for the la Niña can be seen in the following:



**Fig 8: Schematic graphic of la Niña**

Even though climate change implies a hug threat for the inhabitants of PNG, they have also found some ways to cope with extreme weather events. The following table represents some of the main strategies to cope with, for example, extreme drought:

## Indigenous coping strategies under drought

Practice	Description
Cultivation under canopy of trees	To reduce evapo-transpiration of crops under shade.
Cultivation on riverside plains	Families who had land near the river planted the main crops like taro, sweet potato, vegetables there.
Gardening in windsheltered areas	Planting materials were also maintained, were planted where soil was seen to be moist enough to support plant growth
Cultivated in the swamp or marsh areas	
Smoke smudges	Making fire, as through bamboo smoke to gardens nearby. the warm smoke disturbs cold air setting on the garden; but this is only effective in small gardens.
Covering crops with dry grass or leaves	To avoid direct contact with frost.
Cultivation on slopes	Frost moves down slopes to settle on the flat.
Plant trees across the slope	Trees disturb the flow of cold air down the slope.
Practices adopted to cope with water shortage for domestic use	
Carted water	Carried from using containers pots.
Bamboo piping	
Wells	Where the water table was not too deep, wells were dug.
Tanks	
Socio-economic measures to cope with the impact of drought	
Migration	
Use of cash and remittances from relatives and friends	
Support from friends	
Postponement of social obligations	Bride price
Sale of assets and artefacts	

(cf. NARI 2003)

## **4. CASE STUDY - EAST AND WEST HIGHLANDS PNG**

In the following chapter, a short general overview of the project will be given. Furthermore, the main parties involved in the research conducted for this paper will be presented.

### **4.1. WESTERN PACIFIC EU ARD PROJECT**

#### **4.1.1. General Information**

The “Western Pacific EU ARD Project” focuses on the “generation and adaptation of improved agricultural technologies to mitigate climate change-imposed risks to food production within vulnerable smallholder farming communities in western pacific countries” (NARI 2013). The project is financed by the European Union and implemented by the PNG National Agricultural Research Institute (NARI) in partnership with the following institutions:

1. the Ministry of Agriculture and Livestock (MAL), Solomon Islands,
2. the Department of Agriculture and Rural Development (DARD), Vanuatu and
3. the University of Natural Resources and Life Sciences, Vienna (BOKU) in Austria” (NARI 2013).

The project is a five year project and started in February 2011. The total costs of the project are EUR 3.66 million with a EUR 2.93 million support from the EU and a contribution from NARI of EUR 0.73 million (cf. NARI 2011, 2013).

#### **4.1.2. The Project Objective**

The overall objective of the project is, as the title of the project already implicates, trying to find methods and techniques to enable people from smallholder farming communities to cope with problems caused by climate change, which threaten their existence. However, another main aim of this project is to improve the “food production capacity” of areas, which these communities use for their farming (NARI 2011).

#### **4.1.3. Target Beneficiaries**

The target beneficiaries in this context are smallholding farming communities in Papua New Guinea, in Vanuatu and on the Solomon Islands. In total eleven sites were selected including around 100 households per site. Five sites are located in Papua New Guinea, three in the Highlands and two in the Lowlands. That makes a total of 500 households. Three sites are located in Vanuatu and on the Solomon Islands with a total number of 300 households (cf. NARI 2011).

#### **4.1.4. Water Related Tasks**

The following chapter will focus on how “Integrated Water Management” concepts and “Participatory Approaches” are and will be implemented in water related tasks of the project. In recent years, participatory approaches have been very often criticized in many ways. Participatory approach applied in the context of development cooperation is controversial and often has been more theoretical than practical; meaning that it sometimes failed to actually help the target communities (Cooke/Kothari 2007: 1)

In the case of the “Western Pacific EU ARD Project” it needs to be pointed out without the participation of the communities it would never be as successful as it is at present. In addition it needs to be underlined in this context that the “Western Pacific EU ARD project” is a research project and therefore it should not be seen as a traditional development project.

## **Causes**

As already mentioned before, the project has the aim to find ways to develop methods and techniques for smallholder farming communities to mitigate the three main problems caused by climate change, namely the problems arising from salinity, severe water shortages and extreme wet conditions. One of the first tasks was to conduct “rural appraisal surveys” in order to find an equal number of sites, where the three main problems mentioned above were present (cf. NARI 2011).

## **Strategies**

The second task involved the development of “integrated water management” for each target group. Based on the “rural appraisal assessments” of local water balances and water counting strategies should be developed in cooperation with the community in a “participatory approach” to find strategies suitable for the specific condition of each individual site.

## **Methods**

Water harvesting methods, irrigation techniques and water conservation strategies should be implemented at the pilot sites. The idea behind the project is that in the future communities will forward these methods and techniques to other smallholder farming communities in the area so that other non-participating communities also can profit from it.

## 4.2. KOPAFO AND KEREPIA COMMUNITIES

As stated before, the aim of the project is to integrate eleven sites across the three countries, Papua New Guinea, Solomon Islands and Vanuatu (NARI 2011). The following research was carried out in two different communities belonging to two of the selected sites, namely Kopafo Community and Kerepia Community.

Kopafo Community is situated in the Bena Bena district in the Eastern Highlands Province and the Kerepia Community in the Tambul district in the Western Highland Province. The two communities are indicated on the map shown below.

In order to give a better insight into the local underlying conditions, the following section will focus on introducing both communities as well as on highlighting main points of interests. All information provided was collected during a two months stay in Papua New Guinea. The information was provided by community members

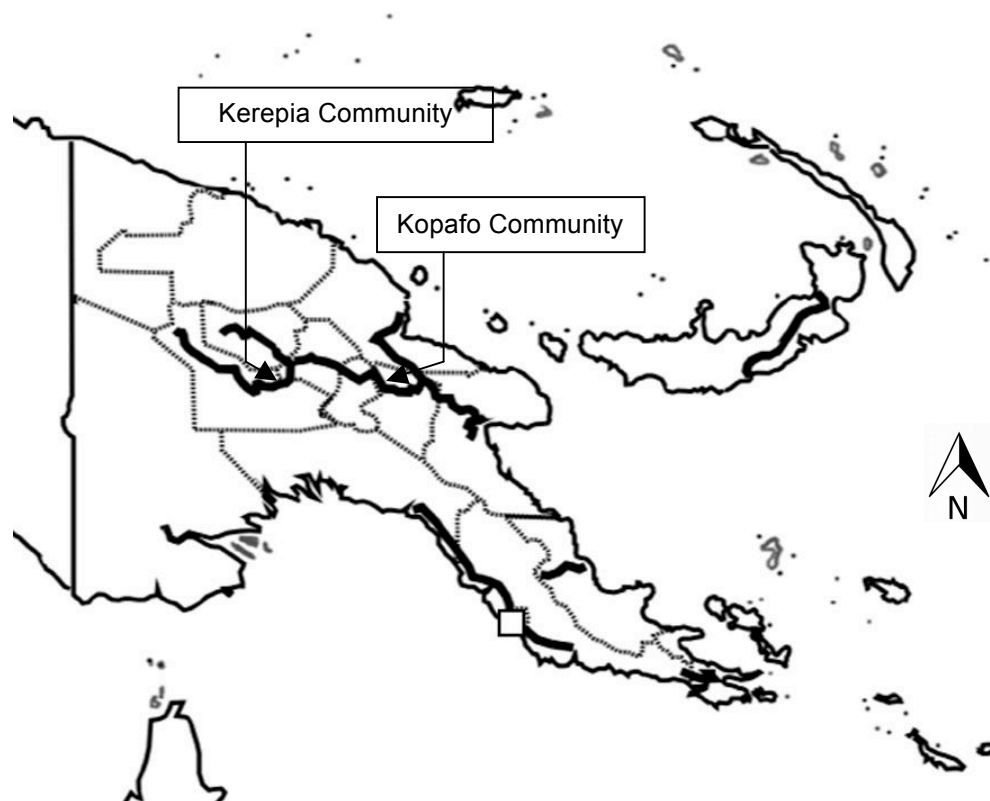


Fig 9: Location of Kopafo and Kerepia Community (modified after Google Earth)

# KEREPIA COMMUNITY

Western Highlands Province

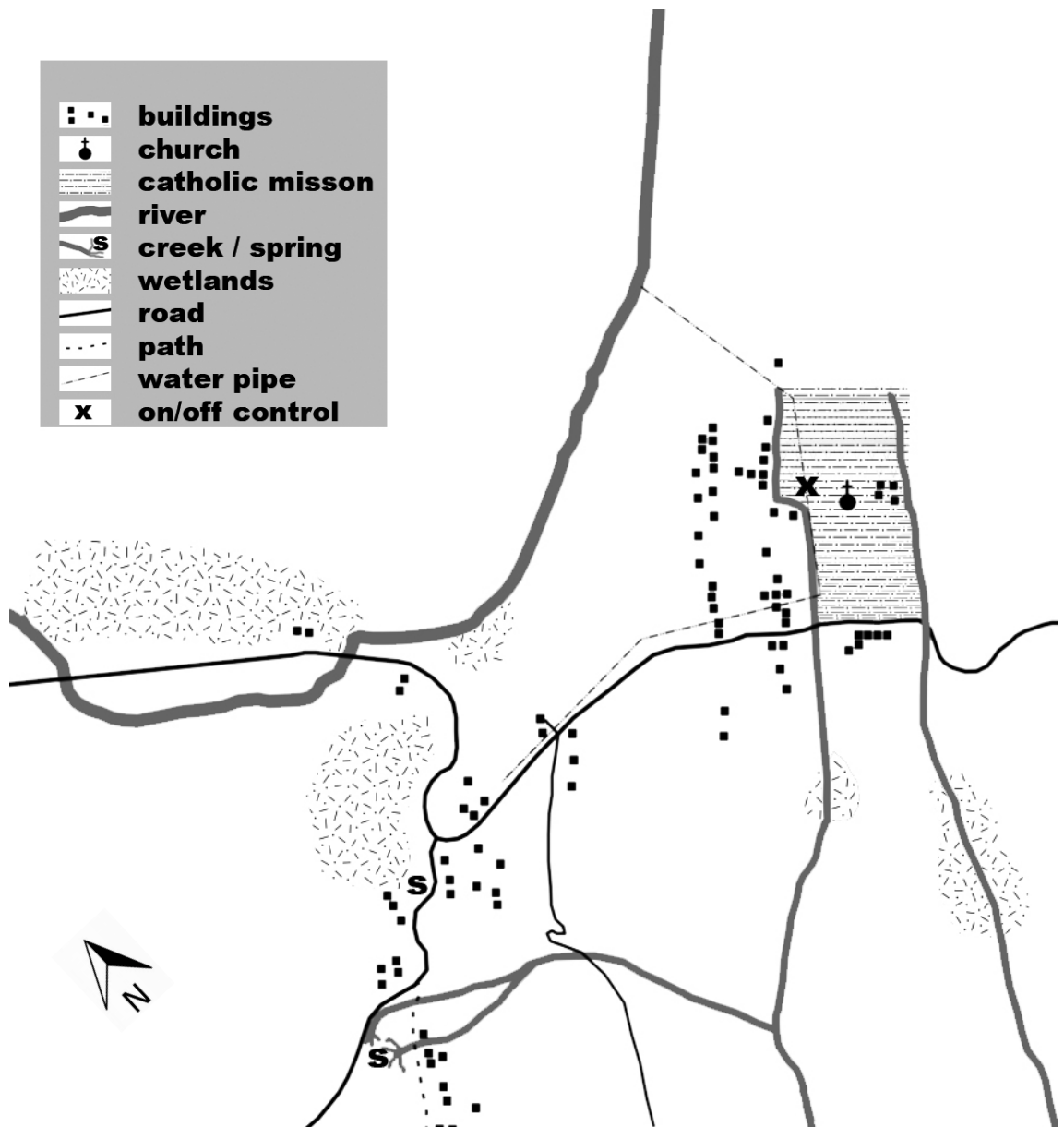


Fig 10: Kerepia Community (modified after John Poli)

# KOPAFO COMMUNITY

Eastern Highlands Province

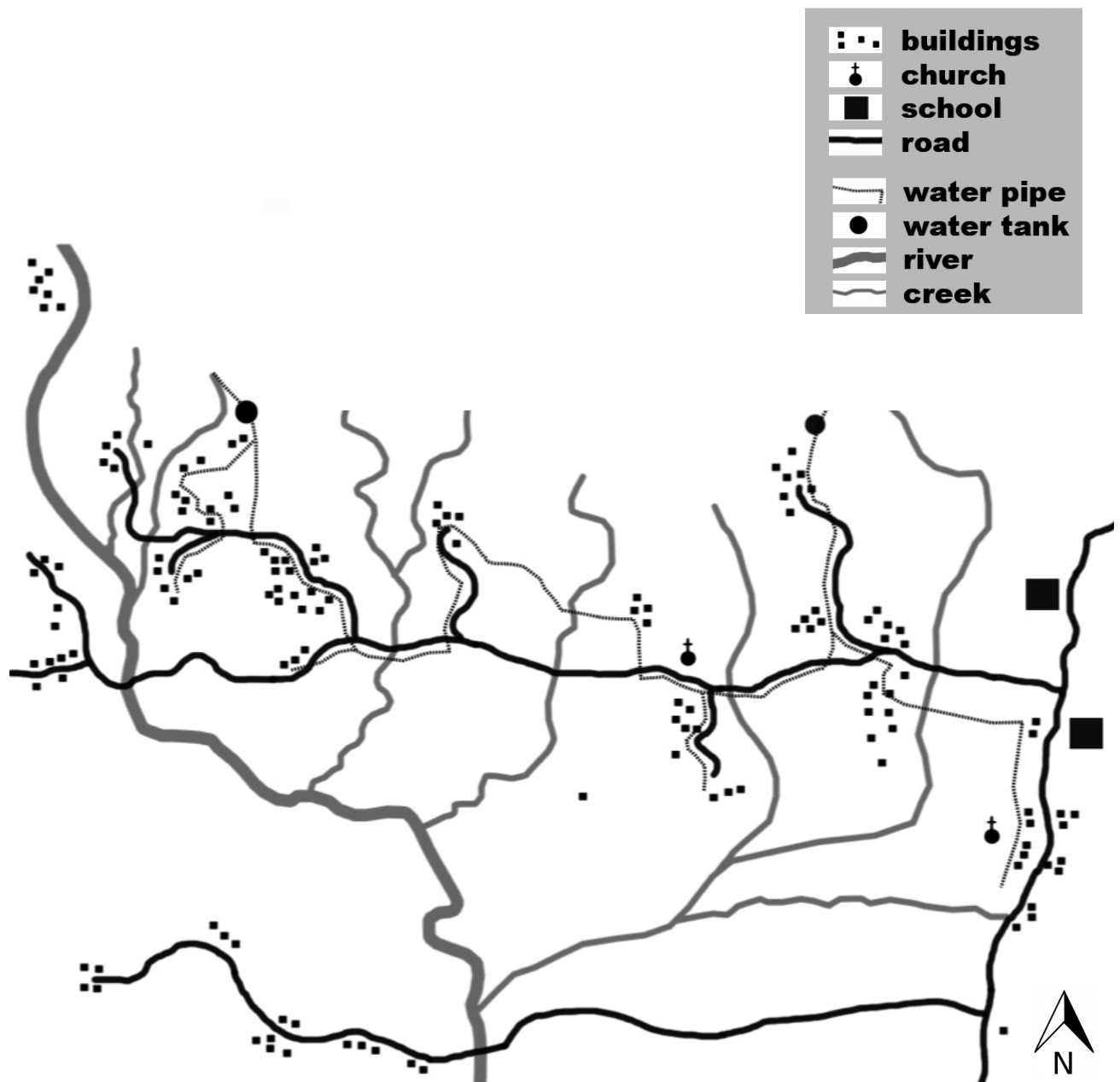


Fig 11: Kopafo Community (modified after Ate Sofe)



#### **4.2.1. Water management**

Most information encountered matches previous reports on water management, which were written at a time when rapid assessments of the selected communities in this area were made (Western Pacific EU ARD Project 2013).

The main point of interest regarding water management was to find out how people in the communities manage their water use in general as well during dry season. The aim was to come to a better understanding of traditional water management including irrigation systems, water and soil issues, as well as inquiries of possible allocations of water to different categories of use. Special focus was placed on finding out about special practices community members use during dry season and about historical changes, as well as on ascertaining the specific time in the year when dry season occurs in the communities in question.

The results showed that traditional ways of water purification, or other ways of water management are known but have not been tried out and tested by both communities.

Dry season normally lasts for three months (mid June/July/August/mid September) and little creeks dry out after between these months. The big river, however, never dries out. Both communities speak of 'drought' if the dry season lasts longer than seven to nine months. According to farmers (younger ones) first drought was in 1991 and the one in 1997 lasted for nine months ending in January 1998. The dry season in 2010 lasted for seven months (cf. Knabl Field Research Report 2012).

#### **Water Management in Kopafu Community**

In Kopafu Community there are no improved water irrigation systems during dry season. As mentioned in previous reports, there is a gravity-fed water supply

system, which was implemented by Benny Alan, MP for Bena Ungai in 1999 and 2010, which is seen on the picture below.



**Fig 12: Tank of Gravity-Fed Water Supply (Source: B.K.)**

During dry season problems linked with low pressure and parasites occur. The system is connected with the creeks, which will dry out after two to three months. For these reasons, it appears that there is no efficient water supply.

During prolonged dry seasons (meaning that dry seasons last longer than three to four months) small rivers close to the hamlets dry out and people obtain water by fetching it from the big river. Buckets with wholes function as watering pans for watering flowers. Two cups of water are used per plant between 5 and 6 a.m. and between 5 and 6 p.m. These practices are only applied in the first two months after dry season starts. Other farmers reported that they make holes in the middle of the field, which need to be filled with water for providing the plants with water. In addition they build a dam made of stones in the river dig an extra drain, which leads the water directly to the gardens.

The average water consumption per family is around 20l/day

## Water management in Kerepia community

There is also a gravity-fed water supply system implemented by CIDA (Canadian Development Agency), which is operated by the local priest Joe Bisson at Kerepia Mission. The tank can be seen on the picture below as well as one of the water taps coming from this source. Moreover, an on-off switch is used to control the water inflow during dry season, on the mission's property. The local priest Joe Bisson, who operates the water supply system, is also responsible for the allocation of water between different users during dry season. The water is allocated in the following way: in the morning only the school and the health centre get have water from the tank. The times at which water is running through the pipes are announced in the church. The water tank provides water for 300 people out of 3500 in the community. Others fetch water from the nearby creeks or springs. Water from the big river is usually fetched during the night, as it seems to be cleaner. In areas in which the ground is waterlogged people obtain water by digging 2 feet deep drains around "mounts"<sup>4</sup> (cf. Knabl Field Research Report 2012).



**Fig 14: Tank of Gravity-Fed Water Supply**  
(Source: B.K.)



**Fig 13: Tap of Gravity-Fed Water Supply**  
(Source: B.K.)

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<sup>4</sup> „Mounts“ are special heaps of earth where people plant their crops on, which can reach a feat of height in the Western Highlands Provinces (WHP).

#### **4.2.2. Ownership**

The main interest regarding ownership lay in how water allocation and land use were handled in Kopafu Community and Kerepia Community.

In both communities land is passed on from fathers to their sons. Women and older children inherit their own plots. Land can be bought too, but that is rarely the case. Both communities state the increasing population as problematic. Both communities mention the problem of land usage.

The communities mention the cultural understanding of everyone's right to water. Someone can own the land but not the water. There has never been a tribal fight over water. Water is shared among the community members (cf. Knabl Field Research Report 2012).

#### **The Understanding of Ownership in Kopafu Community**

The main river is shared among four communities before it joins the main river in the valley. All family members, even very young children, have their own coffee garden, Coffee season starts at the end of March and ends in June.

#### **The Understanding of Ownership in Kerepia Community**

As far as gardening is concerned, the main work including making "mounts", the people help each other. During my stay I saw eight young women helping to make one "mount", which can be seen on the picture below. They stated that would first finish the work the plot there and that they would continue working all together on someone else's plot afterwards, until all of them had their gardens planted (cf. Knabl Field Research Report 2012).



**Fig 15: Women making “mounts” (Source: B.K.)**

#### **4.2.3. Community Responsibilities**

Regarding community responsibilities the main focus was on finding out how people in the community react when problems occur such as seeing a watchman when the water level gets low, or seeing other people in charge of maintaining common goods like water pipes.

PNG communities respect a complex set of rights and duties. Respect is an important value and people take care of each other.

People usually try to share their knowledge. Many people get special incentives and advice from outside the community by institutions like FPDA. Also children who obtained education away from home often introduce innovations to the communities. There is no special tradition of sharing new knowledge. It is not seen as a must that newly obtained knowledge needs to be passed on.

Action is taken individually in the hamlets first. Some people have come up with individual solutions for problems. One village uses a fishpond to have water close to the garden during dry season, but apparently other communities are not doing the same. Problems are usually discussed in the community (cf. Knabl Field Research Report 2012).

### **Community Responsibilities in Kopafu Community**

There is no watchman in Kopafu Community responsible for checking the water supply. In the centre of Kopafu community there is a special place called “Kakaruk”, where people meet and socialize, but where they also discuss problems. At that place everybody has the right to state his or her opinion.

### **Community Responsibilities in Kerepia Community**

The priest Joe Bisson of the Catholic Mission is in charge of the water tank and tells the people to use the water wisely during dry season. Joe Bisson regulates the amount of water that can be used by the people by opening and closing the valve of the water supply system.

If a problem occurs, people will go and ask other community members (neighbours etc.) whether they have the same problem or not. If nobody finds a solution to a given problem, (e.g., agricultural issues) they will contact NARI (cf. Knabl Field Research Report 2012).

#### **4.2.4. Priorities**

The main point of interest regarding priorities was how communities use water especially during dry season or in unstable times. Another aim in this particular context was to find out about the value of water in general.

In former times water did not play an important role, since water was regarded as something that can be found anywhere. People also stated that there would always be enough water for everyone in the big rivers, which are much further away from the villages than the smaller creeks. The creeks, however, dry out during dry season. Therefore, not enough water can be provided, for the households during that particular. This means that they do not have sufficient access to water, leaving the families without enough water for domestic purposes (drinking, washing and cooking) well as for agricultural purposes (crop irrigation and animal requirements) (cf. Knabl Field Research Report 2012).

### **Priorities in Kopafu Community**

Fetching enough water from the big river, which is far away, cannot provide enough water for the commercial farming of crops during dry season. Inefficient watering leads to a poor harvest. That is why farmers stated that it was more important to have enough water for the family to drink and cook rather than using the water for agriculture. Washing clothes every day during unsteady times is not seen as a priority.

### **Priorities in Kerepia Community**

There has been a big tribal fight in 1989. People stated that since this fight tribal security is their utmost priority. The second most important priority is security within the family. Regarding the use of water during difficult times, they set clear priorities: 1. drinking, 2. washing cooking utensils and 3. washing clothes (cf. Knabl Field Research Report 2012).

### **4.2.5. Climate Change**

The main focus regarding climate change was to find out how this phenomenon affects life in these communities and how they find out about climate change related problems.

Research on knowledge about Climate Change revealed the fact that most community members are familiar with the global warming phenomenon (cf. Knabl Field Research Report 2012).

### **Climate Change in Kopafu Community**

Some people gained information about from newspapers. This is possible, since many people are literate now. They are aware of the fact that CO<sub>2</sub> emissions need to be reduced and that everybody is responsible for that. People first noticed that something was changing when they realized that there were plants growing in their area, which only had grown in areas located at the same altitude as Mt. Hagen before. As far as sustainability is concerned people stated that only few community members think about it.

### **Climate Change in Kerepia Community**

Elderly people stated that they noticed a change in the position of the sun at special times. A certain position of the sun used to introduce the beginning of the dry season. This particular position of the sun changed. In addition, special phenomena which manifested themselves in plants such as flowers or bamboos and the appearance of certain insects were seen as indicators of the beginning of the dry season in previous times. However, these indicators are not accurate anymore. The people appreciate the figures and bar charts regarding climate phenomena in their area provided by NARI (cf. Knabl Field Research Report 2012).

#### **4.2.6. Hygiene Awareness**

The main aim regarding hygiene awareness was to find out to what extent community members are aware of water contamination. Another important point was to find out about traditional ways of water purification.

As far as hygiene awareness is concerned, both communities are familiar with water contamination related illnesses and their symptoms (cf. Knabl Field Research Report 2012).

#### **Hygiene Awareness in Kopafu Community**

People are familiar with the causes of dirty drinking water. And they talk with other communities, with which they share the water resources, about the importance of not throwing rubbish into the river. However, rubbish is still thrown into the river. Clothes are washed in the same water they fetch for drinking or cooking. The next health centre is far away.

#### **Hygiene Awareness in Kerepia Community**

In the community of Kerepia there is a health centre, which was built by the Catholic Mission. The health centre makes it possible to stop breakouts of certain illnesses much faster. Furthermore, it helps to promote education and to



take necessary health precautions. Health authorities came to the community in the 1970s. Some people have fixed cement blocks where they shower and wash their clothes.

They also do not drink water from areas close to grazing fields, as they know that it might be contaminated with manure. The People who do not use the water from the tank which is transported via pipes, use water from two different springs.

They use different water for cooking and for drinking. The only use water from the spring as drinking water. They also do not use water that contains rust or smells muddy.

People also stated they found it very important to wash themselves every day because otherwise sickness would occur. If somebody washes clothes on a spot where drinking water is fetched, they are forced to go to the big river (cf. Knabl Field Research Report 2012).

#### **4.2.7. Knowledge sharing**

The main point of interest regarding knowledge sharing was to find out how knowledge is passed on from generation to generation and how newly acquired innovations are usually spread across the communities.

People usually try to share their knowledge. Many people get special incentives and advice from outside the community, e.g., by institutions like FPDA or DPI. However, there is no special tradition of sharing knowledge and it is not seen as a must (cf. Knabl Field Research Report 2012).

#### **Knowledge Sharing in Kopafu Community**

Actions are taken individually in the hamlets first. Some people have come up with individual solutions to problems. One village uses a pond to have some

water close to the garden or growing a nursery during dry season. However, there is no reason to believe that others try to apply the same approach.



**Fig 17: Pond for Water Supply (Source: B.K.)**



**Fig 16: Nursery (Source: B.K.)**

### **Knowledge Sharing in Kerepia Community**

There are some children of community members who received their professional education outside the communities and who introduce new innovations to their people when they come back home. Farmers stated that they tried out different gardening methods every once in a while all by themselves but that they had not been very successful yet. However, if something was successful, there would be a gathering and the information would be shared with the community(cf. Knabl Field Research Report 2012).

#### **4.2.8. Gender**

The main point of interest regarding gender was to find out how duties are divided up by family or village members, paying special attention to the differences between men, women and children.

There are no differences in gender or age as far as fetching water for agriculture or domestic use is concerned. Differences in gardening and housekeeping can be observed. Regarding agriculture, people stated that men tended to do work like digging drainages and making fences, while women and children were mostly in charge of planting and harvesting (cf. Knabl Field Research Report 2012).

### **The Issues of Gender in Kopafu Community**

Men discuss problems with their wives and ask them about their opinion but they do not necessarily have to agree with their opinion.

### **The Issues of Gender in Kerepia Community**

Women are the “head of the programme” as they call it. Women will interfere with their husbands’ decision making, if one family member is affected negatively by the decision. For instance, if the man wants to sell the biggest pig, she will hold him back, keeping in mind that the pig serves purposes, such as the “bride price”<sup>5</sup> (cf. Knabl Field Research Report 2012).

#### **4.2.9. Generation Gap**

The main focus regarding generation gaps was on finding out which water rituals and practices had been used in former times and which aspects had changed over generations. The aim was to give an insight into how advice from the elderly influenced the adoption of new technologies.

People noted that traditional methods of agriculture could not be used in the same way they were applied in former times. People at both locations stated that they could no longer follow their gardening traditions. Before, it had been easy for them to tell the right time for clearing bushes, burning chopped down bushes, tilling soil, planting seeds and harvesting. This pattern had been disturbed by continuous rainfall or short dry seasons. Advice from the elderly is sometimes not helpful anymore and the older generations are more or less

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<sup>5</sup> The term „bride price“ is used in PNG for dowry payments.

helpless. Furthermore, over generations there has been a shift in the appreciation of water (cf. Knabl Field Research Report 2012).

### **The Issue of the Generation Gap in Kopafu Community**

There are no water rituals practiced in Kopafu Community. People in Kopafu Community stated that they are trying to listen to the advice given by their grandparents, since there are much older and have more experience. As far as the clash between the Western way of living and traditional lifestyles was concerned, they reported that they were trying to find a compromise between the two lifestyles.

### **The Issue of the Generation Gap in Kerepia Community**

There are some rituals, which include water in Kerepia Community. In one specific ritual, a witchdoctor throws objects, which once belonged to an enemy (hair, food, excrements, etc.), into a pool of water. If the ritual is successful it is believed that the enemy will die slowly.

Farmers stated that the ideas and skills of the elderly were totally out of place nowadays, because they did not have to face the same problems (e.g., pests) as they did now. This is also caused by rapid population growth. They have to stick on their plots and cannot move to other areas with more fertile soil. Farmers reported that the ground they cultivated was exhausted (cf. Knabl Field Research Report 2012).

#### **4.2.10. Expectations**

Another main aim was to find out which expectations people from both communities had towards NARI.

The people's ancestors had faced some serious problems before. However, the older people cannot give adequate advice regarding extreme weather conditions. The inhabitants are not able to cope with extreme situations all by

themselves, since the changes occur too fast and too sudden. That is the reason why they started to depend on external organisations and institutions.

Both communities had worked with NARI before and stated that NARI could help them with coping with the situation they were facing (cf. Knabl Field Research Report 2012).

### **Expectations at Kopafu Community**

A crucial aspect especially regarding Kopafu Community is the lack of infrastructure. The community members pointed out the importance of proper water supply, especially the need for irrigation systems during dry season, as well as the need for roads, electricity and a health centre closer to the community.

### **Expectations at Kerepia Community**

In this area the infrastructure, as far as properly built roads are concerned, is better, due to a strong Prime Minister (MP) in this area. People need ways transport water to waterlogged areas. In order to maintain food security during dry season, is necessary (cf. Knabl Field Research Report 2012).

## **4.3. RESEARCH RESULTS**

The previous chapter has the purpose of giving an overview of the situation in the communities. Some passages in the next chapter will overlap with information already given in the previous chapter. However, to fully understand the expectations community members have towards organisations, especially towards NARI, a thorough analysis needs to be made. The main points of interests, which have already been discussed in the previous chapter, will be analysed again with the GT method, which has been explained in chapter 1.5.3. of this theses. The results of this analysis are presented in the present chapter.

To understand how specific expectations were formed, it will be necessary to look at the main problems people have to face in their daily lives.

#### **4.3.1. Analysis of Community Problems**

##### **Government**

In both communities, Kopafo and Kerepia, people state that services provided by the government, is poor and that there is a lack of infrastructural services, as well. In Kopafo people appreciate the public school close to the village and the water taps, which were built in 1999 and 2010. Nevertheless, people feel not very supported by the government as they “don’t see the hands of the government” (John Poli, interview, 27<sup>th</sup> February 2012). This statement refers to the water tap, which is not working properly during dry season, and to the streets close to the village, which have to be maintained by the people living in the area. The people of Kopafo Community try to get some financial support for the project but they do not expect to get any financial help. People in Kerepia Community are aware of the country’s rich resources but that they are of the opinion that the those resources have no effect on the community, meaning that they do not bring them any benefits. People think that a weak and corrupt state cannot care properly for its population. People say that they are still “struggling” and that they have the feeling that “no development” is taking place in the country (John Poli, interview, 27<sup>th</sup> February 2012). According to them good governance would bring good schools, bridges, streets and health care centres. As far as this particular aspect is concerned the communities agree. Having that information implies that people have a good knowledge of the dynamics of a political system. Moreover it is vital to understand that people’s needs are not reacted to.

##### **Population Growth**

People of both communities see a link between the presence of problems in agriculture and the problems of soil fatigue caused by rapid population growth. In former times the population density was not very high meaning that only few people had to share the same land. Back then, people cultivated one field for a determined period of time and after that they would not cultivate it for some time and use another field instead. The abandoned field had time to recover before it

was used again. This is not possible anymore. People use the same fields over and over again. People realized the yield of the plants was getting poorer and poorer that the plants were also not as resistant to pests as they had been in former times. People said that NARI had explained this phenomenon to them and now they were applying the method of intercropping and other approaches to mitigate the problems.

### **Climate Change**

People of the community state that recently climate change has caused many problems in agriculture. These problems had not occurred before. People in the community noticed a change in weather patterns. People are not able to produce any proper traditional weather forecasts anymore. This means that they need to apply additional methods and techniques in addition to traditional methods used in agriculture. For example, heavy and intense rain falls force community members to find ways to get the water off their fields. They also noticed that, these days, bananas could grow at altitudes at which they had not grown before. People see this as “evidence” for climate change (John Poli, interview, 27<sup>th</sup> February 2012). Some community members stated that one problem regarding climate change was that most of their fellow community members do not regard climate change as a big problem. That is why this problem is not discussed in an official community context. This means that at present there is no intention to act as a community against climate-related problems. In the next paragraph the process of community discussions will be highlighted, as they constitute a vital aspect when it comes to trying to understand how the community acts if problems occur.

#### **4.3.2. Analysis of Community Spirit**

Problems affecting the community are always seen as a big issue. The wellbeing of the community and its members is a priority and regarded as being more important than individual interests. Community members have to take care of each other. If there is a creek or a spring on a family's field, the family does not have the right to demand all the water for itself, since water is a

common good and belongs to the whole community. There are certain rules like this, which everyone knows and obeys. That implies that people have a strong sense of community but it also requires that all community members are familiar with these rules. As already mentioned, there is a set of unspoken rules, which means that no one explicitly tells the people what to do and what not to do.

### **Discussion of Problems**

In order to look at the ways of how problems are discussed within the community, it is necessary to look at how discussions are held in general in the community. As far as decision-making procedures are concerned, only the leader of the community is empowered to come to a decision. However, decisions have to be accepted by the other community members. All community members have the right to speak and make proposals. However, the actual decision is always made by the leader. The leader speaks to the members of the community and “convinces” them (John Poli, interview, 12<sup>th</sup> February 2012). The community members respect the leader’s decisions, since following the leader is regarded as something highly respectful. If they do not agree with the leader, people think that it is not good for the community, since the leader’s decisions are seen best for the community. In rare cases people can disagree with the leader’s opinion. If there is a disagreement, the majority rules. In order to make this system work people need to respect the cultural hierarchy. The people of the community see the community as one unit. The leader is a person who is good in “talking” (John Poli, interview, 27<sup>th</sup> February 2012). Talking is something that is very important and plays an essential role in the relationships between the community members as well as between the community and organisations or institutions from outside the community.

If a problem in one farmer’s garden occurs, he will first go and ask his neighbours and other community members if the same problem might be occurring in their fields, as well. If they could not find an “explanation” for a given problem, they will call NARI. Every community member has the right to ask NARI for advice, since “NARI belongs to everybody” (John Poli, interview, 27<sup>th</sup> February 2012). However, in most cases there is always one specific person, who is the contact person. In the case of Kopafu Community one of the



community members had contacted NARI. This man functioned as the contact person. As the family is seen as one unit, other family members can take over this part. That was also the case in Kopafu Community, as the original contact person was “busy marketing” (Ate Sofe, interview, 15<sup>th</sup> February 2012). This is why the brother took over his position. As a contact person you have a special position within the community. This person can choose to ignore claims that other community members have towards the organisation. The position of a contact person cannot be compared to the influence of a community leader but it still gives the person special rights.

So any time a problem occurs, they look for someone who “explains” to them what has happened rather than for someone who makes a decision. In order to explain this concept further, the next paragraph will focus on the same sort of dynamics but in a different context. In addition, the next paragraph explains why NARI is getting more and more important as far as “explaining” certain phenomena is concerned which people have to face in their daily lives.

#### **4.3.3. Analysis of the Role of the Elderly**

As shown before, people first start to look for “explanations” in their own community. As both communities are traditional PNG communities the elderly play a special role in the community. The elderly are familiar with and went through a lot of problems in the past. This includes environmental problems like droughts. Their advice is seen as something very valuable. In many cases the elderly give advice to their fellow community members if problems occur. They have the right to give advice because of their experience gained due to their “long life expands”, so “young people see the work only but the experience is from the old one” (Ate Sofe, interview, 15<sup>th</sup> February 2012). This means that the advice given by the elderly needs to be taken into consideration and that people in the community do not make decisions on their own.

The elderly might give advice concerning the following points: how to get information, how to build a house, how to “approach people”, how to “eat with

people” and how to work in the garden (Kopafo Community, personal discussion). However, the elderly are not familiar with the methods and techniques used today. As they do not understand the logic behind many things anymore, they are forced to give pieces of advice which seen as “not good ideas” (John Poli, interview, 25<sup>th</sup> February 2012). For example, the elderly cannot come up with an explanation for ‘new’ problems such as pests or special diseases. The younger generations are aware of that and even if they are loyal to the society structure of their culture, they know that the elderly cannot help them anymore. Therefore, they are looking for other people to help them “explain” certain problems.

#### **4.3.4. Analysis of Expectations**

If there was an expectation which was easily to identify it was definitely the expectation of finding possible explanations for certain occurrences. It is important to underline the fact that community members do not only rely on the explanations provided by organisations and institutions. There are also children of community members who are going to university and who learn about climate change, as people of the community have emphasised. The children then bring back newly acquired knowledge to their communities. Community members know that these children will “explain” certain things to the other members of the community when they come back. The people of the community believe that only those who received proper education have knowledge. Or knowledge, which is better than theirs. This common believe makes the work of organisations and institutions more difficult since it is hard to convince the people to mobilize their own knowledge instead of relying on somebody else’s knowledge.

#### **4.3.5. Analysis of Cultural Ways of Learning**

When NARI comes to the communities, everybody will come together. The people know that sometimes their own knowledge cannot solve problems. They

also know that, nevertheless they need “explanations”. The concept of explaining something always entails that there is someone who is listening and who wants to acquire new knowledge. This is definitely the case in Kopafo and Kerepia Community. To understand how the process of acquiring new knowledge is practiced in the mentioned communities, a close look at how people learn things from each other within the community needs to be taken.

Due to the curiosity of one community member, a lot of methods and techniques were introduced to the community, which had not been there before. In Kopafo Community that was the case with coffee. Coffee had not been in the area before. However, when “the white people” arrived, a young boy of the community took action and showed his support by “helping” these people (Kioso grandfather, interview, 17<sup>th</sup> February 2012). He got involved and made it possible to have coffee and other new methods and techniques “showed” by them to the community. The community appreciated the new methods and techniques introduced by this community member. When a few community members started applying the methods and techniques “given” to them by the external people, other people in the community would see that and would express their desire to “change too” (Nancy, interview, 17<sup>th</sup> February 2012). This led to more and more people adopting new methods and techniques. They “try(ed)” out something new and felt that they “want(ed) western style too” (Nancy, interview, 17<sup>th</sup> February 2012). This means that in many cases curiosity or the desire to use “western style” products, led people to use new techniques or technologies.

The important role of “explaining” in the community can be demonstrated in the following example. The introduction of a health awareness programme changed the people’s mind-set. Before this programme was introduced, water did not play an important or central role in their culture. Water was considered as nothing important. After others “showed and explained” to the people in the community which illnesses contaminated drinking water could cause, the people “now understood” (John Poli, interview, 25<sup>th</sup> February 2012). Even people who had not understood the importance of drinking water before, did after the “explaining” of the effects and consequences of contaminated drinking water.

People of the community also express their request for learning new techniques by asking others directly to “show” certain techniques. In order to learn and acquire new techniques by “watching” requires a person who is willing to show something. How important “watching”, can be seen, if one takes a closer look on how children learn from their parents. When raising the children of the community “watching” and “helping” a very important concepts. This is how the children see how things are done and made. The parents “know” how to do all sorts of things. The kids will see it and so they will acquire their parents’ knowledge, too. The ability to “watch” and “learn” is very important. Without it they regard themselves as “useless” (John Poli, interview, 25<sup>th</sup> February 2012)..

#### **4.3.6. Analyses of the Role of PNG NARI**

According to the people of the communities NARI offered them new breeds of “Kaokao” with more vines and that mature within six months and that are resistant to special pests. More problems due to climate change have lead NARI to conduct more research with the aim of finding techniques to mitigate climate change-imposed risks. People ask NARI for advice regarding this matter, as they believe that NARI is able to “change their lives” (John Poli, interview, 25<sup>th</sup> February 2012). This mechanism requires an institution like NARI, which is willing to contribute their research to the people of the communities. The people of the community do not doubt that NARI is “good” to them and hands down information so they can “see” and “learn” new methods and technologies. NARI is seen as an option for solving problems. Problems lead to “confusion” and as emphasized before, if no one else in the community finds an “explanation” for the problem, they call NARI (John Poli, interview, 25<sup>th</sup> February 2012). The people are sure that NARI “comes” and “explains” things anytime. Their strategy is to listen to NARI’s approach. NARI “tells (them) how” just like parents tell their kids or the elderly tell the younger generations how things are done (John Poli, interview, 25<sup>th</sup> February 2012).

#### **4.3.7. Analysis the Role of Extension Officers**

As stated by the community members, over the years a lot of organisations came to the community. Most of them needed to ask the community members questions and they always answered them the questions. A lot of organisations did not return. That is why “people are fed up with answering” if nothing concrete happens (Johannes Pakatul, personal communication, 18<sup>th</sup> February 2012). However, people also expressed that if organisations like NARI worked in the community they would “help in their way” and that it could change their lives. This notion requires a strong faith in NARI and its approaches. Even if there are certain NGOs which do not return after their assessment surveys or even when organisations and institution introduce methods and techniques which the people in the community cannot use, the members of the community are still of the opinion that it might be positive to have organisations and institutions in the area.

Community members also stated that even when NARI is not able to find a solution to the community’s problems, they do not worry. In that case they would go and ask the “extension officers” of NARI who is working in the area. That means the local people do not expect that NARI knows everything. They have certain presumption of NARI which entails that the organisation knows solutions to their problems. They say about NARI: “they (might) know, we don’t know” (John Poli, interview, 25<sup>th</sup> February 2012).

#### **4.3.8. Analysis the Importance of Contributions**

NARI provides the community with knowledge. This knowledge is passed on through asking and answering questions. NARI is consulted by the people if no member of the community can come up with an answer to a given problem. NARI is doing a lot of research in order to provide specific support for the community. However, without the community people’s help, which includes that

the local people are willing to answer the questions asked by NARI, no research could be carried out. The answers are used as a starting point for their research. It is a community tradition to welcome someone and to “answer questions”. If someone visits the village it is part of their cultural tradition to welcome them by offering food and presents or in some cases even by putting up a little show. Every community member has to prepare something. People introduce themselves and give them the space to ask questions and state their intention. The community members perceive their words as “facts”, and therefore, they will listen (Nancy, interview, 17<sup>th</sup> February 2012). People listen but also discuss what they hear with the others. They observe everything in detail. Also translating what is being said into their local language shows their contribution. The people’s idea of participation is to answer the questions, asked by NARI so that work is able to “start” (John Sofe, interview, 16<sup>th</sup> February 2012).. Under special circumstances “anger” about unfulfilled promised arrangements can lead to neglecting these cultural norms, which may lead to a change of normal patterns of action. It is important to the community members that contributions to already made arrangements are acknowledged. If this is not the case, “anger” and disappointment will be expressed and addressed directly (personal observation, 12<sup>th</sup> February 2012). Giving contributions means extra effort. That means that additional effort will be emphasized to gain credit for it. It is seen as the community’s contribution to the project. Another example of how this shared contribution is demonstrated is when people of the community ask the researcher for support for writing a letter to the government asking for financial support for the project. There were some extra efforts on the part of the community members, as far as the research stay for one particular assessment was concerned: they had to build a shower and special outhouses for the researcher. That was their contribution. To make sure that this contribution is not missed they emphasize writing a report to NARI where this is stated. The researcher is the one who informs NARI of the community’s contribution. This requires an established relationship with NARI. NARI is fulfilling this wish of an established relationship by promising to “keep coming” (Johannes Pakatul, Kopafu Community, 17<sup>th</sup> February 2012).

#### **4.3.9. Analyses of the Importance of Knowledge**

As indicated before, the people of the community do not really have high expectations towards NARI, as far as getting “answers” to their problems is concerned. In most cases it will be like this and NARI can provide the community with special methods and techniques to mitigate agricultural problems. However, member of the community state “sometimes it will bring something better, sometimes not” and sometimes they “don’t know” (Ate Sofo, interview, 17<sup>th</sup> February 2012). They want to do it like their ancestors in the past who followed them too. This requires that they understand that in the past there were organisations and institutions which are worth working with. It also means that they understand these organisations and institutions have brought services or methods and techniques which have made a huge different in their daily lives. That was also the case, as explained before, with coffee. There had not been coffee in this area before but by interacting with the “white people” it was possible to have this plant also in their area. Now people in the community can afford to pay school fees as they use the money earned with the coffee harvest.

#### **4.3.10. Analysis of Priorities**

A case where these phenomena cannot be seen is the awareness programme of a NGO, which lately, has been working with this community. The strategies of this NGO will not be implemented by the men of the community. Since FPDA “tell” them how to use new methods and innovations they are able to sell more vegetables on the market. This fact is recognized and appreciated by both sexes. The other NGO cannot provide this knowledge. Therefore, their topics “are not necessary” for them (Ate Sofo, interview, 15<sup>th</sup> February 2012). For women this is different. They see the work of the NGO as something important. However, “the main priority is always given to men” and since the men are the main decision-makers within a PNG community the priorities of the community are quite clear (Nancy, interview, 17<sup>th</sup> February 2012). And even if the community does not know if NARI will have all the answers to their problems, people of the community will still work together with NARI, which implies the

assumption that NARI “is better than this one” (Ate Sofe, interview, 15<sup>th</sup> February 2012).

It can be said that the community members have certain priorities. Another big priority for the community in Kopafu is a truck. They transport vegetables by bus to the market. They can only transport a certain amount of vegetables. The community members know that a truck would help transport more vegetables to the market and so their income would rise. If they had a truck they could use a certain strategy to sell more vegetables. In that case they would all spread out. Some people would go to the supermarket, some to the local market and some to hotels. They already talked with FPDA about it. FPDA listens but so far has never responded to that inquiry. However, the community has found another way of coming closer to achieving that particular goal: every once in a while they put some money in a kind of fund which might allow them to buy a second-hand car in the future. All of this implies that they have already seen communities doing the same thing and that they say the positive aspects of acting in such a way. It is important to see that they are willing to put some effort into finding solutions on their own.

#### **4.3.11. Recap of Analysis**

It can also be observed that in some cases, not every member of the community will start applying the new methods and techniques. There are villages which have a nursery. Some villages have already got a truck (often it is not working properly), commercial trees which other community members do not have or establishments no other village in the community has. This requires, apart from a strong sense of community also the presence of individual priorities. It also implies that community members accept the fact that other members use individual methods and techniques.

Some people will try out new approaches, others will not. Even if the community discusses a problem, that does not necessarily have to mean that all community members want to take action. To help and to participate in discussions, as well



as making some sort of contribution is important within the community. They state: “we all have to” (Nancy, interview, 17<sup>th</sup> February 2012). However, it is important to keep in mind as Nelson/Wright (1995: 14f) puts it that a community is never a unit. Therefore, one big problem, which might appear, is that it will be hard to motivate community members to try out the new technologies. As we know from educational science needs to be a lot of “showing” in order make “active learning” possible. Having people participate in the project alone will not help.

## 5. DISCUSSION

As the research has shown, water has not been of special importance to the people in the communities in former times and no special ways of traditional water management or traditional irrigation techniques were revealed. Instead, research showed that there are traditional agricultural methods which are still used and, as Courke et al. (2009) underline, these methods have been modified throughout the years, which means the people in the community do not neglect the traditional ways of farming. The first hypothesis (a) can thereby not be verified. For the water related tasks in the Western Pacific EU ARD project, this means that there will have to be a lot of “showing” and people involved in “active learning”. By doing so, people of NARI would follow people’s traditional pattern of passing down knowledge from one generation to the other and would therefore show greater promise. Even though these communities had no traditional water management, it showed that the way they adopt new knowledge works in a similar way, passing knowledge from those who have the insides (e.g. development agencies) to the others by showing them their knowledge.

People in the communities do experience problems caused by the climate change. The degree of knowledge about climate change in general depends on information and resources provided from outside of the regarding communities, mainly from development agencies. By informing themselves, but mainly by having the phenomenon “explained”, people understand that the climate change is responsible for various problems they are facing now. The first part of the second hypothesis (b) can thereby not be verified. Part two of the hypothesis (b) proceeds on the assumption that the communities think the problems occur due to a lack of governmental service and infrastructure. Research showed that people in the communities are disappointed by the governmental service and infrastructure and see development organisations and institutions as an alternative to compensate for that. Nevertheless, they do not blame the state for problems in connection with the climate change. This part of the second

hypothesis (b) can thereby also not be verified. As the people in the community will keep asking NARI and other development bodies to implement health care centres and other public services, the question arises what NGOs can do to strengthen the local structures, as Courke/Harwood (2009: 474) also pointed out that the most successful community based development project are the ones which focus on transforming local polities and economies. Furthermore, an intense “explanation” of the climate change would lead to a better understanding of the positive effects of using new methods and techniques. By “explaining” more about the effects of the climate change, researchers would also follow patterns used by the people in the community themselves to pass on knowledge to each other.

Hypothesis three (c) starts with the presumption that communities and especially young people are highly affected by “western style” influences. This hypothesis can be verified in every regard, as people in the community furthermore do rather seek advice from organisations and institutions, since older generations cannot keep up with the extremely fast changing environment. Organisations and institutions play an important role, as they might pave the way for the community they are working with towards a future these communities would not have experienced without the interference of development agencies (cf. Uma Kothari speech at conference “Internationale Entwicklungsforschung und ihre Herausforderung“, University of Vienna, 28.10.2011).

The most interesting knowledge acquisition is the fact that the research results showed that there are **no expectations** from the local people living in the smallholder farming communities at all of providing new methods or techniques towards the implementing body NARI. People of the community did mention that organisations and institutions are able to „change [...] lives“(John Poli, interview, 25<sup>th</sup> February 2012). But this does not automatically implicit expectations towards them to know an answer to every problem. But this also means that even though people from the community will help by providing information for the research tasks and participate in the community meetings, not all of them will adopt the new methods and techniques and try them out.

Even if the community discusses a problem, this does not mean that all the community members want to take action. Answering research questions and participating in the discussion has to be seen more like a contribution to the project, as it is a community tradition and “all [of the community members, B.K.] have to” (Nancy, interview, 17<sup>th</sup> February 2012) underlines this conclusion, as she states that a community can never be seen as a unit with the same interests and concerns. The hypothesis that people have extremely high expectations (d) could therefore not be verified. Nevertheless, the assumption that NGOs and other implementing bodies are a compensation for the insufficient service of the government can also be noticed in the two communities.

Nevertheless, it has to be said that my statements on the adaptations in water management and irrigation systems in PNG due to climate change are limited, as my investigation is restricted to two out of 11 communities participating in the whole project. Further on, as my field access is regulated, I have to assume some uncertainties regarding the dynamics and conditions of my interaction as western researcher representing the “western style” with and among the local communities. Also, there is always a certain inchoateness which will remain in the data, as also Strauss et al. (1996: 89) point out that it will be never possible for a researcher to find everything in the data.

## **6. CONCLUSION AND OUTLOOK**

The thesis at hand gives an excellent insight into the social dynamics and structures of local communities within development projects. Local communities inherent a strong cultural heritage and it is important to know these dynamics in order to understand their expectations towards implementing bodies. The findings of this thesis give an inside on how the communities of Kerepia and Kopafu deal with the problems caused by the climate change and adapt to new knowledge coming from outside of the communities, especially from development agencies. It has been proven that they are open to new

knowledge and especially the younger generation tends to quickly adapt to the advice given by the institutions. Nevertheless, even though people in the community see development agencies as a possibility to compensate for inadequate governmental service, tremendous expectations towards implementing organisations and institutions to show them new methods and techniques are not noticed. The research showed that special traditional ways of knowledge transfer, for example, have to be adhered in order to make development projects fruitful for both parties, namely the implementing organisations or institution and the local communities. Nevertheless, one part of the research could not be fully lightened in this thesis. Even though community based development projects often implicit an emancipation of all parties, a stakeholder analyses to reveal specific structure of disparities within the development co-operation would be interesting to investigate. This theses would be a therefore a good fundamental work.

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# **Appendices**

## **I. Abstract**

My thesis evaluates the impact of expectation of communities towards the executive agency during a development project in Papua New Guinea (PNG). A five year project from the National Agricultural Research Institute (NARI) had been launched in PNG, to support and secure food security to communities in the pacific countries. The methodology of my paper involves literature research especially on trends in contemporary development assistance, as well as discussions on the efficiency of development assistance. The main core of the thesis will be the developing of a Grounded Theory on how specific local cultural structures and daily routines determine expectations towards development agencies. These communities have a firm cultural heritage and the way they pass on knowledge from one generation to another, influences the way how they handle new innovations. The data was collected during a two month research in PNG in January 2012. Huge global environmental changes had been noticed by the communities, for example, changes in weather patterns which led to seek for explanations for these problems outside the community. Research also shows that expectations from both sides are high and can easily detain the sustainability of the project. To corroborate the theory, the paper will give a short insight into the socio-cultural structure of PNG's society. However, the aim of the thesis is not to give recommendations towards NARI how to address the community, but to demonstrate structural dynamics within the community which have to be taken into account right from the beginning to guarantee the sustainability of the current project and also to ensure positive effects of upcoming projects. The thesis concludes by suggestions to broaden the research by undertaking a stakeholder analysis to reveal possible power disparities.

## **II. Kurzbeschreibung**

Die vorliegende Arbeit beschäftigt sich mit der Erwartungshaltung lokaler „Communities“ gegenüber Durchführungsorganisationen der Entwicklungszusammenarbeit (EZA). 2011 initiierte das Agricultural Research Institute (NARI) ein Entwicklungs- und Forschungsprojekt in Papua Neu Guinea (PNG) mit dem Ziel Ernährungssicherheit zu gewährleisten. Diese Arbeit umfasst eine Literaturrecherche, welche die aktuellen Entwicklungsdiskurse aufzeigt, wie auch

eine Diskussion über die Wirksamkeit von EZA. Des Weiteren wird ein Einblick über die sozio-ökonomischen Faktoren von PNG gegeben. Das Ziel dieser Arbeit ist die Entwicklung einer „Grounded Theory“ darüber, welche Erwartungshaltungshaltungen „communities“ gegenüber Durchführungsorganisationen der EZA entwickeln. Diese Arbeit kommt zu Schluss, dass die „traditionelle“ Wissensweitergabe die Art, wie die Gemeinschaft mit neuen Innovationen umgeht, beeinflusst. Die Daten für diese Arbeit wurden während eines zwei-Monatigen Forschungsaufenthaltes im Jänner 2012 in den Communities „Kopafo“ und „Kerepia“ in PNG gesammelt. Ausgangspunkt der untersuchten Projekte sind die innerhalb der letzten Jahre beobachteten Umwelt- und Klimaveränderungen. Entwicklungsagenturen gehen davon aus, dass die „community“ selbst keine Erklärung und Lösung für diese Phänomene findet und daher auf die Kompetenz der Entwicklungsagenturen angewiesen ist. Diese Arbeit unterstützt bestehende Forschungsergebnisse, die zeigen, dass Erwartungen der „communities“ wie jene der Entwicklungsagenturen sehr hoch sein können und die Nachhaltigkeit eines Projekts stark beeinflussen können. Dabei ist es kein Ziel dieser Arbeit, Vorschläge, wie sich NARI gegenüber den „communities“ verhalten soll zu erarbeiten. Die Arbeit zeigt vielmehr Strukturen und Dynamiken innerhalb der „community“ auf. Die Arbeit kann als Basis einer Akteursanalyse genutzt werden, die Machtstrukturen innerhalb des Projekts thematisiert.

### **III. Interview Guideline**

#### **1. Water Management/Water Use**

- What is the daily water use?
- Time and space allocation of water use?
- Mental note of access and use?
- Where does the sickness of water come from?
- Water rights? One Source, two communities?
- When does dry season starts? How do you know?
- Water use in dry season? Special strategies?
- What kind of water irrigation systems do you use?
- When do you water the plants in normal/dry season?
- If there is no water in the creeks anymore, what do you do?
- Are there watchmen for the water resources in dry season?
- Priorities in water use during dry season?
- Are there special traditional rituals regarding water?

#### **2. Community**

- What is the difference between family, community, clan?
- What are the most important values of the community?
- Is there a clan leader? What is he good at?
- Is there a leader of the family?
- Are there special things only women/men do?
- Daily routines?
- How do you know what to do? Are you trying out different methods to?
- What do the children do?
- How do they know what to do?
- Who makes the decision within the community?
- What happens if someone disagrees?

### 3. Expectations

- Do you have a lot of “western style” things?
- What happens with the old traditions? Generation Gap?
- Is there a special contact person to NARI?
- Are there many other organisations communing to the community?
- What do they do? Are they important to you?
- What about the government? What are they doing?
- What expectations do you have personally towards NARI?
- Anything else you would need?

## **IV. List of Interview Partners**

### **Interview Partners in the Communities**

#### *Kopafo Community, Bena Bena district, Eastern Highlands Provinces*

- Ate Sofe, Subsistence Farmer
- John Sofe, Subsistence Farmer
- Nancy, Subsistence Farmer
- Eleanore Kioso and grandfather Kioso

#### *Kerepia Community, Tambul district in Western Highland Provinces*

- John, Poli, Subsistence Farmer
- Joe Bisson, Kerepia Catholic Mission

### **Discussion Partners NARI**

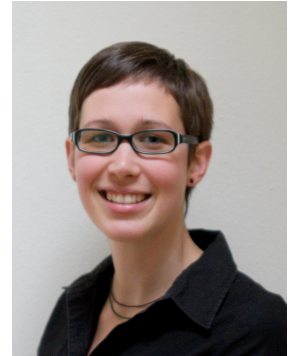
- Workneh Alaye, Project Leader, NARI Head Office Lae
- *Norah* Omot, Programme Leader, *NARI* Head Office Lae
- Akkinapally *Ramakrishna*, Main Highlands Programme, *NARI Aiyura*
- Johannes Pakatul, Regional Centre Manager, NARI Aiyura

### **Personal Discussion Partners**

- Shirley J Willie, Divine World University, Madang

## V. Curriculum Vitae

# Curriculum Vitae – Barbara Knabl



### Personal Information

Name **Knabl Barbara**  
Adress Pirk 3, 9433 Sankt Andrae, Austria  
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e-mail: [babel\\_knabl@hotmail.com](mailto:babel_knabl@hotmail.com)

Nationality Austrian

Date of birth 29<sup>th</sup> March 1986

### Academic Education and Training

Okt 2006 – Jun 2013

*Principal Subject:*  
**International Development**

*Key Focus:*

Rural Domestic Water Management, Traditional Ecological Knowledge, Global Education, Integrated Rural Development, Participatory Approach

*Diploma Thesis:*

Rural Water Management in Papua New Guinea – Expectations towards implementing Bodies

Okt 2010 – Jun 2013

*Principal Subject:*  
**Primary School Education**

*Key Focus:*

Global Education, Political Education,

*Bachelor Thesis:*

Blinde Flecken im Unterricht? Zur Aneignungs- und Vermittlungsproblematik in schulischen Unterrichtssituationen

## Studies Abroad

Jan 2009 – Jul 2009

*Support Program:*  
Erasmus Program

*University:*  
Lapin Yliopisto, University of Lapland, Rovaniemi, Finland

*Key Focus:*  
Indigenous Land Rights, Traditional Ecological Knowledge,  
Sustainable Environmental Development

Dec 2011 – March 2012

*Support Program:*  
“Short-Term Grant Abroad” from the University of Vienna

*Place:*  
Lae/Aiyura/Mt. Hagen/Madang, Papua New Guinea

*Purpose:*  
Field Study for the Diploma Thesis; Conduction of Interviews and Research Stay  
within local Communities

## Scholarships

„Short-Term Grant Abroad“ from the University of Vienna

## School Education

1996-2000

Hauptschule St. Marein, Wolfsberg, Austria

2000 – 2005

Secondary Higher School for Hospitality and Tourism, Wolfsberg, Kaernten

## Language Skills

Mother tongue

German

Other languages

*Self-assessment*

*European level <sup>(\*)</sup>*

Understanding		Speaking		Writing
Listening	Reading	Interaction	Production	

**English**

C2 Proficient	C2 Proficient	C1 Proficient	C1 Proficient	C1 Proficient
B1 Independent	B1 Independent	B1 Independent	B2 Independent	B2 Independent

**Italian**

<sup>(\*)</sup> Common European Framework of Reference (CEF) level

## IT Skills

- Microsoft Office (Word, Excel, Power Point, Outlook, Access)
- Adobe Photoshop, Macromedia (Flash, Dreamweaver)
- Atlas.ti