Community Vulnerability and Capacity Assessment in the Context of Disaster Risk Reduction

Case Studies of Villages in Kabupaten Sikka, Kabupaten Ende and Kota Serang

Tyas Ayu Lestari
Ragil Satriyo Gumilang
Aswin Rahadian
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Wetlands INTERNATIONAL

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Translated by:

Wendy Suryadiputra

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PARTNERS for RESILIENCE

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Authors	:	Tyas Ayu Lestari Ragil Satriyo Gumilang Aswin Rahadian Ita Sualia
Translated by	:	Wendy Suryadiputra
Design & Layout	:	Triana and Tyas Ayu Lestari
Contributors	:	Eko Budi P, Didik F, Kuswantoro, Bartholomeus U., Urip T.
Cover photographs	:	PFR Team

This report can be obtained from:

Wetlands International Indonesia
Jl. A. Yani No. 53 Bogor 16161
Tel. 0251 8312189
Fax. 0251 8325755
E-mail: admin@wetlands.or.id
http://www.wetlands.or.id

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Preface

Praise and thanks to God for His mercy and blessings that this report on the Community Vulnerability and Capacity Assessment in the Context of Disaster Risk Reduction conducted in three kabupaten districts at sites mentored by WIIP under the PfR (*Partners for Resilience*) Project could be completed successfully. The activities were carried out in the Kelurahan Sawah Luhur neighbourhood of Kota Serang municipality, 2 villages in Kecamatan Magepanda subdistrict of Kabupaten Sikka district (Desa Reroroja and Desa Done villages), 3 villages in Kecamatan Talibura subdistrict of Kabupaten Sikka (Desa Talibura, Desa Darat Pantai, and Desa Nangahale), and 2 villages in Kecamatan Kotabaru subdistrict of Kabupaten Ende district (Desa Tou Timur and Desa Kotabaru). This report is the result of several stages of activity, including planning and preparation, field survey, data and information analysis, and report writing.

This assessment of vulnerability level and capacity at the sites mentored by WIIP was designed to ascertain the characteristics and frequency of hazards faced by the local community, as well as the capacity possessed by the community, and the sites vulnerable to disaster impact. The authors are aware that this report is far from perfect. Field constraints were a limiting factor in the acquisition of data and information.Nevertheless, the authors hope that all the information contained in this report will be of use to the community, local village and district/municipal governments, as well as to other parties who have an interest in reducing the disaster risk at those sites, and that in future it will be a consideration in sustainable ecosystem management, and in deciding on mitigation steps for Disaster Risk Reduction (DRR).

Bogor, December 2012

Wetland International Indonesia

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List of Terms and Abbreviations

AUSAID	Australian Agency for International Development
BANGWITA	Community empowerment foundation for the development of Tana Ai area. The foundation was set up in 1994 (Bangwita in 2002). Bangwita focuses its activities on sustainable agricultural development and organic farming.
BAPPEDA	Regional Development Planning Agency (*Badan Perencanaan dan Pembangunan Daerah*)
BKSDA	Agency for the Conservation of Natural Resources (*Balai Konservasi Sumber Daya Alam*)
BLHD	Regional Environment Agency (*Badan Lingkungan Hidup Daerah*)
BOS	School Operational Assistance (*Bantuan Operasional Sekolah*)
BPBD	Regional Disaster Mitigation Agency (*Badan Penanggulangan Bencana Daerah*)
BRI	Bank Rakyat Indonesia
CAPD	Pulau Dua Nature Reserve (*Cagar Alam Pulau Dua*).
CARITAS	A confederation of 165 catholic aid organisationsworkingin development and social services. Caritas works in over 200 countries.
COREMAP	Coral Reef Rehabilitation and Management Programme.
DIAN DESA	A local NGO that plays an active role in community development, focusing on the development of appropriate technology
DO	Dissolved Oxygen, the concentration of oxygen dissolved in water
DEM	Digital Elevation Model
Dephut	Ministry of Forestry (*Departemen Kehutanan*, abbreviated as Kemenhut or MoF)
DRR	Disaster Risk Reduction
Ecosystem	Defined as “a complex in which habitat, plants and animals are considered as one interacting unit, the materials and energy of one passing in and out of the others”(Woodbury, A.M. 1954. Principles of general ecology. McGraw Hill Book Co., New York in Setiadi, 1983).[1]

[1]Setiadi, Y. 1983. Pengertian Dasar Tentang Konsep Ekosistem. Published by Fakultas Kehutanan IPB. Bogor

ECOSYSTEM MAPPING	An activity to identify the existence of types of ecosystems in a certain area, including the bio-physical-socio-economic characteristics/ conditions in and around it. Mapping is assisted by Remote Sensing and accompanied by field survey / verification.
EMR	Ecosystem Management & Rehabilitation
EWS	Early Warning System
FPRB	Disaster Risk Reduction Forum (*Forum Pengurangan Resiko Bencana*)
GAPOKTAN	Association of Farmers' Groups (*Gabungan Kelompok Petani*)
GPS	Global Positioning System
HAK ULAYAT	This is a communal land right under traditional adat law that entitles the indigenous inhabitants of a certain area to benefit from its natural resources, including the land itself, to sustain their lives. This right arises from the uninterrupted hereditary physical and spiritual bonds of the traditional community.
INSIST	Indonesia Society for Social Transformation
KK	Head of household (*Kepala Keluarga*)
LSM	Local NGO (*Lembaga Swadaya Masyarakat*)
MCK	Bathing, washing and toilet facilities (*Mandi-Cuci-Kakus*)
MOSALAKI	Traditional adat elder in the Sikka and Ende districts
MUDIKA	Catholic youth organisation
NGO	Non Government Organisation
NTT	East Nusa Tenggara (*Nusa Tenggara Timur*)
PAMSIMAS	Community based provision of drinking water and sanitation (*Penyediaan Air Minum dan Sanitasi Berbasis Masyarakat*)
PAROKI/PARISH	A catholic community having defined limits and forming part of a diocese
PAUD	Early Learning (*Pendidikan Anak Usia Dini*) – equivalent to playschool
PEMPROV	Provincial Government (*Pemerintah Propinsi*)
PEMKAB	District Government (*Pemerintah Kabupaten*)
PERDES	Village Regulations (*Peraturan Desa*)
PfR	Partners for Resilience
PIKUL	Various Community Study Circle (*Lingkar Belajar Komunitas Bervariasi*) – a local NGO in Kupang
PKK	Family Welfare Education (*Pendidikan Kesejahteraan Keluarga*)

PMI	Indonesian Red Cross (*Palang Merah Indonesia*)
PNPM	National Community Empowerment Program (*Program Nasional Pemberdayaan Masyarakat*)
POLINDES	Village Maternity Polyclinic (*Poliklinik Bersalin Desa*)
POLLUTION	The entry or introduction of living creatures, matter, energy and/or other components into a particular environment by human activity, such that the environmental quality deteriorates to a level which causes that environment to be unable to perform its alloted function.
PRA	Participatory Rural Appraisal
PRB	DRR
PUSKESMAS	Public Health Centre (*Pusat Kesehatan Masyarakat*), usually in every *kecamatan*sub-district
RT	Neighbourhood Association (*Rukun Tetangga*): the lowest level of administration, comprising a number of households
RW	Community Association (*Rukun Warga*): the second to lowest level of administration, comprising a number of RTs
RESTORATION	The effort to restore the function of mined land to its former condition.
SANRES	*Yayasan Flores Sejahtera*: Flores welfare foundation
SD	Primary school (*Sekolah Dasar*)
SHM	Freehold land ownership certificate (*Surat Hak Milik*)
SIBAT	Community Based Disaster Preparedness (*Siaga Bencana Berbasis Masyarakat*): a PMI program for NTT
SLTA	Senior high school (*Sekolah Lanjutan Tingkat Atas*)
SLTP	Junior high school (*Sekolah Lanjutan Tingkat Pertama*)
SPPT	Annual Tax Notification/Invoice (*Surat Pemberitahuan Pajak Tahunan*)
SWISSCONTACT	An international development organisation established by the Swiss private sector, having more than 30 years experience in Indonesia
TDS	Total Dissolved Solid: total amount of dissolved solids in water
VCA	Vulnerability and Capacity Assessment
WII	Wetlands International Indonesia
YASBIDA	*Yayasan Bina Daya Cabang Sikka*: Sikka branch of the *Yayasan Bina Daya* Foundation

1. Introduction

1.1. Background

Indonesia is a country of multiple disasters. There are around 13 types of disaster that could occur at any time. More than 200 million of Indonesia's inhabitants are exposed to the possibility of tsunami, with around 5 million living in tsunami-prone areas. Moreover, being located in the "*Ring of Fire*", Indonesia also possesses about 400 volcanoes of which 100 are still active. Other hazards arise from environmental destruction and over-exploitation of natural resources, which trigger a range of disasters. Despite this reality, many of the country's inhabitants are still unprepared to cope with disaster.

Currently, the frequency of disasters has been increasing along with the effects of climate change, like drought, floods, abrasion, etc. Consequently, it is vital that people learn about disaster so as to mitigate its impact. Because of Indonesia's vast geographical area, the key to dealing with disaster lies in preparedness and mitigation. Wetlands International–Indonesia Programme (WIIP) is currently in the midst of efforts directed towards disaster risk reduction and adaptation to climate change in several parts of Indonesia through Partners for Resilience (PfR) activities. These areas include Kelurahan Sawah Luhur-Kota Serang, 2 villages in Kecamatan Magepanda-Kabupaten Sikka (Desa Reroroja and Desa Done), 3 villages in Kecamatan Talibura-Kabupaten Sikka (Desa Talibura, Desa Nangahale, and Desa Darat Pantai), and 2 villages in Kecamatan Kotabaru-Kabupaten Ende (Desa Kotabaru and Desa Tou Timur). All these PfR activities will continue until 2015, with several main objectives including to (1) Improve and build the community's capacity to face disaster risk and climate change, (2) Improve and strengthen institutions at various levels and local NGOs, and (3) Undertake advocacy on environmental management activities related to disaster risk reduction and adaptation to climate change so that they will be included in and become regional management plans. All of the abovementioned objectives will lead towards creatinga community with solid human resources and livelihoods.

Assessment is an element of the PfR activities at these sites, its purpose being to evaluate the effectiveness and development of the activities there. The entire analysis is contained in the report "Community Vulnerability and Capacity Assessmentin the Context of Disaster Risk Reduction". This report is a living document which will continue to develop while the PfR activities continue. Even though the Assessment was performed in 2012, the information presented will continue to develop along with the development of field activity until the end of the project.

1.2. Objectives

This Assessment of the Vulnerability Level and Capacity of Communities in several WIIP mentored villageshas the following objectives:

1. To identify the characteristics, frequency and potential of hazards that frequently occur in these villages;

2. To identify the particular areas and inhabited sites that are most vulnerable to disaster impact;

3. To identify elements in the community environment that could be impacted by disaster and their capacity for dealing with it;

4. To identify the community's existing capacity for coping with disasters and the impacts resulting from such disasters;

5. To recommend priorities for ecosystem management in the context of disaster risk reduction (DRR).

1.3. Benefits

The information obtained from this Community Vulnerability and Capacity Assessment is expected to provide benefits for various parties and interests, including:

1. To assist stakeholders to determine a range of ecosystem management strategies in the context of disaster mitigation at the various sites assessed ;

2. To assist stakeholders to determine and develop community capacity in the context of disaster risk reduction (DRR);

3. To provide a satisfactory information and data base that can serve as a reference in monitoring the developing impact ofthe various activities, both for disaster prevention and environmental restoration (repair);

4. To support efforts directed at policy improvement in ecosystem management and environmental campaigning.

2. Method of Assessment

2.1 Sites and Times

This community vulnerability and capacity assessment was performed in three different districts: Kota Serang municipality in Banten Province, and Kabupaten Sikkaand Kabupaten Ende in East Nusa Tenggara Province (Figure 1). Details of these sites can be seen in Table 1. The sites were not limited administratively,and external factors were also taken into account while performing the assessment at these sites. The assessment was carried out at different times at each site. Details of these times are presented in Table 2. Preliminary information was collected through a literature study to obtain secondary data, while primary data was obtained directly at the site as shown in Table 2. Primary data was obtained through direct interviews with members of the community, the completion of questionnaires, and the construction of transect maps, all of which were carried out in 2012.

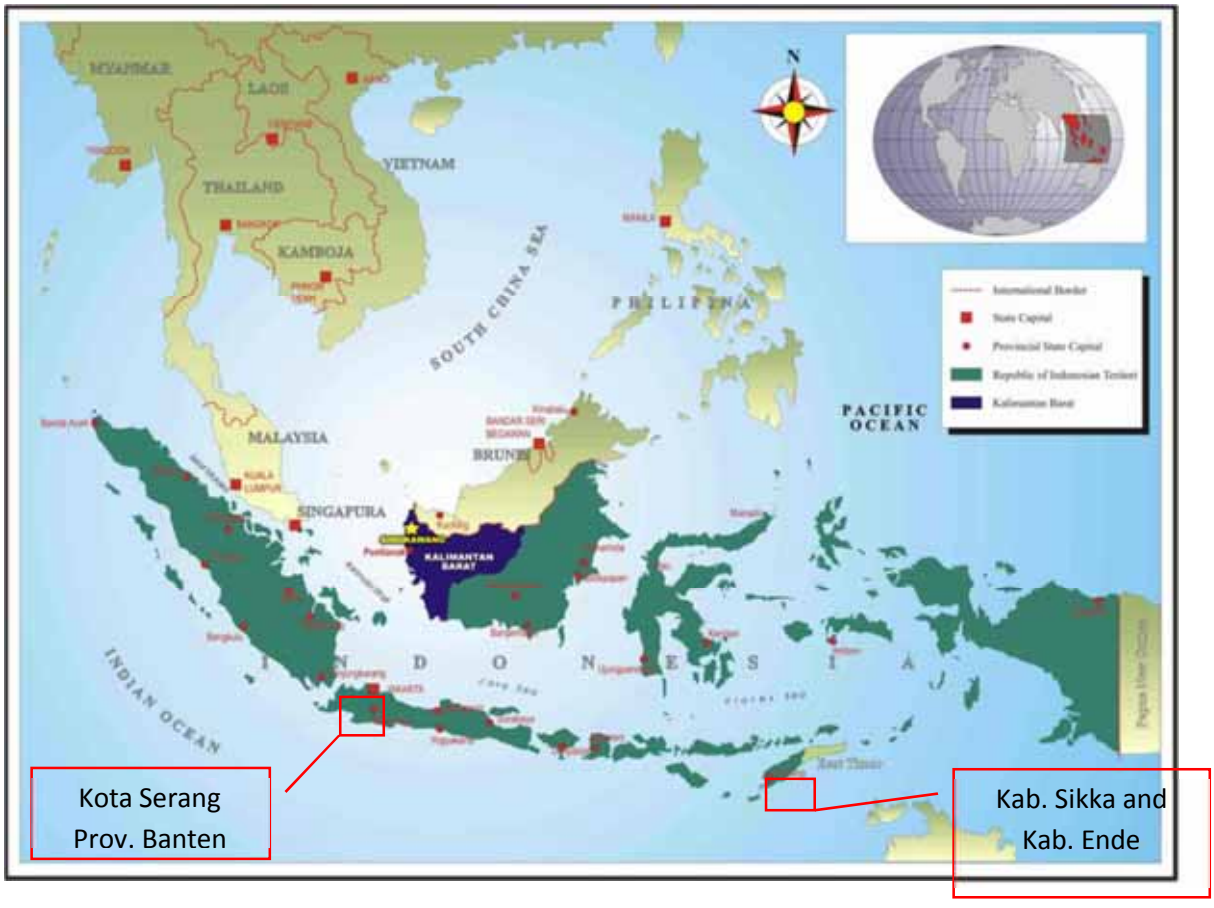


Figure 1. *Sites for Community Vulnerability and Capacity Assessment in the Context of Disaster Risk Reduction.*

Table 1. Sites for Community Vulnerability and Capacity Assessment in the Context of Disaster Risk Reduction

Province	District/Municipality (Kabupaten/Kota)	Sub-district (Kecamatan)	Site
Banten	Serang	Kasemen	Kelurahan Sawah Luhur
Nusa Tenggara Timur (NTT)	Sikka	Magepanda	Desa Reroroja • Dusun Mageloo • Dusun Koro • Dusun Duli
			Desa Done • Dusun Watuwa • Dusun Ladublewa • Dusun Detunggawa
		Talibura	Desa Nangahale • Dusun Nangahale • Dusun Namandoi • Dusun Utan Wair • Dusun
			Desa Talibura • Dusun Kampung Baru • Dusun Talibura • Dusun Tanah Merah • Dusun Habihodot
			Desa Darat Pantai • Dusun Wairwua • Dusun Blatat • Dusun Napong Gelang
	Ende	Kotabaru	Desa Kotabaru • Dusun 1 • Dusun 2 • Dusun 3 • Dusun 4
			Desa Tou Timur (Focused on two villages only) • Dusun Wolotou • Dusun Mulawatu

Table 2. Activity Schedule for Community Vulnerability and Capacity Assessment in the Context of Disaster Risk Reduction

No	Site	Activity Schedule
1	• Kelurahan Sawah Luhur (Kota Serang-Prov.Banten)	• Literature study 1996-2012 • Primary and secondary data collection at the assessment site March-April 2012 • Construction of transect map March-April 2012
2	• Desa Darat Pantai, Desa Talibura, Desa Nangahale (Kec Talibura-Kab.Sikka, Prov.NTT) • Desa Reroroja, Desa Done (Kec.Magepanda-Kab.Sikka, Prov.NTT)	• Literature study began in February 2012 • Primary and secondary data collection at the assessment site April-May 2012 • Construction of transect map April-May 2012
3	• Desa Kotabaru, Desa Tou Timur (Kec.Kotabaru-Kab.Ende,Prov.NTT)	• Literature study began in February2012 • Primary and secondary data collection at the assessment site April-May 2012 • Construction of transect map April-May2012

2.2 The Assessment Team

The assessment team was organised into three groups, i.e. one for each of the three sites (Kota Serang municipality, Kabupaten Sikka, and Kabupaten Ende). The team consisted of experts on the topics to be assessed and field facilitators who understood the sociological conditions at each research site. The assessment team for each site can be seen in Table 3.

Table 3. Assessment Team at Each Assessment Site

Team	Assessment Team Members	Assessment Field	Assessment Site
1	Tyas Ayu Lestari	Vulnerability of Human Resources *(SDM)* and Natural Resources *(SDA)*	• Kelurahan Sawah Luhur
	Ita Sualia	Socio-economics	
	Ragil Satriyo Gumilang	Ecosystem Mapping	
	Urip Triyanto	Facilitator	
2	Tyas Ayu Lestari	Vulnerability of Human Resources and Natural Resources and Socio-economics	• Desa Reroroja • Desa Done • Desa Kotabaru • Desa Tou Timur
	Aswin Rahadian	GIS and Ecosystem Mapping	
	Ragil Satriyo Gumilang	Forestry and Land Rehabilitation	
	Didik Fitriyanto	Facilitator for Kec.Magepanda and Kec.Kotabaru	
	Bartholomues Udak	Technical Field Staff	
3	Tyas Ayu Lestari	Vulnerability of Human Resources and Natural Resources and Socio-economics	• Desa Nangahale • Desa Talibura • Desa Darat Pantai
	Aswin Rahadian	GIS and Ecosystem Mapping	
	Ragil Satriyo Gumilang	Forestry and Land Rehabilitation	
	Kuswantoro	Facilitator for Kec.Talibura	
	Bartholomues Udak	Technical Field Staff	

2.3 Equipment and Materials

2.3.1 Equipment

Equipment used during the assessment:

- Camera
- Tally sheet
- Recorder
- Stationery
- GIS and Remote Sensing software
- Global Positioning System (GPS) to determine coordinates

2.3.2 Materials

The materials used during the assessment can be seen in Table 4.

Table 4. Materials Used during the Research

No	Site	Materials
1	• Kelurahan Sawah Luhur (Kota Serang-Prov. Banten)	• GeoEye Imagery , acquisition date 14 April 2009 • Maps of Land Cover and Use • *Tambak* (coastal aquaculture pond) ownership map for 2011 • Questionnaire
2	• Desa Darat Pantai, Desa Talibura, Desa Nangahale (Kec Talibura-Kab.Sikka, Prov.NTT) • Desa Reroroja, Desa Done (Kec.Magepanda-Kab.Sikka, Prov.NTT)	• High Resolution Satellite Imagery (Extraction and Modification from Google Earth) • Questionnaire
3	• Desa Kotabaru, Desa Tou Timur (Kec.Kotabaru-Kab.Ende,Prov.NTT)	• High Resolution Satellite Imagery (Extraction and Modification from Google Earth) • Questionnaire

2.4 Data Collection Techniques

Data and information were collected via the following techniques:

2.4.1 Social, Economic, Vulnerability and Community Capacity Data

1. Literature study of general information publications: village monographs, disaster information, biodiversity, and literary references that support data and information in the field.

2. Rapid Rural Appraisal (RRA) was performed prior to carrying out detailed measurements in the field.The purpose of RRA was to identify natural resource uses at the research site which were related to disaster and adaptation to climate change, and to determine target respondents.

3. Participatory Rural Appraisal (PRA) was performed to obtain primary data. PRA was carried out together with the community represented by a number of respondents at each research site. Respondents were selected with regard to the following criteria: age, gender, educational level, type of employment. All the respondent criteria were set with the purpose of minimising possible information bias in the field. PRA was performed through the following activities:

    - Presentation of disaster-related materials to provide the community with a basic understanding as well as to guide them when directly involved in field activities, both in field observation and interviews.
    - Focus Group Discussions (FGD) to obtain detailed information in the field and to know the realities related to community vulnerability and capacity.
    - Completion of prepared questionnaires. The purpose was to obtain information on community perspectives and additional information about disasters, vulnerability and the capacity of the community at the assessment site.
    - In-depth interviews with respondents and key-informants, to reinforce information already gathered. Key-Informants comprised policy holders and influential persons at the assessment site.

All the information obtained, whether from questionnaires, FGD or in-depth interviews, referred to the Participatory Risk Assessment (PRA) module developed by Wetlands International South Asia. Information and data on respondents was gathered using a purposive random sample (Respondents selected at random and with a particular purpose). Many of the respondents were members of a group mentored by Wetlands International Indonesia Programme.

2.4.2 Biophysical Data and Mapping

1. In-situ water quality measurements were taken using DO meter, SCT meter, and pH meter. The DO (Dissolved Oxygen) meterwas used to measure DO and water temperature, the SCT meter for TDS (Total Dissolved Solids) concentrations and water salinity, and the pH meter to obtain water pH (acidity) levels.

2. Transect Mapping and transect history analysis were performed together with the community from an ecosystem viewpoint. Transect mapping and transect history analysis are tools in the analysis of VCA (Vulnerability and Capacity Assessment) to get a picture of the geographical zone differences in land use and changes, such as in housing and stretches of ricefields, aquaculture farms, forest, etc. The assessment team investigated the natural resources ecosystem management dynamics of various land covers and transect change history.

3. Spot Mapping was performed to facilitate a visual understanding of the layout of various development facilities (village office, schools, places of worship, irrigation channels, rural roads, etc.) and the delineation of ecosystems and stretches of land (housing areas, ricefields, forest, etc.) and potential disaster sites.

2.5 Methods of Analysis

Analysis of data and information obtained in the field was divided into two categories: socio-economic and natural resources. A detailed explanation of each method of analysis follows below.

2.5.1 Socio-economic Analysis

- ***Information on the Assessment Site (Village), Demographyand Village Economy***
  Information about the site comprised a general picture of the village and other general information (socio-economic, demographic, etc.) obtained from village monographs and information boards in each village office. In addition, other information was obtained from local village officials and traditional *Adat* elders having authority at that site.
- ***Vulnerability and Capacity Assessment (VCA) Analysis***
  VCA analysis was performed through PRA activities, specifically FGDs, questionnaire completion, and in-depth interviews with respondents. The information obtained was presented in figures and tables using Ms. Excel software.
- ***Stakeholder Analysis***
  Stakeholder analysis consisted of the identification and respondents' perceptions of various stakeholders at the assessmentsite.The information and data obtained were processed into the form of tables and figures using Ms. Excel software.

2.5.2 Natural Resources Analysis

- ***Analysis of Vegetation, Land Cover, Ecosystem***
  Analysis of vegetation and land cover was done by a transect walk through the entire village area from hill forestto the coast. The information obtained was processed into the form of transect maps, spot maps, pictures, and descriptions.
- ***Map Analysis***
  Information gathered for all the maps related to the assessment site made use of GPS and was analysed using a range of software. Apart from map output, other information, such as area, boundaries, etc. was also obtained using these softwares.
- ***Analysis of Transect Maps and Spot Maps***
  Both maps were made participatively. Participative mapping by the Assessment Team was done with the help of a pre-prepared, printed high resolution working map. This working map described land cover conditions on a more accurate scale. The first step taken was to get together the community leaders who knew the village area and ask them to draw a sketch of the village's situation and/or to add information to the pre-prepared working map. Next, this drawing was discussed in a forum and the other participants asked to give their opinion as to whether the sketch was correct and to discuss the ecosystem dynamics. Information obtained included:1) Land status, 2) Current use, 3) User group, 4) Productivity, 5) Constraints, 6) Solutions. The last step was for a field ground check to be carried out jointly by the Assessment Team and community, as a basis for analysis and creation of a more accurate village map. Field surveys were conducted from north to south, or west to east, or from the end of one road to another road, or from high ground to low. Information obtained included: 1) village boundaries, 2) the position of village facilities and infrastructures, 3) village potentials, 4) the sites of disaster events and threats. Examples of the maps produced from this participative analysis are presented in Figures 2-5.

Figure 2. *Working Map*

Figure 3. *Spot Map*

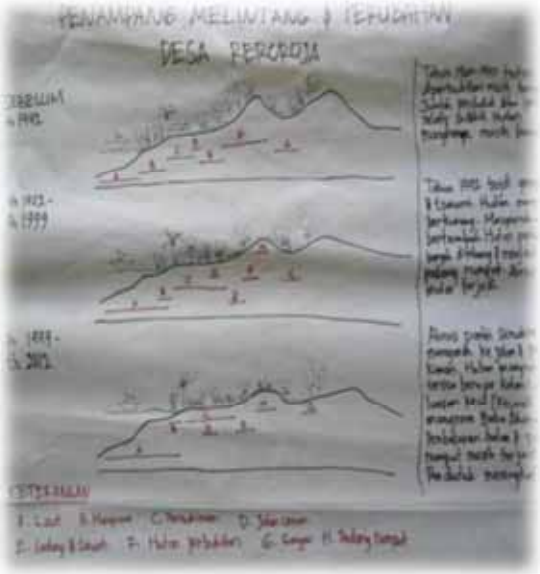


Figure 4. *Transect Map*

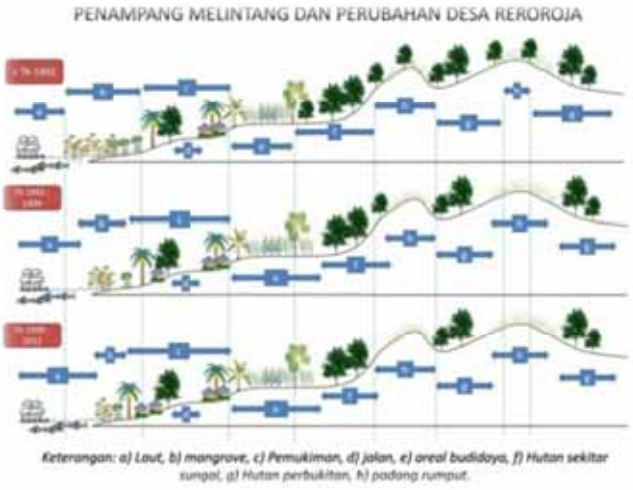


Figure 5. *Evaluation and Presentation of Transect Map*

2.5.3 Water Analysis

Information on the water quality at each assessment site was obtained by taking in-situ measurements directly in the field. Parameters tested included DO, temperature, salinity, water pH level and TDS concentration. These were all measured using portable instruments, i.e. SCT meter, DO meter and pH meter. Results from the field were then compared against the quality standards in force, which are:

- Quality standard according to Indonesian Government regulation No.8 of 2001 on Water Quality Management and Water Pollution Control (*Peraturan Pemerintah RI Nomor 82 Tahun 2001 tentang Pengelolaan Kualitas Air dan Pengendalian Pencemaran Air*)

- Potable Water Quality Standard according to the Indonesian Health Minister, NO.492/MENKES/PER/IV/2010

2.5.4 Priority Analysis and Ecosystem Management Scenarios

Environmental priority analysis was undertaken by asking respondents to rate certain items by assigning them scores on a scale of 1-9 (Saaty Scale modified, see Table 5). Each score represents the respondent's perception of the three areas of assessment to be analysed: ecological assessment (natural resources), socio-economic, and institutional. Each of these assessments possesses certain attributes as shown in Table 6. The information obtained was then analysed using Cdplus30 software to determine the priority problems that should be solved first. The scenarios were as follow:

- Scenario A : managed entirely by local government so control, activities and supervision are wholly the government's responsibility

- Scenario B : jointly managed by the local government and village community. Government holds control while all management activity is performed through government-community cooperation. In addition, government and community also work together to supervise all management activity so as to create overall cooperation and responsibility

- Scenario C : managed entirely by a third party, such as a private enterprise, local NGO, or other party having an interest in the site.

Table 5. Saaty Scale Modified

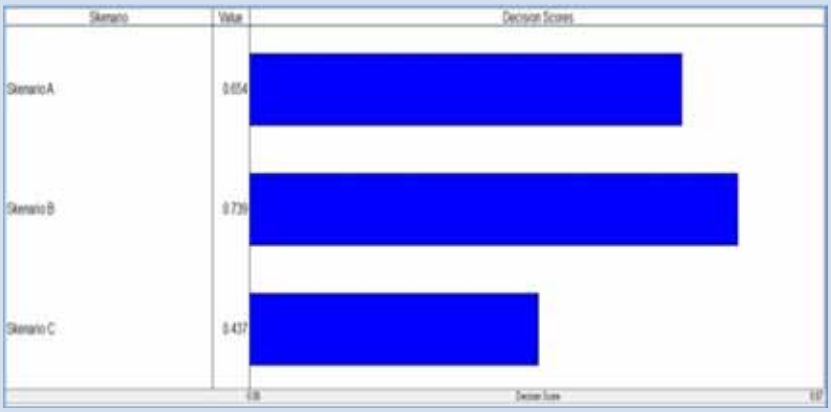
Saaty Scale	Meaning
1	Not Important
3	Not very important
5	Moderately Important
7	Important
9	Extremely Important
2, 4, 6, 8	Intermediate values

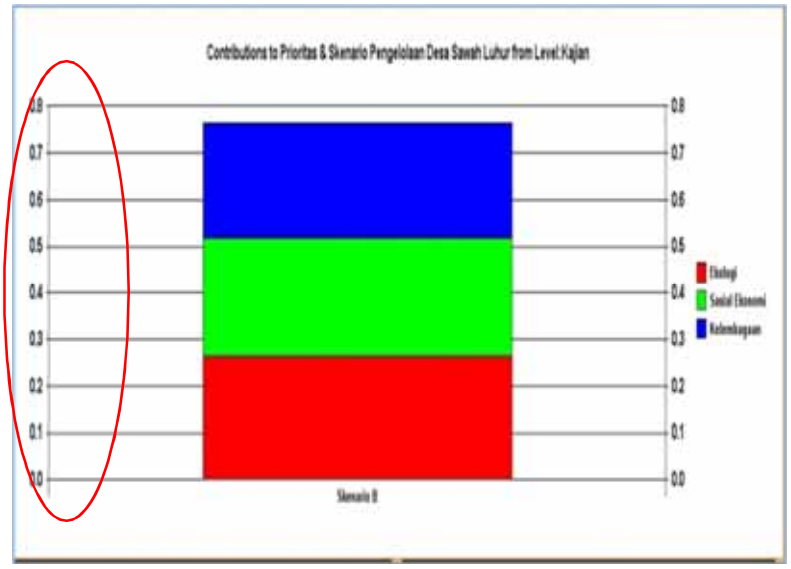
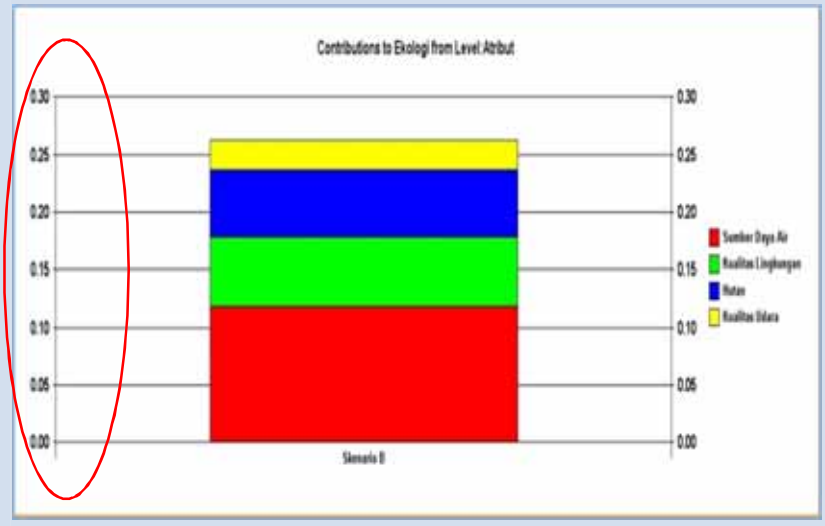
Table 6. Environmental Management Scenarios

Assessment	Attributes
Ecological (Natural Resources)	Water Resources
	Forest Condition
	Air Quality
	Environmental Quality
Socio-Economic	Community Opinion
	Educational Level of the Community
	Community Participation and Understanding of Disaster and Disaster Impact Reduction
Institutional	Local Governance
	Infrastructure readiness/ condition
	Human Resources Development

The analysis gave rise to a number of graphs showing the environmental management scenario chosen by the respondents. In addition, the analysis indicated the management priorities recommended for urgentimprovement, both at the assessment level and attribute level within each assessment. This interpretation is presented in Table 7.

Table 7. Results of Environmental Management Priorities Analysis

Analysis Results	Remarks
	• Analysis results with highest value indicate the scenario recommended for environmental management at the assessment site. • The values will differ at each site, depending on the average of the values entered on the questionnaire (***Annex 8 Part I***). • Values will also depend on the number of respondents analysed

Analysis Results	Remarks
	• Bar colours (red, green and blue) indicate the assessment having the highest priority to be addressed. • Red area indicates top priority, green second and blue third. • The numerical scale at left of the graph (circled in red) shows values based on average valueobtained for a number of respondents (***Annex 8 Part H***). • This numerical scale will vary for each site as it depends on the average from questionnaires completed by respondents and on the number of respondents who completedthem. • The scale in this graph is not finite (e.g. 0 to 1) as the value will change at each site.
	• Top management priority is shown in red, second in green, third blue and fourth yellow. • The value obtained in each assessment will differ depending on the number of attributes offered (as the number was not always the same)and the average resulting from the questionnaire at each site (***Annex 8 Part H***). • The scale in this graph is not finite (e.g. 0 to 1) as the value will change at each research site.

3. Assessment Results

3.1 Kelurahan Sawah Luhur in Kota Serang Municipality

3.1.1 Profile of Kelurahan Sawah Luhur

3.1.1.1 General Description of Kelurahan Sawah Luhur

Kelurahan Sawah Luhur lies within the administrative sub-district Kecamatan Kasemen. Geographically, it is situated at coordinates 06°01'05"-06°02'05" Southand 106°11'38"-106°13'14" Eastand, as it borders directly onto the sea, is categorised as a coastal village. Kelurahan Sawah Luhur borders directly onto the Java Sea to the north, onto Desa Kolasan to the south, Desa Margaluyu to the west and Kecamatan Pontang, specifically Desa Sukajaya, to the east. An administrative map of Kelurahan Sawah Luhur is presented in Figure 6. Kelurahan Sawah Luhur covers an area of 1894 ha, a large part of which is used for rice farming and the rest for coastal aquaculture ponds.

Figure 6. *Map of Kelurahan Sawah Luhur.*
Source: Google Earth modification (2012).

The status of Kelurahan Sawah Luhur changed in 2007 when Kabupaten Serang district became part of Kota Serang municipality. Prior to this, Sawah Luhur had been a rural village (*desa*) with a Village Head elected directly by the community. As a result of the change, however, it became an urban village (*kelurahan*) with its Head appointed directly by the Kasemen District Head (*Camat*).

Access to Kelurahan Sawah Luhur is quite easy. The 6 metre wide main road connecting Kelurahan Sawah Luhur to Kota Serang has been tarmacked. The distance from Kota Serang to Kelurahan Sawah Luhur is 15 km. In addition to land access, Kelurahan Sawah Luhur can also be reached by sea by boat, departing from Pelabuhan Karang Hantu harbour or Pelabuhan Kali Kemayung harbour. Facilities and infrastructures in Kelurahan Sawah Luhur can be accessed easily. Nevertheless, some of them still need attention, especially the supply of clean water. The water source for this village is of poor quality, tasting brackish. The educational facilities in Kelurahan Sawah Luhur are adequate, from primary school (SD) through to senior highschool (SLTA), with both state and private schools available. Health facilities in the village include a public health centre (*Pusat Kesehatan Masyarakat /Pustu*) and an integrated health services post (*posyandu*). Villagers suffering serious illness usually seek treatment at the General Hospital in Serang (*Rumah Sakit Umum Daerah Kota Serang*). Detailed information on facilities and infrastructure in Kelurahan Sawah Luhur is presented in Table 8.

Table 8. Public Facilities and Infrastructure in Kelurahan Sawah Luhur

Type of Facility	Details	Number
Educational	School buildings	16
	Teachers	20
Religious	Mosques	10
	Musholas	14
Health	Public Health Centre (*Puskesmas*)	1
	Village Health Post (*Poskesdes*)	1
	Midwives	2
	Paramedic	1
	Doctor	1
	Polyclinics/ Medical Centres (*Balai Pengobatan*)	3
Transportation	Provincial road	4 km
	District (*Kabupaten*) roads	3 km
	Village roads	1.5 km
	Local roads (*Jalan Lingkungan*)	1.256 km
Government	Village Office (*Kantor Desa*)	1
Sport	Football fields	2
	Volleyball courts	2
	Badminton courts	2
	Table tennis	1
Financial	Cooperative	1

3.1.1.2 Institutions in Kelurahan Sawah Luhur

Institutions in Kelurahan Sawah Luhur hold an important role in policymaking related to environmental management. By "environment" is meant both the physical and social environments. Institutions in Kelurahan Sawah Luhur comprise various stakeholders who interact directly with Sawah Luhur's natural resources, particularly due to the presence of Pulau Dua Nature Reserve (*Cagar Alam Pulau Dua / CAPD*). Besides, economic life and activities to enhance the community's capacity to mitigate disaster impact are not unaffected by the various stakeholders in Sawah Luhur. Details of stakeholders in Kelurahan Sawah Luhur are presented in Table 9.

Table 9. Stakeholders having a Role in Environmental Management in Kelurahan Sawah Luhur

Type of Institution	Name of Institution	Activities Undertaken	Ranking (Score 0-5)
LSM/ NGO	Macan Kikik (Domiciled and working in Sawah Luhur)	• Environmental conservation	3
	Wetlands International Indonesia Program (Working in Sawah Luhur)	• Coastal rehabilitation of Pulau Dua area • Mangrove reforestation • Community capacity building	4
Bank/ Financial Institution	Mobile Bank (*Bank Keliling*) (Financiers : financial institution or private individual)	• Loans	2
Religious Institution	Forum Ulama Desa	• Religious	3
Agricultural and Fisheries Extension Services	Gabungan Kelompok Petani Petambak (Gapok) (Association of Aquaculture Farmers' Groups)	• Help with provision of seeds • Help with provision of fertilizer and farming necessities • Provides information on agriculture and fishery	4
Government Institutions	Ministry of Forestry	• Controls CAPD policy	4
	Agriculture and Fisheries Office (*Dinas Pertanian dan Perikanan*)	• Extension services • Help with provision of seeds, fertilizers for farmers	3
	Village Government	• Carries out village government • Plans AnnualRegional Budget (APBD) • Issues village bylaws and policy	4
Education	Playschool/ Early Learning (TK/ PAUD) (2 schools)	• Education	1
	Primary Schools (7)	• Education	4
	Junior Highschools (3)	• Education	3
	Senior Highschool (1)	• Education	2

Note: Ranking based on the number of facilities and/or activates performed at the site

Government institutions are stakeholders who have the authority to carry out most of the environmental management policy for Sawah Luhur. In addition, the participation of local and international NGOs and the community also contributes significantly to environmental management there.The presence of CAPD nature reserve is an asset because it acts as a natural defence against potential threats and hazards from the sea and in the mitigation of climate change. Besides this, the other institutions listed in Table 9 each have their own role to play according to their individual function. In general, all the stakeholders play a very significant role in disaster risk reduction. For example, extension service agencies, educational and religious institutions make a big contribution to character formation and character strengthening in the community. Financial institutions in the form of a mobile bank also indirectly help to strengthen the local economy, although they are not good for the community if interaction is too frequent, because of the high interest rates charged on loans.

3.1.2 Community Profile for Kelurahan Sawah Luhur

Information to create a profile of the Kelurahan Sawah Luhur community was obtained by getting the respondents together in a Focus Group Discussion (FGD). The FGD included presentation of material by the WIIP Team and interviews based on guided questions from a pre-prepared questionnaire.

The analysis showed that Kelurahan Sawah Luhur respondents were of various ages. The average age was around 40 years, the youngest being 17 and the oldest 65. This age range made it possible to get information from varying points of view, from the past until the present. Respondents who took part in the FGD were all male and members of KPPAD mentored by Wetlands International Indonesia Programme. As regards educational level, most of the respondents had either never attended school or had attended only primary school, compared to those who had reached a higher level. This information is presented in Figure 7.

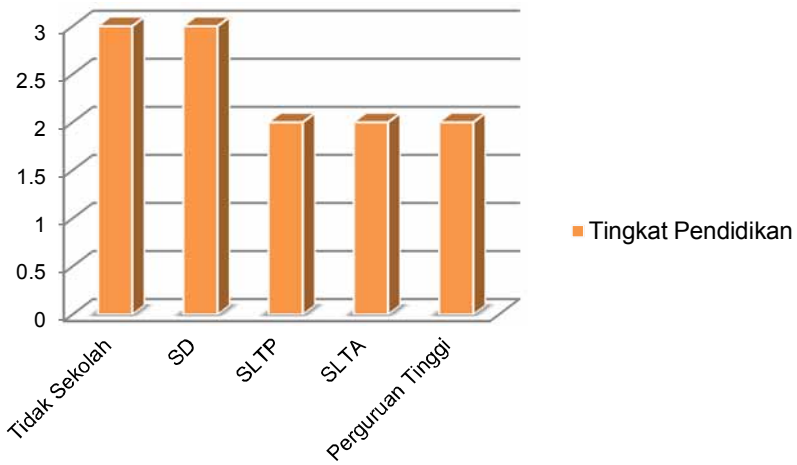


***Figure 7**. Educational Level of Respondents in Kelurahan Sawah Luhur*
Captions: Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi).

Besides educational level, information on respondents' livelihoods is presented in Figure 8 and 9. Figure 8 shows that most respondents were aquaculture farmers or civil servants. This is because most of the respondents who attended the Risk Analysis FGD were members of the KPPAD mentored by WIIP. Figure 9 shows that most respondents did not have a side job so depended heavily on the produce from their ponds and the programs from WIIP.

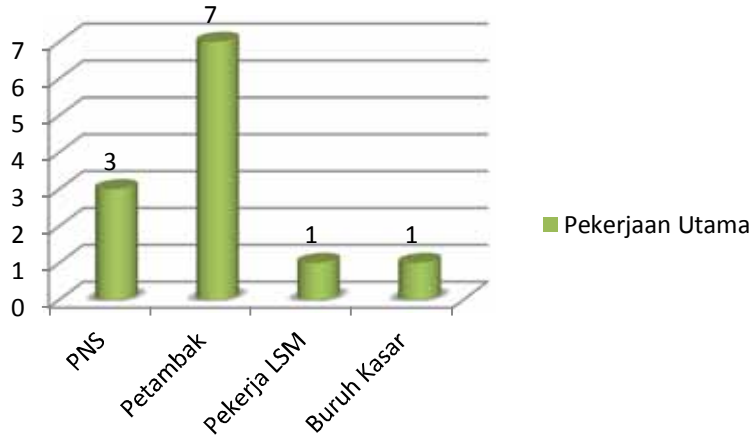


Figure 8. *Main Occupation of Respondents in Kelurahan Sawah Luhur.*
Captions: Civil Sevarnt (PNS), Aquaculture Farmers (Petambak), NGO Staff (Pekerja NGO), Labourer (Buruh Kasar).

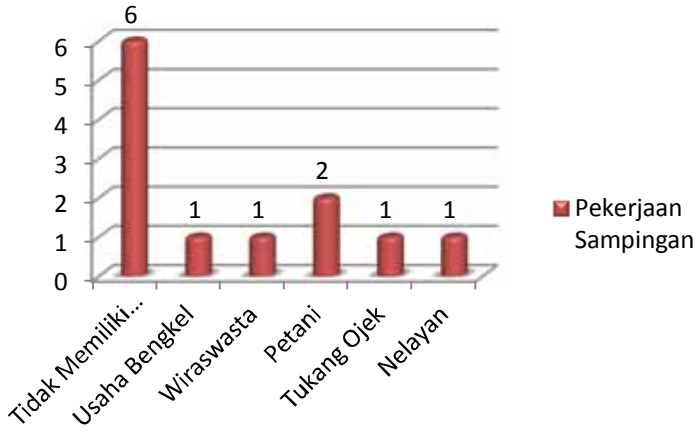


Figure 9. *Side Jobs of Respondents in Kelurahan Sawah Luhur.*
Captions: None (Tidak Memiliki Pekerjaan Sampingan), Automotive Repair Shop (Usaha Bengkel), Entrepeneur (Wiraswasta), Motor-Cycle Taxi (Tukang Ojek), Fisher (Nelayan)

The size of respondents' incomes can be seen in Figure 10. The analysis revealed that most respondents earned an average of Rp. 500,000–1,000,000. Most of them were *tambak* fish farmers whose lives depended on the produce of their ponds. According to them, this was their net income after deducting production costs for each restocking of the ponds.Information on their income and expenditures is presented in Figure 10. This reveals that almost half (46%) of the respondents had expenditures of Rp.500,000-1,000,000. Their income and expenditure were almost balanced, but in fact that they feel not adequate level of prosperity. Information on respondents' financial circulation is presented in Table 10.

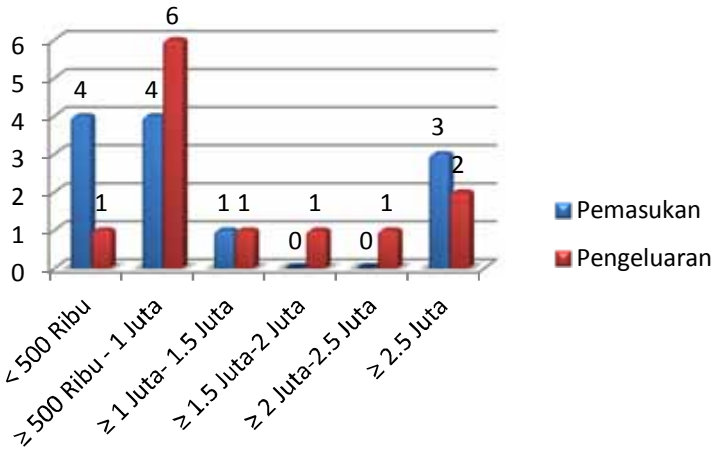


Figure 10. Information on Incomes and Expenditure of Respondents in Kelurahan Sawah Luhur
Captions: Income (Pemasukan), Expenditure (Pengeluaran), Thousand (Ribu), Million (Juta)

Table 10. Details of Financial Circulation of Respondents in Kelurahan Sawah Luhur

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Livelihood			
Civil servant	Rp.500,000-Rp.6,000,000	Rp. 700,000-Rp.6,000,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed (Most of them have side job as a farmer)
Aquaculture farmer	Rp.500,000-Rp.1,000,000	Rp. 500,000-Rp.900,000	Clothing, food, health, education, entertainment,capital to repair fishing equipment and boat
Local NGO employee	Rp.3,000,000	Rp.1,500,000	Clothing, food, health, education, entertainment, capital to repair fishing equipment, bait, and boat
Labourer	Rp.750,000	Rp.600,000	Clothing, food, health, education, entertainment
Side Job			
Automotive Repair Shop	Rp. 200,000		Supplementary income
Entrepreneur	Rp.3,000,000	-	Supplementary income
Farmer	Rp. 200,000-Rp.300,000		Supplementary income
Motor-cycle-taxi driver	Rp. 1,000,000		Supplementary income
Fisher	Rp. 200,000-Rp.300,000		Supplementary income

Source: Questionnaire and interviews with respondents

To meet financial shortfalls, many of the respondents usually took out loans. Loans from the mobile bank were primarily for meeting day-to-day living costs. Most respondents had loans from the door-to-door mobile bank (private individual or legal entity), their reason being the easy loan conditions, as all the mobile bank required from them was their ID card (KTP).The maximum loan allowed was Rp.1,000,000. Apart from the mobile bank, loans were taken out from bank-level financial institutions with more stringent conditions but for larger amounts of money. Respondents with this larger loan to bank-level financial institutions usually used it for additional business capital.. The much more prosperous respondents with incomes above 4 million rupiah owned a vehicle, at least a motorcycle, and could educate their children to a higher level.

Almost all the respondents owned their own home (Figure 11). The house they inhabited had 2-4 bedrooms on average. Most lived in permanent buildings with solid walls and ceramic tiled floors. Only a few still lived in semi-permanent buildings (Figure 12). Information on sanitation facilities was also analysed (Figure 13). Almost all the respondents used gas for cooking, only one still used firewood. All the respondents enjoyed mains electricity.

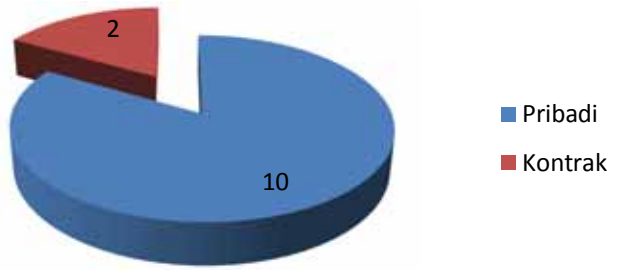


Figure 11. *Home Ownership Status of Respondents in Kelurahan Sawah Luhur.*
Captions: Owner-Occupier (Rumah Pribadi), Rented (Rumah Kontrak)

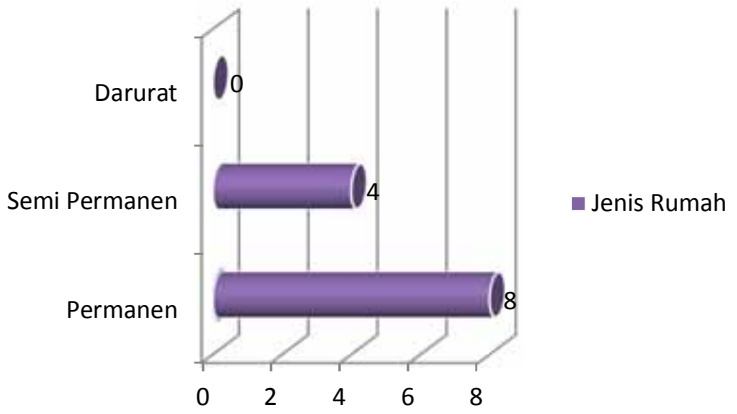


Figure 12. *Types of Housing of Respondents in Kelurahan Sawah Luhur.*
Captions: Type of House (Jenis Rumah), Non-Permanent Building (Darurat), Semi-Permanent Building (Semi Permanen), Permanent Building (Permanen)

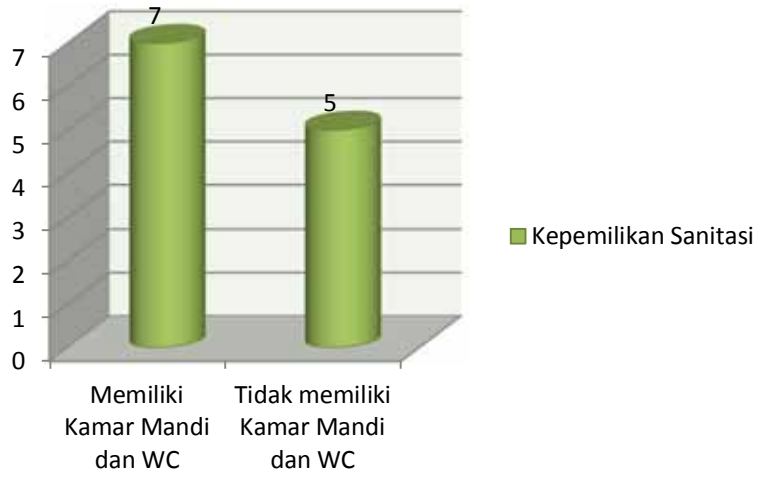


Figure 13. *Sanitary Facilities of Respondents' Homes in Kelurahan Sawah Luhur.*
Captiosn: Sanitary Facilities Ownership (Kepemilikan Sanitasi), Own Bathroom and WC (Memiliki Kamar Mandi dan WC), No Bathroom or WC (Tidak Memiliki Kamar Mandi dan WC)

As regards land ownership status, most respondents (about 69%) owned land, while 31% did not.Those who did not own land were *tambak* aquaculture farmers who just worked the land. Most (75%) owned an area of 0-0.5 ha and only 25% owned more than 0.5 ha. This land was used for agriculture and fishery (*tambak*), the yields from which are presented in Figure 14. Most of the respondents fall into the poor to moderate prosperity level on the basis of the criteria given in Table 11. Only a few fall into the higher prosperity level, these being mostly civil servants and local NGO employees. Farmers and fish farmers were generally in the low prosperity category.

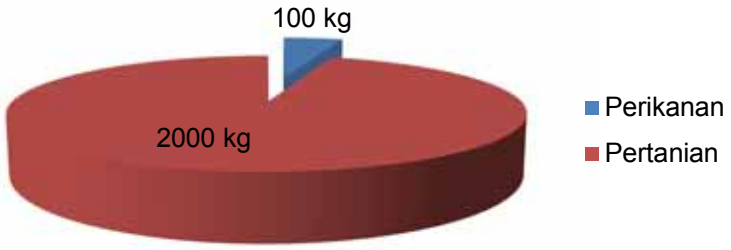


Figure 14. *Harvest Yield from Agriculture and Fishery for Respondents in Kelurahan Sawah Luhur.*
Captions: Perikanan (Fishery), Agriculture (Pertanian)

Table 11. Prosperity Parameters for Respondents in Kelurahan Sawah Luhur, Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock	30-50 animals	10-20 animals	Fewer than 10 animals
Agricultural yield/harvest (Rice)	More than 50 sacks	20-50 sacks	1-10 sacks
Fishery yield/harvest (Milkfish/*Bandeng*)	More than 50 Quintal	10-50 Quintal	Less than 10 Quintal
Highest educational level of children	University	Junior-Senior Highschool (SMP-SMA)	Primary - Junior high school (SD-SMP)
Type of house	Permanent building, solid walls, ceramic tiled floor, zinc roof	Semi permanent, timber walls, zinc roof, concrete or earth floor	Simple/non-permanent, bamboo walls, thatched roof (leaves), earth floor
Area of land owned	>2 ha	1-2 ha	< 1 ha, or none
Fishing equipment	Motor boat, fish traps, nets	Sampan and nets	Rod and line
Income	More than Rp.3,000,000/month	Rp.1,000,000 to 3,000,000/month	< RP. 1,000,000/month
Transport	Car, motor cycle,motor boat	Sampan and motor cycle	None
Communication tools	Television, handphone, satellite dish, radio	Television, handphone, radio	Handphone, TV

3.1.3 Ecosystem Profile for Kelurahan Sawah Luhur

3.1.3.1 Ecosystems and Natural Resources in Kelurahan Sawah Luhur

According to information from members of the community, there are five types of natural resources in Sawah Luhur. These include Pulau Dua Nature Reserve (32 Ha), fish ponds (525 Ha), boundary rivers (2), ricefields/farmland (900 Ha), and sea (514 Ha). These five are used more by the community, especially the ricefields and fish ponds, while the sea is used by the private sector. The relationship between Kelurahan Sawah Luhur's natural resources and their users is presented in Figure 15. The natural resources in Sawah Luhur are managed collaboratively by government and community. The sea in Sawah Luhur is managed by the community and private sector while Pulau Dua Nature Reserve and the rivers are managed directly by government. Details of the relationship between Sawah Luhur'snatural resources and their users and managers are presented in Table 12.

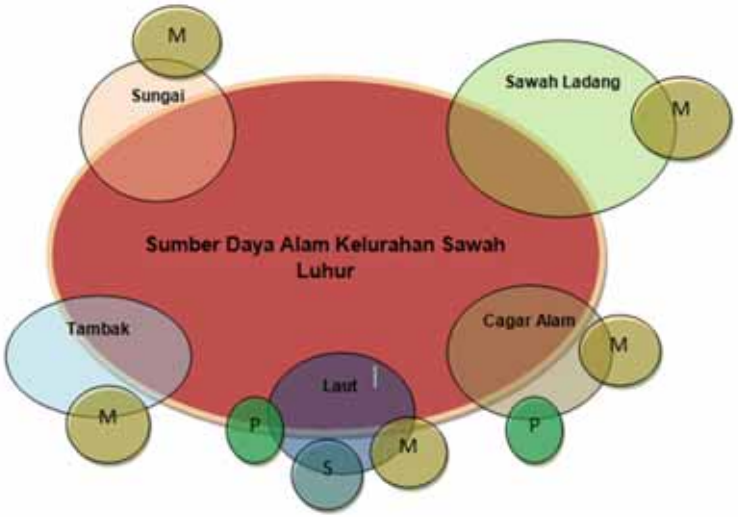


Figure 15. *Relationship between Natural Resources and their Users in Kelurahan Sawah Luhur. Captions: Natural Resources in Kelurahan Sawah Luhur (Natural Resources in Kelurahan Sawah Luhur), Rivers (Sungai), RiceFields/Farmland (Sawah ladang), Fish Pond (Tambak), Sea (Laut), Nature Reserve (Cagar Alam)*
M = Community, P = Government, S = Private Sector, CA = Nature Reserve

Table 12. Relationship between Sawah Luhur's Natural Resources and their Users and Managers, and the Desired Management Scenario

Natural Resource	Present Users			Present Manager			Desired Management Scenario		
	Government	Community	Private Sector	Government	Community	Private Sector	Government	Community	Private Sector
Pulau Dua Nature Reserve	√	√		√			√		
Fish ponds (*Tambak/ Empang*)		√	√		√			√	
Boundary rivers		√		√			√	√	
Ricefields/Farmland		√			√			√	
Sea	√	√	√		√	√	√	√	√

Source: Results of direct analysis with Kelurahan Sawah Luhur community(2012)

3.1.3.2 Spot Mapping

A spot map is a type of map created manually to facilitate visual understanding of the position of various facilities and potential disaster sites. Such facilities include the village office, schools, places of worship, irrigation channels, village roads, etc. The first step in creating the spot map was for community leaders to make a situation sketch of the area. This started with the delineation of village boundaries, rivers, roads, irrigation channels, various major infrastructures at the site and areas prone to disaster threat. After that, the drawing was discussed with the community to check its accuracy. A spot map of Kelurahan Sawah Luhur is presented in Figure 16.

***Figure 16**. Spot Map of Kelurahan Sawah Luhur.*

In the spot map above, the red marks represent sites considered to be disaster prone. Most of the disaster prone sites are near the Java Sea. The biggest potential threats in that area are abrasion, tidal flooding (*banjir rhob*), and water pollution. Coastal erosion and abrasion pose a serious threat to forest areas (Pulau Dua nature reserve) and coastal fish ponds because these form a large part of the land cover in this area. If this disaster potential is not urgently addressed, the threat will become more serious and the impact on Pulau Dua nature reserve's ecosystems and the community's fish ponds much worse. This claim was reinforced by the community, who stated that the northern part of Desa Sawah Luhur was the area which had the greatest disaster threat.

The next disaster threat with potentially high impact is tidal '*rhob*' floods. These attack the people's fish ponds so they often experience losses as a result of high tides. The fish in their ponds are swept out to sea or die as a result of stress. Such *rhob* floods occurred in Sawah Luhur in 2004 and 2008. The high tide entered into the fish/shrimp ponds and reached 3 villages in the vicinity. As a result, all the shrimps/fish experienced stress because the pond water became mixed with sea waterat high tide, so in just 2 days there was mass death of the fish/shrimps. *Rhob* floods occur once every 4-7 years in the Kelurahan Sawah Luhur area.

According to information from members of the community, the water has been polluted since 1997 when a sand quarrying company (PT. Gerak Galuh) began operations on the shores of Kelurahan Sawah Luhur. Ever since the sand quarrying began, said local inhabitants, the water in the fish ponds was polluted. As a result, harvests fell to 70%. This drop was strongly suspected to have been caused by waste brought in by high tides from Teluk Banten. Another recent phenomenon was the sudden death of ancient mangrove of the species *Avicinea* sp. The cause of this needs to be studied in more depth, both to identify the cause and to prevent the same thing from happening to the other tree species.

In addition to these three threats, another threat that often occurs in the residential area is drought, which happens almost every year. The difficulty of finding a source of good quality water in Kelurahan Sawah Luhur is a problem that needs urgent solution. Another potential threat in Sawah Luhur is tsunami, although none is known to have occurred there. The continuing depletion of the mangrove forest could reduce their capacity to withstand a tsunami.

3.1.3.3 Transect Mapping and Landscape Change

A transect map is a picture of the different geographical zones in land use. The geographical zones concerned include: housing areas, stretches of rice fields, fish ponds and forest, etc. A transect map was created by making a transect of the research site from north to south, and west to east.For each land use type, including ricefields, fish ponds and forest, information was gathered on soil type and texture, land use, topography, types of crop plants (annual and seasonal), and types of livestock. The transect route show in Figure 9. This transect route was limited by the land use classification classes dominant in Kelurahan Sawah Luhur, such as nature reserve forest, fish ponds, housing areas, and ricefields. Details of the transect map for Kelurahan Sawah Luhur are presented in Table 13.

Table 13. Transect Map of Kelurahan Sawah Luhur

No	Variable	A-B (CAPD nature reserve–Fish farms)	B-C (Fish farms–Housing Area)	C-D (Housing Area – Ricefields)
1	Soil type & texture	Light clay - clay	Dusty sandy soil - stony	Stony sandy soil and muddy soil
2	Topography	Slope	Moderate slope	Slope
3	Land use	Nature Reserve forest – Fish farms	Schools, homes, roads, mosque and ricefields	Homes, ricefields, dry fields
4	Plant Types	Avicinea, Rhizophora, Waru, etc.	Cassava, Kepuh trees *Sterculia spp.*, andBanyan*Ficus spp*	*Oryza sp Padi, Cocos nucifera*, Mengkudu, Banana*Musa spp.*, Jackfruit, Cassava
5	Livestock	Goats	Goats, chickens	Goats
6	Hazards or Risks	Abrasion, water pollution, '*rhob*'high tide flooding	Drought, flood, tornado (storm)	Drought, flood, tornado (storm),
7	Health	-	Malaria, Acute respiratory tract infections, skin disease	Malaria, Acute respiratory tract infections, skin disease
8	Vulnerable groups	-	Children, expectant mothers, the elderly	Children, expectant mothers, the elderly
9	Occupation	Labourers	Labourers, farmers, fishers, skilled labour, traders	Farmers, labourers
10	Infrastructure	Semi permanent huts	School, homes, roads, mosque	Semi permanent huts
11	Recommendations	Coastal rehabilitation (soft/ hybrid engineering), water pollution investigation	Flood prevention, clean water facilities, Rehabilitation	Irrigation improvement

Source: Results of direct analysis with Kelurahan Sawah Luhur community in Laporan Kajian Tingkat Kerentanan dan Kapasitas Masyarakat di Kelurahan Sawah Luhur-Kota Serang(2012)

An analysis of landscape changes was made to identify changes in the area from year to year. A cross section of Kelurahan Sawah Luhur is presented in Figure 9. In the 1970s, the land of Pulau Dua nature reserve was still separate from Kelurahan Sawah Luhur and covered an area of only 8 Ha. As a result of emerging land during 1970-1990, the reserve subsequently became joined to the mainland. What is certain is that in 1983 the emerging land joined Pulau Dua nature reserve to the mainland, and the total area of the reserve increased to 32 Ha. Most of the shore in Kelurahan Sawah Luhur is mud but in some places the beach contains some sand. According to information from the community and from direct observation of the remaining vegetation found at the site, fairly dense mangrove forest grewall along the Banten shore. The species growing there included Api-api *Avicennia marina*, Avicennia spp, Mangrove*Rhizophora stylosa*, *Rhizophora apiculata*, *Rhizophora mucronata*, *Ceriops decandra*, *Bruguiera spp*, *Sonneratia spp*. and several others. When the mangrove forest was still dense, the local people utilised it for collecting firewood and to catch fish, shrimps and crabs. This use of the mangrove forest was wise and balanced taking into account the land's carrying capacity, so did not disturb its conservation. The condition of vegetation along the coast of Kelurahan Sawah Luhur prior to land conversion is illustrated in Figure 18.

Figure 17. *Cross section of Kelurahan Sawah Luhur.*

Figure 18*. Illustration of Vegetation Condition along the Coast of Kelurahan Sawah Luhur Prior to Conversion*

The destruction of mangrove forest began with the large scale land conversion of mangrove forest to shrimp farms.Most of the mangrove forest in this area has now been cut down and replaced by shrimp farm ponds.At first, the shrimp farmers got very good harvests. As time went on, however, attack by white spot virus crippled all of Indonesia's shrimp farms, including those in Kelurahan Sawah Luhur. Shrimp harvests failed as a result and many shrimp farmers suffered losses.Nevertheless, they perseveredwith the shrimp farming until the following harvest, but this also failed.As a result, they stopped farming shrimps and a large part of Sawah Luhur's coastal pond area became abandoned.

The conversion of mangrove forest to shrimp ponds changed the condition of Kelurahan Sawah Luhur's coastal vegetation. The only mangrove forest left is that in Pulau Dua nature reserve and a few small colonies in the front zone.Several years after the conversion, natural succession is occurring in the pond area. However, it is extremely limited because the land's carrying capacity for mangrove growth has dropped drastically. Moreover, natural succession is also hampered by the farmers, who cut down new mangrove growth because they think it disturbs the operation of their ponds. However, the situation is very different in Pulau Dua nature reserve, where the mangrove is still in excellent condition and forms habitat for water fowl and other wildlife. Besides, Pulau Dua nature reserve is also used for ecotourism, research and as a source of mangrove seeds.

The terrestrial area of Kelurahan Sawah Luhur was originally dry land, consisting of forest and undergrowth. However, since the Dutch colonial era, this area began to be inhabited by people from Cirebon (in Java) whose main livelihoods were agriculture and *tambak* fish farming. From then on, the land was passed down from generation to generation."*Hak Girik*" land ownership rights were granted by the village government (now the *kelurahan*) to the land owner. The land along the main road in Kelurahan Sawah Luhur belongs to the Ministry of Public Works. The local people build homes on this land by obtaining land use rights from the Ministry of Public Works. However, most of these houses are permanent buildings.

Most (about 80%) of the agricultural land in Kelurahan Sawah Luhur is no longer owned by the local community because it has been sold to people from outside.For this reason, most of the rice and fish farmers work the land without owning it. Even if owned by people from outside, however, the ownership status of land in Kelurahan Sawah Luhur is mostly still *Girik*, only a small amount yet having been converted to freehold certificate status with*Sertifikat Hak Milik (SHM)* deeds issued by Notary/National Land Agency(*Badan Pertanahan Nasional (BPN*))of Kota Serang.

3.1.4 Disaster, Vulnerability and Capacity of The Kelurahan Sawah Luhur Community

3.1.4.1 Information on Disaster in Kelurahan Sawah Luhur

3.1.4.1.1 History of Disasters and Seasonal Events in Kelurahan Sawah Luhur

Kelurahan Sawah Luhur is a relatively safe place as regards disasters. This can be seen from its history, which records fairly rare incidence of disaster. Disaster occurs only at times of extreme weather conditions, such as several consecutive days of heavy rain, gales, etc.The disaster history of Kelurahan Sawah Luhur can be seen in Table 14.

Table 13. History of Disasters in Kelurahan Sawah Luhur

Year of Occurrence	Type of Disaster	Description	Impact
1997	Flood	• Flood due to several days of rain and to high tides • Usually occurs once every 5-7 years and lasts for one week • Flood reached1 village, occurring in residential and coastal areas	• Damage to ponds and ricefields belonging to the community • Failed harvests from ponds and ricefields
2004	High tide flood	• Flood due to high tides • Flood occurs once every 5-7 years and lasts 2 weeks • Flood reached 3 villages, occurring in residential and coastal areas	• Several areas inundated by flood • Community experienced access difficulties as residential areas were flooded
2006	Tornado	• Occurred only occasionally in 2006 • Only those areas hit by the wind (ricefields and homes) were affected	• Coconut trees blown down • One inhabitant was seriously injured
2009	Tornado	• Occurred only occasionally • Only those areas hit by the wind (ricefields and homes) were affected	• 45 houses were damaged, 2 of them seriously
2011	Extended dry season /drought	• Occurs once every 8 years along the coast of Serang and lasts 8 months	• Rice fields dried up • Inhabitants threatened byshortage of clean water • Farmers experienced late harvest
Routinely	Flood	• Floods occur as a result of heavy rain accompanied by *rhob* high tide flooding • Occurs once every 5-7 years	• Ponds flooded and unable to operate • Fish/shrimp farmers threatened with harvest failure and loss • Main road flooded thus preventing access
	Extended dry season /drought	• Occurs once every 8 years	• Ponds cannot operate and some become salt fields
	Water shortage	• Occurs every year	• Community suffer shortage of clean water sources • Community under threat from use of unsuitable (poor quality) water

Source: *Laporan Kajian Tingkat Kerentanan dan Kapasitas Masyarakat di Kelurahan Sawah Luhur- Kota Serang* (2012)

Some of the disasters in Kelurahan Sawah Luhur seem to occur in a cycle as they happen once every so many years. As these can be predicted, the local community and government should be able to pay more attention to them, so that all elements can prepare well to face these disasters. It is also hoped that all elements can anticipate events and carry out evacuation when disaster occurs. Furthermore, they can take steps to prevent the recurrence of similar disasters.

3.1.4.1.2 Disaster Impact

The disasters that occur in Kelurahan Sawah Luhur have a range of impacts, particularly on the lives of the community. Drought has a very serious impact on the Sawah Luhur community. It can cause their sources of water, a primary necessity for life, to dry up. When water sources start to dry up, the community's income-earning activities are severely hampered. The majority of Sawah Luhur's residents are rice and fish/shrimp farmers, and water is essential for their fields and ponds. In anticipation of drought, rice farmers usually plant watermelons in place of rice, while fish/shrimp farmers become fishers in the river estuary or along the coast instead of operating their ponds.

The next disaster to impact on the community is the flooding that happens once every 5-7 years. It inundates their ricefields and ponds, thus crippling their activity. Another impact of floods is the spread of diarrhoea and skin diseases, especially among children, although the inhabitants of Sawah Luhur consider both these diseases to be normal and nothing to worry much about. Table 15 describes the impacts caused by disasters that have occurred in Kelurahan Sawah Luhur .

Table 14. Disaster Impact in Kelurahan Sawah Luhur

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on felling trees near the river, but has not been actively enforced
Tidal flood										• Planting of mangroves and beach plants
Extended dry season										• Residents have started constructing wells at each house but alternative

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
										measures still needed
Tornado										• Keep away from areas with trees
Water shortage (Drought)										• Plant trees and make the place rainwater during the rainy season arrives
Epidemic										• Extension services promoting a healthy life style • Public sanitary facilities (*MCK*)have been built • Construction of water sources such as a well at each home

Key: High Medium Low

Besides identifying impacts, an analysis was also done of the community's perceptions about the impacts of various disasters that had occurred. This analysis is presented in Figure 19. The figure shows that most respondents expressed disagreement at being relocated to a safer area. Such relocation referred to the movement of ponds, ricefields and even homes. They strongly agreed with being given guidance on preparations for and actions during a disaster, as well as the repair of facilities and infrastructure at the site.Their perception was that disaster preparedness activities need to be carried out so that planning will not be top-down. Moreover, this information was necessary to give the local communitya more advanced understanding.

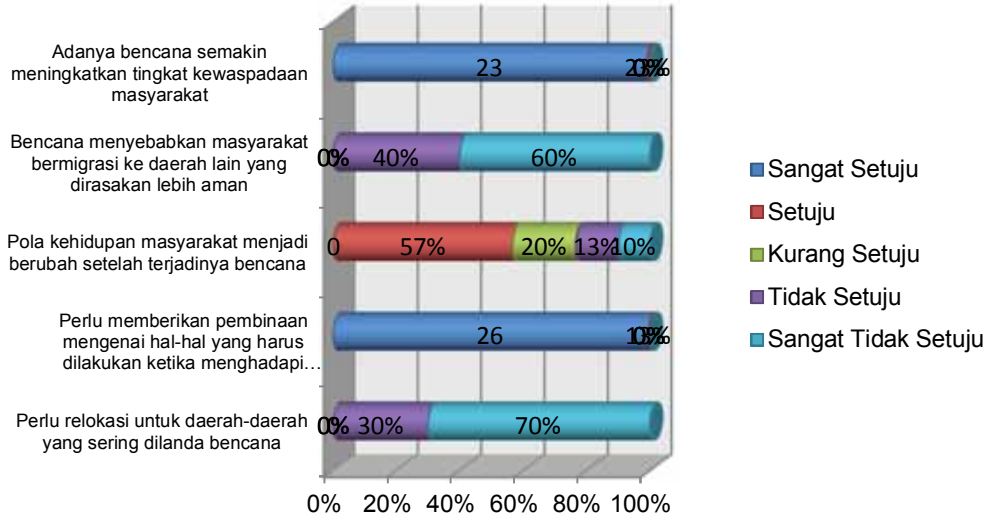


Figure 19. *Respondents' Perception of Disaster Impact in Kelurahan Sawah Luhur*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

3.1.4.1.3 Vulnerability in Kelurahan Sawah Luhur

Vulnerability in Kelurahan Sawah Luhur was analysed for several variables. The variables used in analysing vulnerability and capacity levels were adopted from the analysis methodology developed by the Indonesian Red Cross (PMI 2008), and comprised environmental health level, socio-cultural, attitudinal and motivational, institutional and organisational, and economic variables.The condition of these five variables is presented in Table 16.

Table 15. Analysis of Physical and Social Vulnerability Levels in Kelurahan Sawah Luhur

Variable	Vulnerability	Capacity
Physical and Environmental Health (ecosystem)	1. Shortage of water supply to ricefields (irrigation) especially during dry season 2. Availability of clean water and drinking water 3. Cutting down mangrove for fire-wood and for conversion to aquaculture ponds 4. Abrasion in the vicinity of Pulau Dua	1. Access to Kota Serang town is only 15km by tarmacked road 2. Public transport is available 3. There are irrigation channels 4. The community possessequipment to till the ricefields 5. There is a village hall and multi-purpose hall measuring 30m^{2}and a mosque measuring 300m^2.

Variable	Vulnerability	Capacity
	Nature Reserve 5. Tidal floods (*rhob*) 6. Extended dry season 7. Bathing, washing and toilet activity (*MCK*) still done in the irrigation channels 8. Frequent cases of dengue, diarrhoea and skin irritation 9. Cases of infant malnutrition still occur	6. There is a Public health centre (*Puskesmas*) staffed by 1 doctor and 1 midwife 7. Pulau Dua Nature Reserve covers 32 ha and is dominated by mangrove vegetation
Socio-Cultural	1. School dropout (most only finish primary school) 2. Unemployment 3. Consumer culture: indications that largest monthly expenditure is on cell phone credit, petrol and cigarettes 4. Every household owns household items bought on credit 5. There is no community leader who has the respect of all residents	1. The community still work together (*gotong royong*) 2. Most heads of households have joint activities i.e. Kuran recital at the mosque every Thursday evening 3. Traditional arts to celebrate religious festivals and Indonesian Independence Day
Attitudes/ Motivation	1. Youths often found just sitting around aimlessly (*nongkrong*) at food stalls 2. Do not use bathing/washing/toilet facilities 3. Do not use rubbish bins 4. Feel that school is a burden	1. Open to newcomers and outsiders who come with development programs
Institutional/ Organisational	1. There is a local NGO (originating from the Sawah Luhur community), but the activities it develops tend to be incidental	1. The *Kelurahan*government is close to the community's daily lives 2. Another institution is well respected, i.e. the mosque administration 3. The family welfare organisation (*PKK*) is active every month at the *Posyandu* integrated health services post 4. An NGO (i.e. WIIP) is currently working for environmental issues 5. Potential for funding under the *PNPM*national community empowerment program
Economic	1. Shortage of jobs 2. Ponds are not productive 3. Rice harvests disrupted due to water supply problems 4. Attack by agricultural pests 5. Categorised as a poor village 6. Average inhabitants' monthly income is <Rp.1million 7. Houses are generally made from woven bamboo with thatched roof, or small houses made from disused planks of wood	1. *BLT*cash hand-outs 2. Compulsory 9 years free schooling 3. Poverty Assistance 4. State health insurance schemes: *Jamkesmas/Askes*.

Source: Processed from data for Puskesmas Kasemen 2011, Dinas Dishubkominfo Kota Serang 2012, interviews with local residents and field observation

Of the five variables above, Physical and Environmental Healthranks first for vulnerability. As well as identifying vulnerability on the basis of variables, the level of Sawah Luhur's human resources' vulnerability and capacity regarding hazards was also evaluated based on the respondents' own perceptions. Respondents assessed for themselves the level of threat, vulnerability and capacity of the human resources possessed by Sawah Luhur in response to flood, fire, drought, epidemic and water pollution (Figure 20).

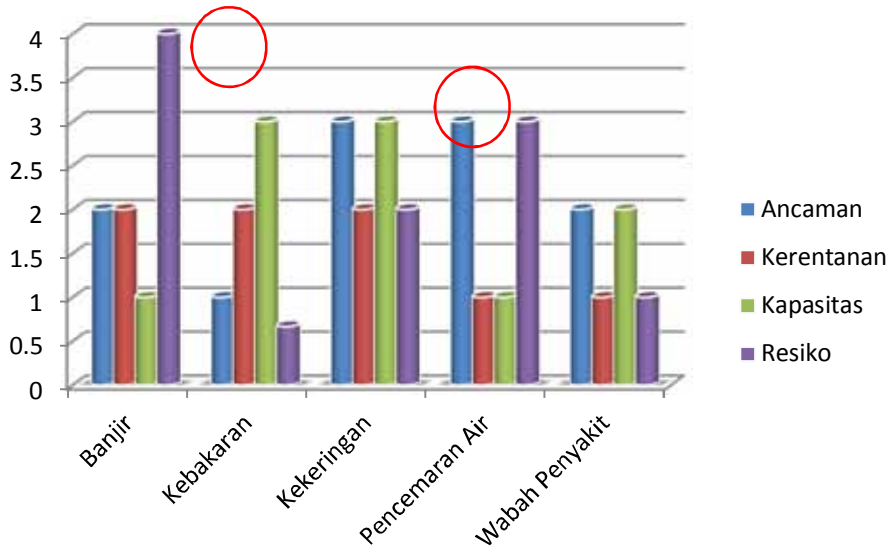


Figure 20. Information on Disaster Threat, Vulnerability and Risk based on Type of Disaster in Kelurahan Sawah Luhur.
Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Flood (banjir), Fire (Kebakaran), Drought (Kekeringan), Water Pollution (Pencemaran Air), Epidemic (Wabah Penyakit)

From Figure 20 it can be seen that the highest threats in Sawah Luhur are the problems of flooding and water resources, i.e. drought and water pollution.The main impact felt from this is that incomes fall because most of the village's inhabitants are farmers and fish/shrimp farmers.However, the highest disaster risk in the village is flood, considering that the community's capacity for dealing with this is quite low. This differs from drought; even though the threat of drought is quite high, the community's capacity for responding to it is also quite high. As a result, the risk of drought in this village is not as high as that of flood.

3.1.4.2 Community Capacity in Kelurahan Sawah Luhur

Improving the community's capacity is important in disaster risk reduction. In this discussion, community capacity means the availability of supporting facilities and infrastructure in the process of saving lives and property. In addition, information on an early warning system is also part of the discussion of community capacity.

3.1.4.2.1 Early Warning System

An *Early Warning System*isa device used in disaster risk reduction, particularly as related to the mobilisation of large numbers of people.Itcan be done in a traditional way or using more modern media. Traditional media such as '*kentongan'* (a bamboo tube beaten to raise the alarm) or announcements over loudspeakers can reach a limited area. Modern media include the direct use of electronic media by authorised institutions such as BMKG (The Meteorology, Climatology, and Geophysics Agency), BPBD (Regional Disaster Management Agency) or Regional Head, as well as other social media like newspapers and magazines.

So far, the disasters occurring in Sawah Luhur have not been sudden onset disasters. Therefore, no such early warning system (EWS) has ever been implemented in Sawah Luhur. However, the village does have EWS facilities in the form of *kentongan*and mosque loud speakers. These could be used to announce hazards and constitute an asset for an early warning system there.

So far, people have received information about disasters that happen elsewhere via television, radio and newspapers. Now, in Kota Serang town there is a municipal level institution dedicated to the handling of disasters, known as theBPBD (*Badan Penanggulangan Bencana Daerah* / Regional Disaster Management Agency). At the lower administrative levels (*Kecamatan*and*Kelurahan*), however, there is as yet no institution, nor information, training nor simulation for dealing with disaster. The institution that plays a role in Sawah Luhur when floods and droughts occur is the Village Government. Its actions have included distributing*'raskin'* (rice rations for the poor) aid and clean water, cleaning up flood debris, and operating health services. All of these were felt by the community to have been of great benefit to them. In addition, the Village Government has also conducted awareness raising activities together with the relevant Technical Offices.

The community's perceptions regarding early warning in their village was one of the foci in the gathering of information on community capacity. This information was obtained through interviews with a number of respondents and key informants. It is presented in Figure 21, which shows that in general the inhabitants of Sawah Luhur knew about and could access information about early warning of disaster, particularly if a big disaster was going to happen. This can be seen from the finding that only 8% of respondents knew nothing about EWS while the other 98% did know about it. Those who knew about EWS knew that early warning information is giventhrough the mass media (newspapers, television, radio), announcements in the mosque, and the traditional *kentongan*. All respondents said that the moment they received early warning information they would respond immediately by taking steps to save themselves, their family and possessions. Respondents' perceptions on what they would do to save themselves after receiving EWS warning are presented in Figure 22.

The proportion of respondents who knew about the EWS ever receive early warning information from the mass media (newspapers, television, radio), announcements in the mosque, and gong (traditional tools hazard marker).

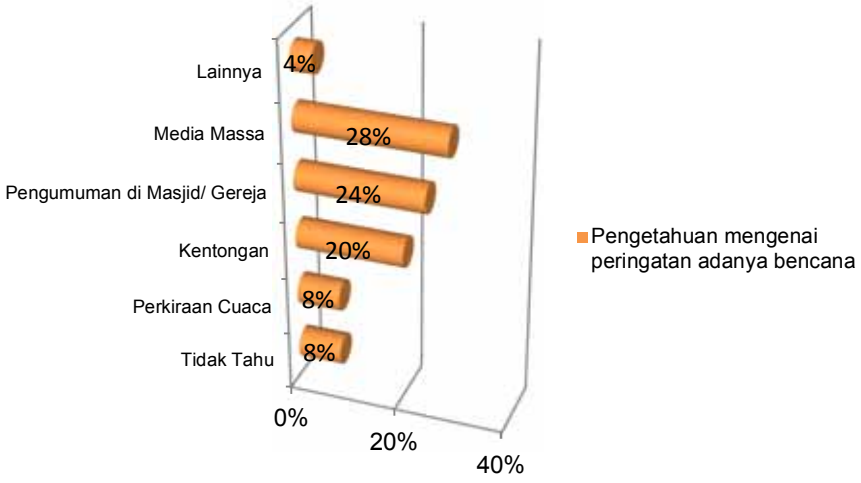


Figure 21. *Kelurahan Sawah Luhur Respondents' Knowledge of EWS.*
Captions: Knowledge of Disaster Warnings (Pengetahuan Mengenai Peringatan Adanya Bencana), Other (Iainnya), Mass Media (Media Massa), Announcement in Mosque/ Chruch (Pengumuman di Masjid/ Gereja), Kentongan Alarm (Kentongan), Weather Forecast (Perkiraan Cuaca), Didn't Know (Tidak Tahu)

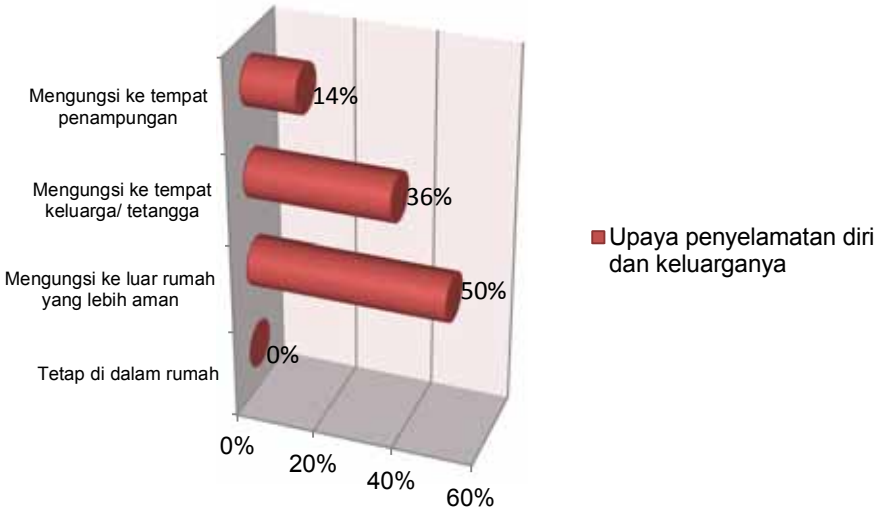


Figure 22. *Efforts that Kelurahan Sawah Luhur Respondents would Make to Save Self and Family.*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family. Neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Stay Inside Home (Tetap di dalam Rumah)

Analysis shows that all the respondents chose to evacuate to a safer place rather than stay at home.They felt safer evacuating outdoors (50%) rather than to a family/neighbour'sor friend's place (36%) or to a shelter (14%). Outdoor places included open land and areas felt to be safe but not too far from their home. They did not want to evacuate too far away as they were concerned about their property.

Information on local government's role in supporting early escape efforts and their role at the time of a disaster was also analysed through perceptions (Figure 23). This showed that local government took more post-disaster action such as distributing aid (56%), providing emergency shelter (28%), and providing evacuation equipment to rescue victims (11%). Only 6% of the respondent felt that local government had given early warning before an impending disaster. Efforts to provide EWS information already exist but need to be further improved as not all levels of the community are yet aware of them.

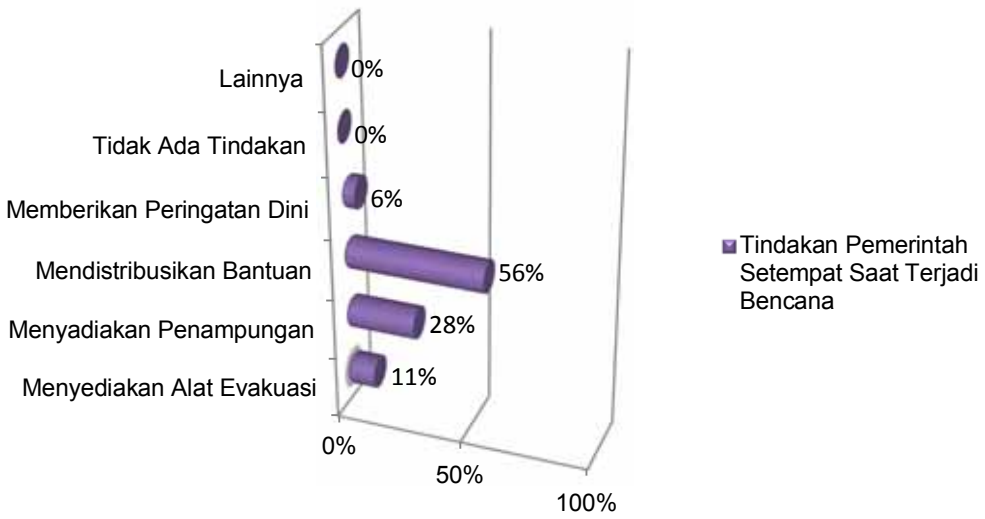


Figure 23. *Information on Action Taken by Kelurahan Sawah LuhurGovernment in Response to Disaster Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), Other (Lainnya), No Action Taken (Tidak Ada Tindakan), gave Early Warning (Memberikan Peringatan), Distributed Aid (Mendistribusikan Bantuan), Provided Shelter (Menyediakan Tempat Penampungan), Provided Evacuation Equipment (Menyediakan Alat Evakuasi)*

3.1.4.2.2 Access to and Control of Community Assets

Results of the analysis of access to and control of assets, both privately owned and public, in Kelurahan Sawah Luhur can be seen in Table 17, which presents the assessment team's conclusions based on interviews and direct field observation.

Table 16. Information on Access to and Control of Assets that can be Used when Disaster Occurs in Kelurahan Sawah Luhur

Private Source of Ownership	Accessibility at Time of Disaster				Ownership Control
	Flood	Fire	Drought	Epidemic	
Agricultural Land	Yes	Tentative, depends where fire occurs	Yes	Yes	Father
Homes	Yes		Yes	Yes	Father, Mother
Furniture	Yes		Yes	Yes	Mother
Valuables	Yes		Yes	Yes	Father, Mother
Vehicles	Yes		Yes	Yes	Father
Clothes	Yes		Yes	Yes	Father, Mother
Food	Yes		Yes	Yes	Father, Mother
Savings/Money	Yes		Yes	Yes	Father, Mother
Fuel	Yes		Yes	Yes	Father, Mother
Valuable Documents	Yes		Yes	Yes	Father, Mother
Public Source of Ownership	**Accessibility at Time of Disaster**				**OwnershipControl**
	Flood	**Fire**	**Drought**	**Epidemic**	
Places of worship	Yes	Yes	Yes	Yes	Community
Roads	Yes	Yes	Yes	Yes	Community
Market	Yes	Yes	Yes	Yes	Community
Football field	Yes	Yes	Yes	Yes	Community
Village Hall/Office	Yes	Yes	Yes	Yes	Village Government
Boats	Tentative, depends where flood occurs	Yes	Yes	Yes	Community with Prior Permissionfrom Owner
Water sources	Yes	Yes	-	Yes	Community
Public bathing, washing, toilet facilities	Yes	Yes	Yes	Yes	Community
School buildings	Yes	Yes	Yes	Yes	Community withPrior Permission

Source: Findings from questionnaire and direct observation in the field (2012)

All private assets can be utilised in the event of flood, fire, drought and even epidemic. This proves that community preparedness is adequate on a personal level if seen from the physical aspect (facilities and infrastructure). Similarly, publically owned assets (facilities and infrastructure) in Sawah Luhur are generally accessible. Some facilities such as roads and clean water sources are still difficult to access, especially during floods and droughts. These two public facilities therefore need to be improvedin anticipation of flood and dry seasons.

3.2 Desa Reroroja – Kabupaten Sikka

3.2.1 Profile of Desa Reroroja – Kecamatan Magepanda

3.2.1.1 General Description of Desa Reroroja

Prior to 2005, Desa Reroroja was part of the Kecamatan Nita subdistrict. Then on 05 September 2005,under regional regulation *Peraturan Daerah Kabupaten Sikka* No.3, the subdistrict Kecamatan Magepanda was created as a result of the expansion of Kecamatan Nita. Desa Reroroja is divided into three *dusuns*(hamlets): Dusun Mageloo, Dusun Koro, and Dusun Duli. The Desa Reroroja area is also divided into 7 Community Associations (RW), and 24 Neighbourhoods (RT). According to the 2011 statistics for Kecamatan Magepanda, Desa Reroroja covers an area of 41.97 km^2 (4197 ha) which is around 34.03% of the total area of Kecamatan Magepanda (*Kecamatan Magepanda Dalam Angka 2011*, BPS-Statistics Indonesia). However, a spatial analysis gives the area as being 50.37 km^2 (5037.76 ha)**.** An administrative map of Desa Reroroja is presented inFigure 11and the boundaries of Desa Reroroja are as follow:

- North : Flores Sea
- South : Desa Para Bubu (Kec. Mego-Kab. Sikka)
- West : Desa Tou Timur (Kec. Kotabaru-Kab. Ende)
- East : Desa Magepanda and Desa Done (Kec. Magepanda-Kab. Sikka)

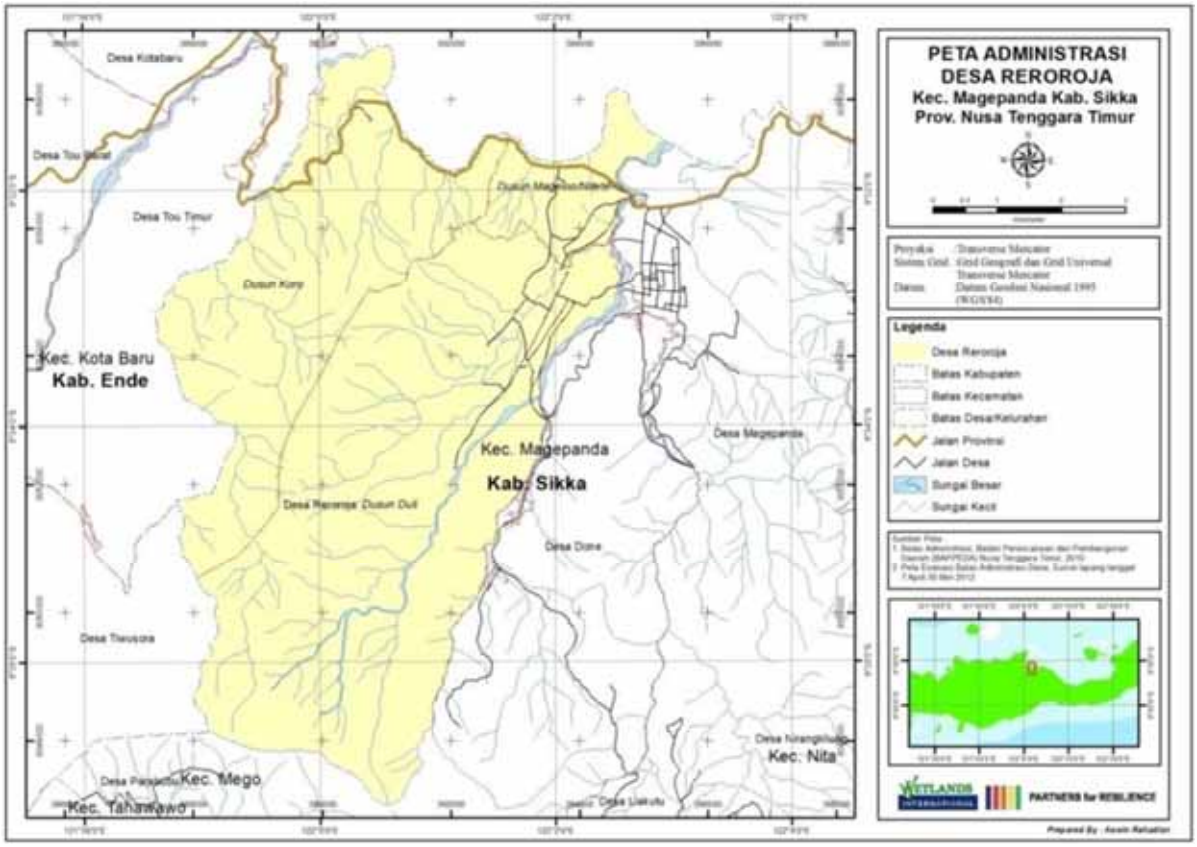


Figure 24. *Administrative Map of Desa Reroroja*

Dusun Mageloo and Dusun Koro border directly onto the sea while Dusun Duli is in the hills. The Desa Reroroja area has a hilly topography with a relatively narrow flat area that is mainly along the coast.The Desa Reroroja shoreline is about 7.5 km long and parallel to the main road.Field survey and spatial analysis show that a large part of Desa Reroroja's topography is steep or very steep. As much as 23.4% has a gradient of 25-40% and another 40% has a gradient of over 40%. Such topography is highly vulnerable to disaster, especially landslide. Information on land gradientsin Desa Reroroja is presented in Table 18 and Figure 12.

Table 17. Land Area of Desa Reroroja Based on Gradient

Gradient	Area (ha)	%
0-8%	768	15.2
8-15%	363.73	7.2
15-25%	583.32	11.6
25-40%	1176.68	23.4
>40%	2146.02	42.6
Total Area	5037.76	100.0

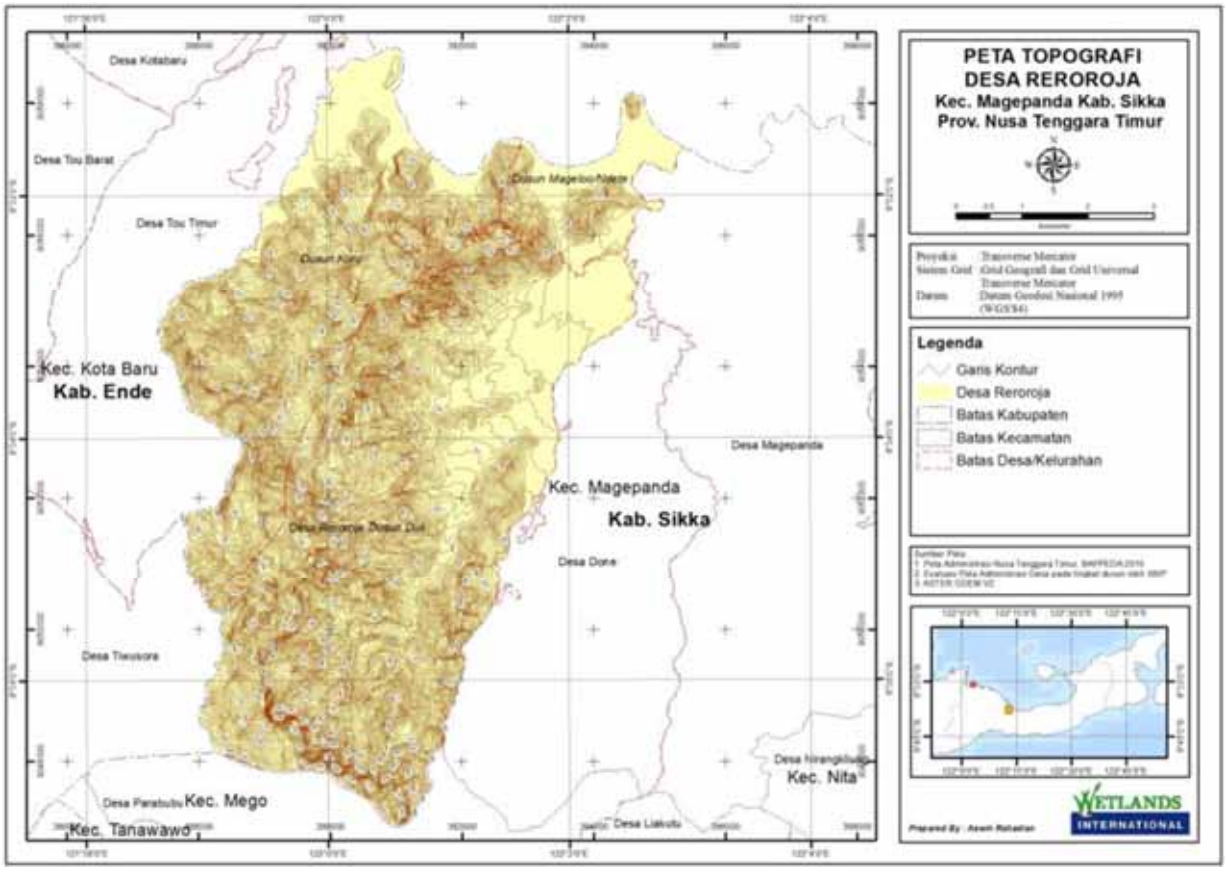


Figure 25. *Topography Map of Desa Reroroja*

Accessibility to the village is quite good.The main road is tarmacked although the roads into each dusunneed repair.The village can be reached by public transport in the form of buses and/or passenger vehicles. These are both limited in number, however, so most of the inhabitants travel by *ojek* motor-cycle taxi. The distance from Desa Reroroja to Kota Maumere is around 30 km.

The community does already possess facilities and infrastructure to support their daily lives insectors such as education, health, lighting, economic, and water, etc., though these are still basic. Desa Reroroja has only primary school buildings (state and private) in eachdusun. The health facility accessible to the villagers is the *polindes* (village maternity clinic) in Dusun Mageloo. As regards lighting, not everybody yet enjoys mains electricity from PLN, as some still use generators or kerosene lamps. Economic difficulties are given as the main reason for not using PLN's services. For clean water, the villagers normally use water from springs and wells. The clean water source for Dusun Duli is a spring that has never gone dry. However, the inhabitants of the other two dusunshave to rely on well water and rainwater for their needs. The quality of this water also needs attention as most of their wells are brackish.

3.2.1.2 Institutions in Desa Reroroja

The institutions in the village comprise a range of stakeholders who are closely linked, especially in the making of rural environmental management policy (Table 19). In this regard, the traditional *adat* institutions play a vital role in Reroroja community life, particularly relating to the management and utilisation of the environment. Many of the *adat* rules are more binding than government regulations, even though they are unwritten. This is because the *adat* rules have been practised and handed down by the community for generations. Examples include the prohibition on forest clearing and encroachment, mangrove clearing, the use of explosives for fishing, etc. Nevertheless, due to current developments and the increasingly pressing necessities of life, some irresponsible members of the community have begun to flout these rules.

Besides the *adat* institutions, governmental and non-governmental institutions also have an important role in environmental management activity in the village and collaborate on a range of village policies. Both programs from central government and those from local/international NGOs are carried out together to create a rural environment that is strong in the face of disaster. Moreover, these programs aim to improve existing facilities and infrastructure in the village. The character of the other village institutions, such as economic, religious, extension, educational institutions and EWS, is related more towards the strengthening of community and community social life. Such strengthening is to create a strong village with high community capacity. It is hoped thereby to create a solid community that is strong in the face of all the disasters that frequently occur in Desa Reroroja.

Table 18. Institutions in Desa Reroroja

No	Type of Institution	Name of Institution	Activities	Ranking
1	LSM/NGO	Wetlands International Indonesia Programme (WIIP)	• Rehabilitation of coastal environment • Mangrove reforestation • Community capacity building through economic activity • Improvement of rural human resources	4
		Dian Desa	• Environmental management • Construction of water installation at Dusun Duli • Productive Economic Activities	3
		PLAN	• Educational activities for children • Child health program • Children's rights activities	3
2	Bank/ Financial institution	Kopdit, CU, UPK, PNPM, Bank Keliling(mobile bank)	• Savings and loans	1
3	Religious institutions	OMK, KUB	• Religious activities for Catholic congregation • Religious education for Catholics	2
		Remaja Mesjid (Mosque youth group)	• Religious activities for Moslems • Religious education for Moslems	2
4	Extension agency	Gabungan Kelompok Tani (Gapoktan) (Association of Farmers' Groups)	• Agricultural extension and socialisation • Provision of seeds and fertilizers • Savings/loans activity within the farmers group	3
5	Government agencies	*Puskesmas, Polindes, Sospol*	• Public health services, • Maternity and infant health services, • Village security services	3
		Village Government	• Implements village government • Plans Annual Regional Budget(APBD) • Issues village bylaws and policy	4
		BPD	• Implements government together with village officials • Plans Annual Regional Budget(APBD) together with village officials • Issues policy and village bylaws • Monitors performance of village officials	4

No	Type of Institution	Name of Institution	Activities	Ranking
6	Educational institutions	Playschool/ Early Learning (TK/ PAUD) (2), Primary schools (2)	• Children's education	1
7	Private enterprise	Perusahaan Mutiara	• Pearl Culture	1
8	Early Warning System (EWS)	Sibat (community-based disaster preparedness) provided by PMI	• Evacuation in the event of disaster • Construction of public kitchen and shelter	2
9	Traditional Adat Institutions	Lembaga Adat Desa Reroroja (Reroroja village adat institute)	• Performs traditional ceremonies and rituals in the village • Determines various regulations related to village community life	4

3.2.2 Community Profile for Desa Reroroja

The community profile for Desa Reroroja was analysed by approaching a number of respondents considered to be representative. They comprised 13 menand 18 women. Most of the respondents analysed were Catholic and of Lio ethnicity (the indigenous ethnic group of Desa Reroroja). The others included respondents from Bajo, Sikka, Maumere, Palue, Tanani, and Java. The average age of the respondents was 41 years, the youngest being aged 20 and the oldest 66. The variation in respondent age was intended to minimise bias so that information obtained for the village community profile would be fairly comprehensive. 28 of the respondents were married, 2 widowed/ divorced, and 1 unmarried. On average, they had lived in the village for more than 30 years. Information concerning their educational level and livelihoods can be seen in Figure 26 and 27.

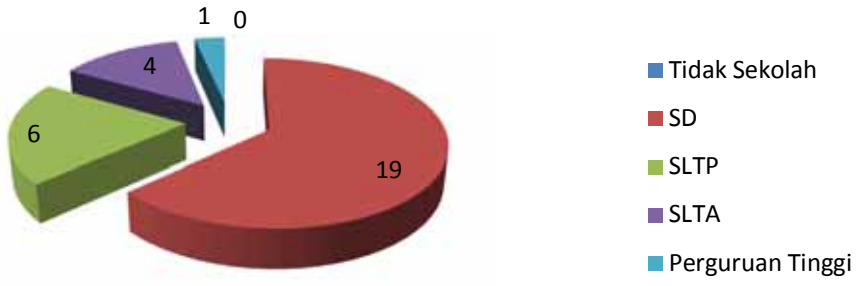


Figure 26. *Educational Level of Respondentsin Desa Reroroja.*
Captions: Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi)

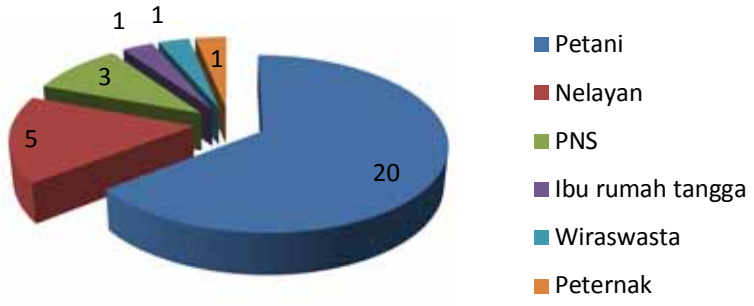


Figure 27. *Main Occupations of Respondents in Desa Reroroja.*
Captions: Farmer (Petani), Fisher (Nelayan), Civil Servant (PNS), Housewife (Ibu Rumah Tangga), Entrepreneur (Wiraswasta), Livestock Farmer (Peternak)

Most of the respondents owned their own home. Generally, these home-owners did not yet possess a land-ownership certificate from the National Land Agency. They usually held only a SPPT (land tax invoice) or a "*Girik*" house ownership document issued by the village. These houses mostly ranged from semi-simple to non-permanent.If we walk around the village, we can see that most of the homes are made from bamboo, or half brick half bamboo. Almost all the roofs are zinc, although the non-permanent houses usually have thatched straw or lontar palm leaf roofs. The respondents' level of prosperity was also analysed using information on their assets and debts, as presented in Tables 20 and 21.

Table 20. Information on Assets Owned by Respondents in Desa Reroroja

Ownership Status	Rich	Average	Poor
Livestock per household	10 animals	4	None
Rice Yield/ Harvest	60 bags	15 bags	2 bags
Highest educational level of children	University	Junior secondary (SMP)	Do not attend school
Type of house	Permanent construction (solid walls, ceramic tiled floor, tiled or zinc roof)	Semi-permanent construction (timber walls or half solid walls, concrete floor, zinc roof)	Non-permanent construction (timber or bamboo walls, earth floor, zinc or straw roof)
Area of land owned	>10 Ha	2-9 Ha	1 Ha or none
Agricultural equipment	Tractor	Buffalo and plough	Mattock, machete, hoe (tofa)
Fishing equipment	Nets, motor boat, fish trap (*kelong*) or lift net (*bagan*)	Sampan and nets	Rod and line, net
Communication device (Handphone orTelephone)	More than 2	1	none
Jewellery	Gold or elephant tusk/ivory	Gold	none

Source: Laporan PfR-NTT Tim WIIP(PfR-NTT report by WIIP Team) plus field verification

Table 19. Information on Debts incurred by Respondents in Desa Reroroja

Source of loan	Reasons for Borrowing from this Source				Annual Interest	Repayment system
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service		
Private bank or Cooperative	10 million	30 Km (inMaumere town)	Quite a lot. Collateral is required to obtain a loan.	Good	0.9 %	Depends on the size of the loan and on the mutual agreement reached between the two parties.
Kopdit	5 million	Officer comes to the house	Easy	Good	1.3%	Depends on size of loan
Family	Depends on need	Nearby	No regulations	Good	Interest free	Based on mutual agreement
PNPM	Depends on Group agreement	Nearby	Group Regulations	Good	1.5%	Depends on loan
Mobile Bank (*Bank Keliling*)	Depends on capacity	Officer comes to the house	ID card (KTP)Easy regulations	Good	20 %/ Loan	Depends on loan (Usually repaid in daily instalments)

Source: *Laporan PfR-NTT Tim WIIP*(PfR-NTT report by WIIP Team) plus field verification(2012)

Based on the information in Table 20 and field interviews, it is known that on average the respondents own 2-5 heads of livestock and obtain an agricultural yield (in the form of rice, maize, etc.) of 10-20 sacks/harvest (each sack holds 50-100 kg). Therefore, these respondents generally fall into the 'poor' to 'average' category. The 'rich' category usually contains only certain persons, such as the *tuan tanah* (land lord). The *tuan tanah* possesses a greater number of livestock and larger agricultural yields because he possesses much more land. Other information was obtained during field interviews concerning elephant tusk.In Flores, elephant tusk is valued more highly than gold. As well as being difficult to obtain, these elephant tusks have historical value having been handed down from generation to generation, such that ownership of them is still considered sacred.

From Table21 it can be seen that respondents had loans from various sources: bank, Kopdit Obor Mas, PNPM-Mandiri, family, and mobile bank (*bank keliling*). Many members of the community still borrow from the mobile bank as theregulations are easy and the loan money is paid out quickly. However, the rate of interest charged is very high, which the respondents object to. Nevertheless, because their needs are urgent they still borrow at these high rates. Of the 31 respondents interviewed, fewer than 10 individuals had no debts and the rest all had loans. They (10 individuals had no debts) said they could not afford the repayment instalments and did not want to be bound by obligations that madetheir lives uncomfortable.

3.2.3 Ecosystem Profile for Desa Reroroja

3.2.3.1 Ecosystems and Natural Resources in Desa Reroroja

In terms of their formation process, ecosystems in Desa Reroroja can be divided into two categories: natural ecosystems and man-made ecosystems. Both cover a range of land cover classes: human settlement, mangrove forest, mixed plantation, cultivation (dry fields and rice paddies), bush, river, hilly forest (mixed forest) and grasslands. Information on ecosystems in Desa Reroroja is presented in Table 22. The assessment of ecosystems and land cover focused on the entire region of Desa Reroroja. Lack of conformity in data on the administrative boundaries and definitive map was a constraint for the team when performing the field assessment. Ideally, the administrative boundaries and definitive map drawn up by each level of government (from village level to central government level) should correspond to those understood by the local people. Moreover, the Desa Reroroja map and boundary information available were not in digital form but just simple sketches without any coordinates or scale.

Table 20. Types of Ecosystem in Desa Reroroja

Type of Ecosystem	Area (Ha)	%
Dry land forest	2672.45	53.0
Marine	26.23	0.5
Scrubland	117.66	2.3
Grassland / savannah	621.77	12.3
Human settlement	65.28	1.3
Coastal	22.99	0.5
*Tambak*aquaculture ponds	2.24	0.0
Mangrove	35.58	0.7
Cultivation	1473.62	29.3
Total Area	5037.82	100.0

Village mapping was performed with the participation of the community. This served as a medium for clarification and for enhancing the community's understanding of the condition, potential and boundaries of the village (*desa*) and hamlets (*dusun*). Participatory mapping had been performed several times in Desa Reroroja by, among others, PMI, PNPM, COREMAP and the WIIP field facilitator. The assessment team elicited data as well as supplementing and confirming the accuracy of previously existing data with the community and village government in a discussion forum (*Focus Group Discussion*) and in-depth interviews. From the results of these, the assessment team deduced the relationships between natural resources and their users in the vicinity of Desa Reroroja.

A large part of the land in Desa Reroroja is used for agriculture as most of the inhabitants work as farmers. The relationships between natural resources and their users in the Reroroja area can be seen in Figure 13 and Table 23.

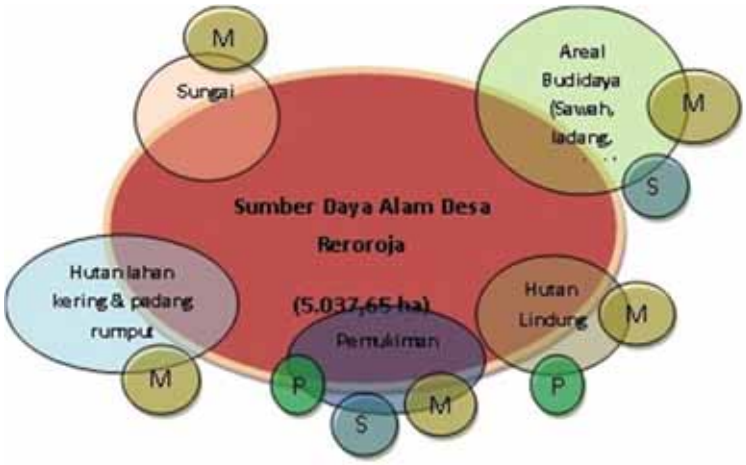


Figure 28. *Relationship between Natural Resources and their Users in Desa Reroroja. Captions: Natural Resources in Desa Reroroja (Natural Resources in Desa Reroroja), Rivers (Sungai), RiceFields/Farmland (Sawah ladang), Dryland Forest and Grassland (Hutan Lahan Kering dan Padang Rumput), Human Settlement (Pemukiman), Protection Forest (Hutan Lindung) M = Community, P = Government, S = Private Sector*

Table 21. Relationship between Use, Management and the Desired Management Scenario for Desa Reroroja's Natural Resources

Natural Resource	Present Users			Present Manager			Desired Management Scenario		
	Government	Community	Private Sector	Government	Community	Private Sector	Government	Community	Private Sector
Dry land Forest and Grasslands		√			√		√	√	
Human Settlement	√	√	√	√	√	√	√	√	√
Boundary Rivers		√		√	√		√	√	
Protection Forest	√	√		√	√		√	√	
Cultivation (Rice paddies, Dry fields, *Tambak* aquaculture ponds)		√	√		√	√	√	√	√

Source: *Results of direct analysis with Desa Reroroja community (2012)*

3.2.3.2 Spot Mapping

Spot maps of Desa Reroroja had been made through community participation and separately by certain institutions, including WIIP represented by a field facilitator (Didik F), PMI, COREMAP and PNPM. The product of these maps can only be called a village plan. A village plan had also been made while the ICBRR - CC program (Integrated Community Based Risk Reduction for Climate Change) was being carried out in the village.This was an Indonesian Red Cross KBBM Program

supported by the Netherlands Red Cross (NLRC). One form of ICBRR - CC program activity was the PRA(Participatory Rural Appraisal)-VCA (Vulnerability and Capacity Assessment), the aim of which is to identify and analyse vulnerabilities and capacities in the ICBRR – CC program's partner villages. One of these partner villages was Desa Reroroja.

Data collection on the dynamics of ecosystem and natural resources management used the PRA (Participatory Rural Appraisal) approach, employing several techniques and tools, including Transect mapping and Spot mapping. Unlike previous activities, the participatory mapping performed this time by the WIIP team used the help of a high resolution working map that had already been prepared and printed. This working map described land cover conditions according to a more accurate scale. The community were guided and directed to find out the condition of the village and give information on: 1) village boundaries, 2) the locations of village facilities and infrastructure, 3) village potentials, 4) the locations of disaster events and threats. This information was then integrated with information from ground checks in the field by the assessment team as a basis for analysis and the production of a more accurate village map. The spot map of Desa Reroroja made by the WIIP Team and facilitator in the field is presented in Figure 14.

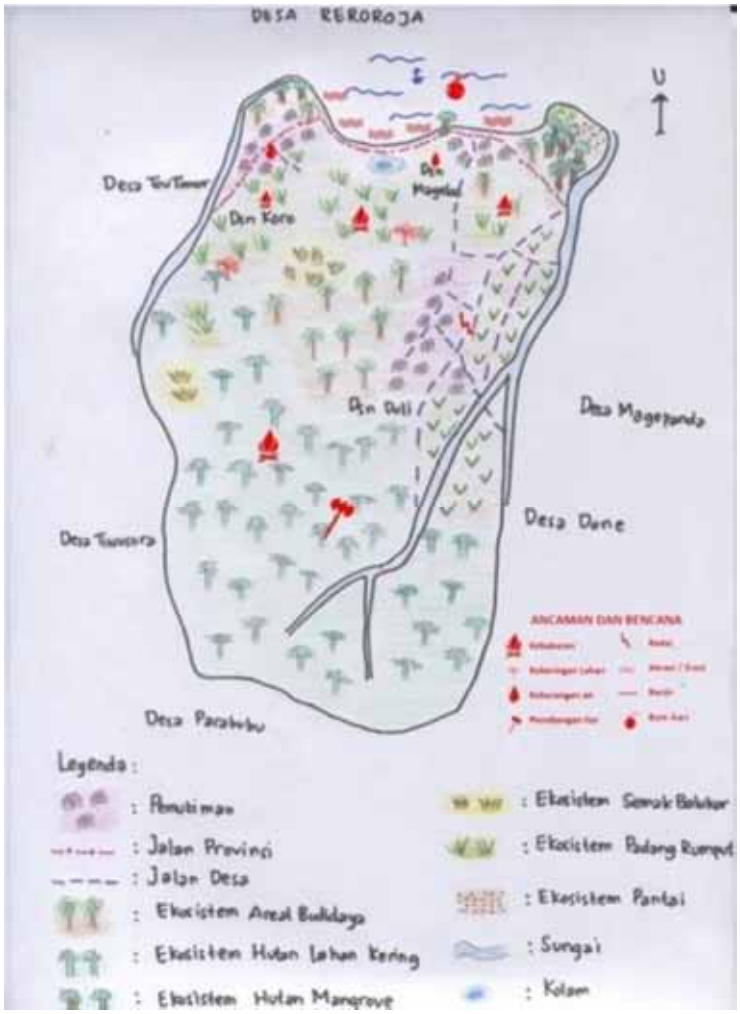


Figure 29. *Spot Map of Desa Reroroja (PMI 2010).*

On this spot map, sites at risk of disaster are indicated by a red symbol. This map was based on the types of ecosystems present in Desa Reroroja and the threats of disasters that could strike the village. These threats include fire, drought, insufficient sources of water, illegal logging, storm, abrasion and fish bombing. Fire frequently occurs in dryland forest and grasslands during the dry season, when air temperatures are high and there is no rain. Another threat to dryland forest is illegal logging. This is perpetrated for a number of reasons, including to obtain timber, to clear paths when hunting, and to clear land for agriculture. Land clearance for agriculture is done at the beginning of the rainy season, around August-October. Parched soil and water shortages occur during the dry season, especially if it is an extended one. The inhabitants of Dusun Mageloo and Dusun Koro often suffer water shortages as these two dusuns do not have a supply of clean water from a spring. Those living in Dusun Duliare much more fortunate as they rarely experience any water crisis or parched fields. This region has an adequate supply of clean water from springs in the hills.

Another type of disaster that has recently begun to strike the village is storms accompanied by high winds. The last one occurred in March 2012, causing damage to plantation and agricultural crops. Flood disasters frequently occur along river banks, often resulting in failed harvests and thus reducing the village's supply of staple foods. These floods are caused by the felling of trees around springs. The villagers know the regulations concerning the prohibition of tree felling in protection forest and concerning the management of land on both sides of a river, but some of them do not obey these regulations. Another result of forest clearance is landslides. These frequently occur in the forest in Dusun Duli.

Abrasion occurs all along the coast due to degradation of the mangrove forest, and is worst in the Dusun Koro area. The mangrove forest in Dusun Mageloo is in better condition than that in Dusun Koro. This is because of deliberate planting carried out by a local inhabitant, Babah Akong. He had voluntarily been planting mangrove since 1993, one year after northern Flores had been hit by a tsunami. Awareness of the need for environmental conservation requires local legislation (*Perda* or *Perdes*) to maintain and extend the area of mangrove forest in the village. Another threat that occurs along the coast and at sea is the bombing of fish. This is done by irresponsible fishers who think only of immediate profit without caring about conserving the environment. This results in damage to coral reefs and their surrounding ecosystems. It takes a long time to restore coral reefs to their former condition. For this reason, village governments have now started to place a ban on fish bombing.

3.2.3.3 Transect Mapping and Landscape Change

Transect mapping of Desa Reroroja was undertaken by the PMI Assessment Team in 2010, as shown in Table 24. This map was still relevant for use in the present assessment so the WIIP Assessment Team and the community focused on transect mapping from an ecosystem point of view. The Assessment Team studied the dynamics of natural resources ecosystem management of a range of land covers and also the history of transect changes. Topics studied included: 1) Land status, 2) Current use, 3) User groups, 4) Productivity, 5) Constraints and 6) Efforts to address them. This assessment of natural resources and ecosystem management focused on natural resources having dynamic management and whose ecosystem was essential. Such ecosystems included: 1) Agricultural land, 2) Mixed plantation, 3) Springs, 4) Mangrove forest, and 5) Sea. Information on the results of the transect map analysis performed by the team is presented in Table 25.

Table 22. Analysis of Previous Transect Map of Desa Reroroja Done in 2010 by PMI

Variable	A-B	B-C	C-D	D-E	E-F	F-G	G-H	H-I	I-J
Soil type	Blackstony soil	Stony sandy soil	Stony sandy soil and muddy soil	Muddy soil and stony sand	Stony sandy soil and stony rock coral	Stony sandy soil and stony rockcoral	Sandy soil and stony rock coral	Dry and stony black soil	Stony black soil
Land use	Cashew plantation, and vacant land	School, church, cave, *pustu* (auxiliary public health centre), , homes and ricefields	Cashew, coconut, homes	Offices, homes, mangrove forest and coconut plantation	Coconut plantation, fish ponds, ricefields, dam, dry fields	"Gua Maria" cave, cashew plantation, homes, dam, pipes, forest	Cashew plantation, homes, school, chapel, coconut plantation , pipes, forest	Cashew plantation, homes, school,wells, pipes	Fields
Hazards or Risks	Fire, storms	No pipe installation (clean water), flood, landslide, drought	Drought, flood, abrasion and storms	Storms, drought and abrasion	Storms, drought, flood and fire	Drought, fire, storms	Drought, flood, landslide and storms	Storms, drought, landslide, fire	Storm, drought and fire
Health		Malaria, acuterespiratory tract infections, skin disease	Malaria, acuterespiratory tract infections, skin disease	Malaria, acuterespiratory tract infections, skin disease		Malaria, acuterespiratory tract infections, skin disease	Malaria, acuterespiratory tract infections, skin disease	Malaria, acuterespiratory tract infections, skin disease	
Vulnerable groups		Children, expectant mothers, the elderly	Children, expectant mothers, the elderly	Children, expectant mothers, the elderly		Children, expectant mothers, the elderly	Children, expectant mothers, the elderly	Children, expectant mothers, the elderly	
Gender		*Arisan*, savings-borrowing, *ikat*weaving, farmer groups, *mudika*, *santa ana*	Fishers,*ikat*weaving	Fishers, farmer groups, *santa ana*,*mudika*,*remaja mesjid* (mosque youth)		Farmer groups, *arisan*,weaving, savings-borrowing, *mudika*,*santa ana*	Farmer groups, *arisan*,weaving, savings-borrowing, *mudika*, *santa ana*	Farmer groups, *arisan*,weaving, savings-borrowing, *mudika*, *santa ana*	
Occupation		Teachers, farmers, fishers, skilled labour, midwife, volunteers, entrepreneurs	Farmers and fishers	Civil servants, entrepreneurs, farmers, fishers, skilled labour, volunteers		Civil servants, entrepreneurs, farmers, fishers, skilled labour, volunteers	Civil servants, entrepreneurs, farmers, fishers, skilled labour, volunteers	Entrepreneurs, civil servants, skilled labour, farmers	

Variable	A-B	B-C	C-D	D-E	E-F	F-G	G-H	H-I	I-J
Infrastructure		School, church, office, *pustu* (auxiliary public health centre),*gua maria*cave		*Polindes*, school,mosque,office of religious affairs (KUA), office, village office, police station, coremap office, market		*Gua maria* cave	School	School, chapel, *posyandu/poskesdes*	
Recommend-ations	Reforestation	Flood prevention, piping installation, reforestation	Abrasion prevention, flood prevention	Reforestation and piping installation	Reforestation and flood prevention	Reforestation and piping installation	Reforestation, flood prevention, piping installation	Reforestation, piping installation	Reforestation

Table 23. Transect Map of Natural Resources and Ecosystem Management Dynamics for several types of land cover in Desa Reroroja

Topic	Land Cover / Use					
	Agricultural Land	**Mixed Plantation**	**Springs**	**Mangrove Forest**	**Hilly Area**	**Sea**
Land Status	Prior to 1970, land was "*adat*" owned (*milik adat*). Now, much of the agricultural land is owned freehold (*hak milik*). According to village government information, the total area of rice paddyfields is 395 ha and dry fields 166 ha.	Prior to 1970, land was "*adat*" owned (*milik adat*). Total area of community plantations is around 54 ha. Individually owned plantations cover 0.5-1 ha.	Freehold, State-owned and *adat* owned.	Freehold, State-owned and *adat* owned. Total mangrove forest area around 30 ha.	Freehold, State-owned and *adat* owned. Area of hilly land used is bush and grasslands covering 558 ha.	State-owned (*Milik Negara*)
Current use	Irrigated rice paddyfields: *Most are in Dusun Duli, system is semi-irrigated, rice is alternated with maize & mung beans.* Rain-fed rice fields: *Mixed with cassava, maize and coconut.* (Dry) fields: *Usually near to people's homes.Crops include: maize, cassava, beans;*	Land planted with coconut, cacao, banana, castor oil plant, and cashew.	For irrigation, drinking water and daily needs	Shellfish & crabsfor personal consumption, and a few people also sell them	Extraction of firewood, timber for house construction, traditional ceremonies	Fish, octopus, squid, sea slugs (captured using traditional methods),and seaweed (for sale and consumption)

Topic	Land Cover / Use					
	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
	commodities most planted are rice and maize					
User group	Most are of the local indigenous ethnic group (Suku Lio). Some fields and paddyfields managed by the churchare community *adat*owned.	Mostly from the local indigenous ethnic group (Suku Lio)	Used by most of the Dusun Duli community to irrigate paddyfields.	Coastal community	Most are from the indigenous local ethnic group (Suku Lio) plus a few other members of the general public	Coastal community and fishers. Mostly from the Bajo ethnic group.
Productivity	Productivity of unhusked paddyfield rice (*gabah*): Dry season: <200 kg/ha Normal season: 1- 2 Ton/ha Good season: >2ton/ha Previously (5 years ago) yields could reach 2-3 times thoseobtained now. Rice plant spacing: 20-25 cm Maize: around 13-14 sacks/ha	Cashew: 1 harvest/year in Aug-Sept, a small harvest also possible in January. Cashew price in January: high but poor quality (Rp 5,000/kg) Cashew price in Aug-Sept: cheapbut good quality (Rp 12,000-15,000/kg) Distance between trees cashew: 6x6 m coconut: 10x10 m Cashew: about 1-5kg/tree (yield increases as tree ages) 1 ha cashew plantation contains 80-100 trees spaced 5-6 meters apart.	Decreasing (...m^3/sec)	More than 1 ton/year of shellfish are caught and sold by one shellfish-collector group (5-6 persons/week)	.....	.....

Topic	Land Cover / Use					
	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
Constraints	Irregular rainfall. Frequent flooding of agricultural land during rainy season. Attack by pests: green padi bug (*walang sangit*)&birds (*pipit*). Tornadoes often damage agricultural land during Dec-Feb. Irregular seasonal calendar Present: October start to clear land, November start planting, December finished planting 10 years ago: August-September started to clear land, September started planting, planting lasted 3 months	Productivity of cacao very poor due to disease and rot.	In the past, trees were cut down near springs. The community know the regulation regarding distance from both sides of river, but some of them do not obey it.	Illegal logging Abrasion No village regulation (*perdes*)yet exists concerning mangrove and environment	Illegal logging, forest fire	Fish bombing, chemical and *tuba* root poisons.
Solutions / efforts to overcome the constraints	Rainfall forecasts and information need to be updated.	Extension services on appropriate mixed plantation cultivation.	Enforcement of law banning the felling trees on both sides of river and around springs. Plant trees around springs	Rehabilitation Extension services/ training on the utilisation of mangrove fruits. Mangrove bark is currently used to dye traditional cloth (a little).	Rehabilitation	Stricter law enforcement.

From 1960 to 1970 Desa Reroroja's coastal area was still fully covered by mangrove forest and hill forest. Forest vegetation slowly decreased along with the increase in the number of inhabitants and the clearing of additional land for agriculture. In 1992 there was an earthquake and tsunami. Mangrove forest in Desa Reroroja declined further. Abrasion began to occur and much hill forest became grassland and critical land. After 1998 (Indonesia's political reformation era) abrasion penetrated further inland towards roads and homes. All that remained of the mangrove forest were small colonies, with the exception of the mangrove forest resulting from Babah Akong's pioneering work. To date, hill forest and grassland are still frequently burnt every year. The Assessment Team considered it extremely important that this matter be addressed during disaster risk reduction efforts in Desa Reroroja. More detailed information on landscape changes in Desa Rerorojais presented in Figure 30.

Key: (a) sea, (b) mangrove,(c) human settlement, (d) road, (e) cultivation area, (f) forest near river, (g) hill forest, (h) grassland.

Figure 30. *Transect Map of Desa Reroroja and Changes from 1992 to 2012.*

Most of the irrigated paddyfields are in Dusun Duli and are managed using a semi-irrigation system, while dryland rice is grown almost equally in the other dusuns.The most common problem experienced by the inhabitants of Desa Reroroja is that the seasons are uncertain and tend to be extreme.In the rainy season, floods and tornadoes often occur on agricultural land, and in the dry season there are problems with the water supply and land fires occur. From interviews with village officialsand community leaders, it was learned that prior to 1971 the land was still owned by the ethnic community (*Hutan Ulayat*). Now, every area of the settlement holds an official land ownership certificate as proof of ownership. However, other areas outside the settlement, which are still considered to be *hak ulayat*,are in the forest, and the people have not been granted certificates for these. The document mostly held as proof of rights to such land is the annual land tax invoice *Surat Pemberitahuan Pajak Tahunan/ SPPT*.

3.2.3.4 Water Quality

Water quality analysis in Desa Reroroja was performed at a number of sampling stations considered to be representative of water quality throughout Desa Reroroja (Figure 16). A description of each station can be seen in the footnotes to Table 26. Stations 1,4, and 7 were water sources used for consumption (drinking and cooking) while the other stations were for other uses such as bathing, washing, irrigation, and the like. Table 26 shows that the DO concentration levels at all the stations were above the minimum level set by the government. However, the DO level at station 2 was the lowest of alland was almost at the minimum DO level recommended by the government. Average water temperature at all stations was within the normal range and supported the life within the water. In Table 26 it can be seen that at almost every station the higher the water temperature the

higher the DO level, the only exception being station 2. Even though the water temperature at station 2 was high, the DO level was quite low due to the high level of salinity. DO concentration falls as the salinity level rises. However, the highest salinity was found at station 3, Kolam Natu pond. This pond has been used as a mangrove rehabilitation area and nursery for mangrove seedlings because it is near the sea and subject to tides.Such conditions are conducive to the growth of mangrove. Moreover, the DO concentration in this area is quite high so can support the life of organisms.

The water pH at all stations met the standards if compared with minimum and maximum pH levels recommended by government. However, the pH at station 3 was the highest of all. It was alkaline because of its high salinity. The higher the salinity of a water body, the higher its pH (alkalinity). An interesting result was TDS (total dissolved solids). The TDS at stations 1 to 5 were higher than the maximum recommended by the Health Ministry. However, the highest TDS concentrations were at stations 2, 3 and 5 which exceeded 1000 mg/L. Stations 3 and 5 are not used for drinking, but the community do use stations 1, 2 and 4 for drinking and cooking. This is quite hazardous and can become a real danger if left and not treated to reduce the TDS. People can reduce the TDS concentration by filtering the water first before consuming it. The filter could be a piece of thick closely woven fabric. This can remove solids and particles from the water, especially those of small size.

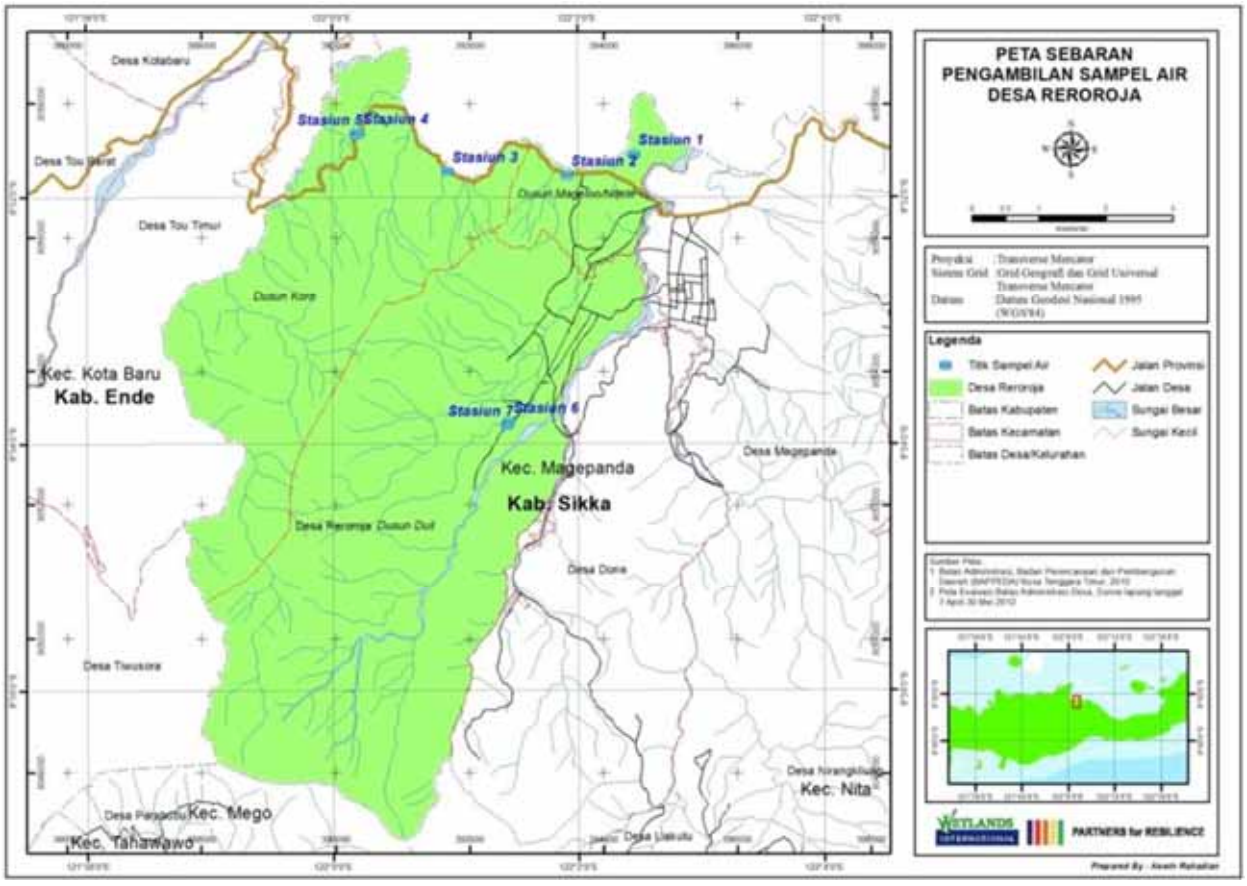


Figure 31. *Map Showing Distribution of Water Sampling Stations in Desa Reroroja.*

Table 24. Results of Water Quality Analysis for Desa Reroroja

Parameter	Unit	Station							*		**	
		1	2	3	4	5	6	7	Min	Max	Min	Max
DO (mg/L)	mg/L	5.4	2.9	5.2	7.1	7	5.4	6.4	2	-	-	-
Temperature (°C)	°C	29.3	28.2	28.4	29.9	27.9	28	26.9	-	-	-	Air temper-ature ±3
Salinity (ppt)	ppt	0.4	1.7	31.3	0.3	0.9	0.1	0.1	-	-	-	-
TDS (mg/L)	mg/L	874	3274	48200	596	1717	221.5	201.9	-	1000	-	500
pH	-	7.68	7.98	8.66	7.2	7.54	7.66	6.79	6	9	6.5	8.5

Notes:

Station 1 : Dusun Mageloo Villager's home (Babah Akong)
Station 2 : WIIP Representative's Office in Desa Reroroja
Station 3 : Kolam Natu pond
Station 4 : Wells in Dusun Duli (Only for drinking)
Station 5 : Wells in Dusun Duli (For washing etc.)
Station 6 : River flowing from Wolokali spring (Dusun Duli)
Station 7 : Wolokali spring (Dusun Duli)

* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Quality Control

** : Potable Water Quality Standard according to Indonesian Health Minister regulation RI NO.492/MENKES/PER/IV/2010

3.2.4 Disaster, Vulnerability and Capacity of the Desa Reroroja Community

3.2.4.1 Information on Disaster in Desa Reroroja

3.2.4.1.1 History of Disasters and Seasonal Events in Desa Reroroja

Disaster occurs in Desa Reroroja almost every year.The most common ones are flood and forest fire. Details of Desa Reroroja's disaster history are presented in Table 27.

Table 25. History of Disasters in Desa Reroroja

No	Year of Occurrence	Type of Disaster	Disaster Chronology	Impact
1	1989-2009	Fire	• Fire flared up suddenly and flames burned for 2 days in the forest.	• Destruction of agricultural crops • Spring dried up • Loss of wildlife habitat
2	1992	Earthquake	• Started with high air temperatures, followed by sudden terrifying tremors	• Loss of life • Loss of property • Destruction of agricultural land • Shoreline receded by 1 meter
3	1993	Abrasion	• 2 m high waves broke onto the land	• Houses on the coast were flooded • Roads were damaged and transportation disrupted
4	2001	Drought	• Rainy season was only mid February • Water discharge from the spring became small so people had difficulty obtaining clean water • As a result, drought occurred during March-June.	• Failure of crop planting • Reduced water discharge from spring • Many animals died • Malnutrition in children
5	2003	Typhoon/tornado	• Strong winds came from the east and whirled in the air for about 10 minutes • Sky became dark red	• Homes damaged (Dusun Duli) • Loss of life
6	2005	Tsunami	• Sky changed and became overcast at 8-10 a.m. • Drizzle accompanied the overcast cloud • Large wave and current suddenly appeared	• Loss of life
7	13-20 January 2006	Typhoon / tornado		• 2 semi permanent houses damaged (Rp. 20,000,000)
8	2006-2007	Anthrax epidemic	• People ate the meat of animals that had died suddenly • Anthrax symptoms appeared with red spots on skin which grew into boils that then burst forming wounds	• Buffaloes died • People contracted anthrax

No	Year of Occurrence	Type of Disaster	Disaster Chronology	Impact
9	2007	Flood	• Heavy rain for 2 days caused river to overflow, resulting in floods • Water reached a height of 1 meter in paddyfields, 0.5 meter in residential area, and 6 meter in the watershed	• Failed harvest as fields inundated for one week • Damage to agricultural land • Loss of livestock • Loss of household furniture/appliances
10	2008	Flood		• no impact
11	2009	Flood		• no impact
12	2009	Fire		• Plantation trees destroyed • Fire occurred almost every year
13	2010	Flash flood	• Flash flood, water overflow due to continuous rain from morning till night • Water height reached 1 meter in residential area	• Damage to household furniture/appliances • Loss of livestock • Damage to agricultural land
14	15 April 2011	Flash flood		• 15 ha agricultural land inundated • 20 homes in Dusun Mageloo and Duli, 2 primary schools inundated • Failure of rice harvest in paddyfields along the river banks • Fairly deep flooding of residential areas
15	15 January 2012	Flood		• 2.5 ha agricultural land inundated • 4 homes damaged by inundation • No measures taken to address the problem, just identification of losses due to flood
16	27 March 2012	Typhoon / tornado	• Occurred in March as a result of climate change. • Rained continuously for 3 consecutive days followed by extremely strong winds	• 5 homes heavily damaged • Trees uprooted • Damage to agricultural land • Electricity and communication networks badly damaged resulting in total blackout lasting 1 week
17	27 April 2012	Flood	• Almost 1 week of rain raised river discharge level • This caused the river to overflow	• Agricultural land alongthe river banks was flooded • Rice ripe for harvest could not be harvested

Source: Laporan PFR-NTT Tim WIIP(PfR-NTT report by WIIP Team) plus field verification, BPPD Kab. Sikka. (2012)

The worst disaster to have occurred in this village was the earthquake accompanied by tsunami in 1992. Its impact was great, particularly the psychological impact. Other disasters that have occurred in Desa Reroroja are flood, drought, abrasion, typhoon/tornado, forest fire, and anthrax epidemic.Flood, drought, abrasion and forest fire have become seasonal disasters in this village and occur every year.

Floods occur every rainy season, i.e. between November and April. As a result of the heavy rainfall and degradation of the forest upstream, the rain water is not completely absorbed by the soil. Drought occurs every dry season, i.e. May to November. The dry season in Nusa Tenggara, including Flores, is longer than the rainy season. The long dry season causes water sources in the village to dry up. As a result, the inhabitants frequently experience a clean water crisis, both for drinking and also for other needs such as washing, bathing, etc. Drought also impacts on agricultural land as it becomes impossible to farm, so it is abandoned by the owners until the next rainy season arrives.

At the start of the rainy season, the villagers usually begin to farm their land again.They start by setting fire to the land, with the aim of clearing away the weeds growing there.In addition, often some of the grasslands are also burned, causing a big fire. Their aim in doing this is so that when the rainy season arrives, lush new grass will grow abundantly and their livestock will be able to graze there.

Another disaster that occurs almost every year is coastal abrasion. This alters Reroroja's shoreline, moving it further inland. To overcome this problem, the local government has constructed abrasion embankments along the coast from Dusun Mageloo to Dusun Koro. In addition, the Reroroja community have started to become aware of the importance of mangroves to life.They have begun to plant mangroves along the seashore. Information on seasonal disasters and events in Desa Reroroja can be seen in Table 28.

Table 26. Seasonal Events and Disasters in Desa Reroroja

Type of disease/disaster	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Fire													Fire frequently occurs during height of dry season
Flood													Flood caused by high rainfall
Malaria													Malaria is frequent during rainy season
Diarrhoea													Diarrhoea is frequent during fruit (dry) season
Acute respiratory tract infections													Frequent during rainy season

Type of disease/disaster	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Skin diseases													Occur during dry season
Eye infections													Occur during dry season
Rice plant pests (caterpillars, brown plant-hopper [*wereng*], green padi bug [*walang sangit*] and stalk borer [*penggerek batang*])													Pests attack crops during irregular rainy seasons
Withered flowers (cashew)													Occurs during dry season

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

From Table 28 it can be seen that, besides disasters, epidemics also attack the Desa Reroroja community almost every year.These diseases occur as a result of the disasters. For example, after a flood the people usually succumb to skin diseases, diarrhoea, acute respiratory tract infections, etc. Moreover, Nusa Tenggara is one of the places where malaria is endemic, so there are cases of malaria there every year. According to Health Ministry information (2011), the eastern part of Indonesia, including NTT, is known to be the area withthe highest malaria stratification.Likewise, eye infectionsand acute respiratory tract infections occur as a result of forest fire because the smoke produced is harmful to people's health.

3.2.4.1.2 Disaster Impact

The various disasters that visit Desa Reroroja have had a not inconsiderable impact. The huge earthquake and tsunami disaster in 1992 left deep trauma and hurt among the people of Desa Reroroja. Seasonal disasters, particularly floods and fires, have also caused considerable loss.Direct impacts include the loss of homes, loss of life, destruction of agricultural land, loss of property, etc. Indirect impacts, meanwhile, are loss of livelihoods and shortage of food, which can result in starvation. Further information on the impacts of disasters that have occurred in Desa Reroroja are presented in Table 29.

Table 27. Disaster Impact in Desa Reroroja

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on tree felling in upstream (forest) areas and in the vicinity of springs, imposed by village government and local *adat* institutions
Flash Floods										• Ban on tree felling in upstream (forest) areas and in the vicinity of springs, imposed by village government and local *adat* institutions • Ban on using landslide prone areas for farming/plantation
Earthquake&Tsunami										• Communities in earthquake prone areasmoved to a safer site
Tornado										• Keep away from areas with many trees
Fire										• Ban on the intentional burning of forest and land, imposed by village government and local *adat* institutions • Extension services and socialisationconcerning the impact caused by illegal/irresponsible burning of land and forest

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Abrasion										• Crop diversification • More effective treatment of land and plants, with the help of technology from government and relevant agencies • Community start setting aside part of their harvest for use during seasonal periods of scarcity
Drought										• Plant trees in spring area • Construct water storage tanks and dig wells
Epidemic										• Extension services promoting a healthy life style • Public sanitary facilities (*MCK*)have been built • Construction of water sources such as a well at each house
Pest attack										• Extension services on pest eradication, plant treatment and land treatment, provided by relevant agency • Provision of pesticides or pest eradication technology by relevant agency

Key: High Medium Low

Besides the physical impacts of disaster, the social impacts on the villagers' lives were also analysed from the respondents' perceptions. The results of this analysis can be seen in Figure 32. The figure suggests that most of Desa Reroroja's respondent are becoming increasingly alert to the disaster risks that often hit the village. In addition, their way of life has also changed following the various disasters.For example, they now know the natural signs of a tsunami, can predict storms from weather forecasts, know about farming systems and crops different from those used in the past, and so on. The respondents were also of the opinion that settlements and farmland at high risk of disaster should be relocated so as to prevent repeated loss. Coastal settlements in particular, they said, should be relocated to a safer site because of the threat to life.Also, they strongly requested guidance on a disaster early warning system, preparations for coping with disaster, and preparedness in facing disaster, in order to reduce possible impacts.

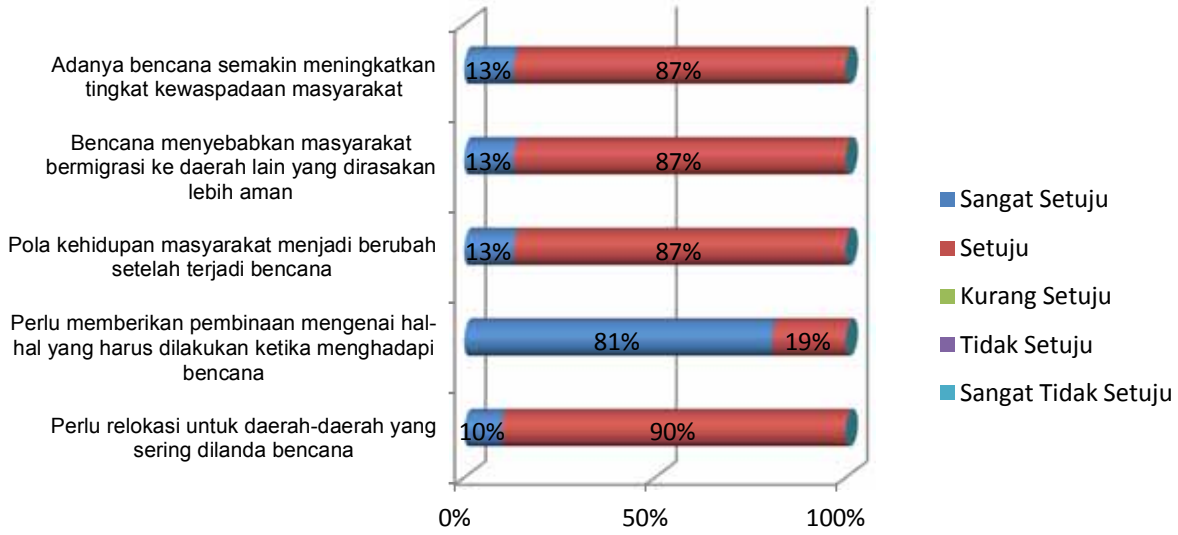
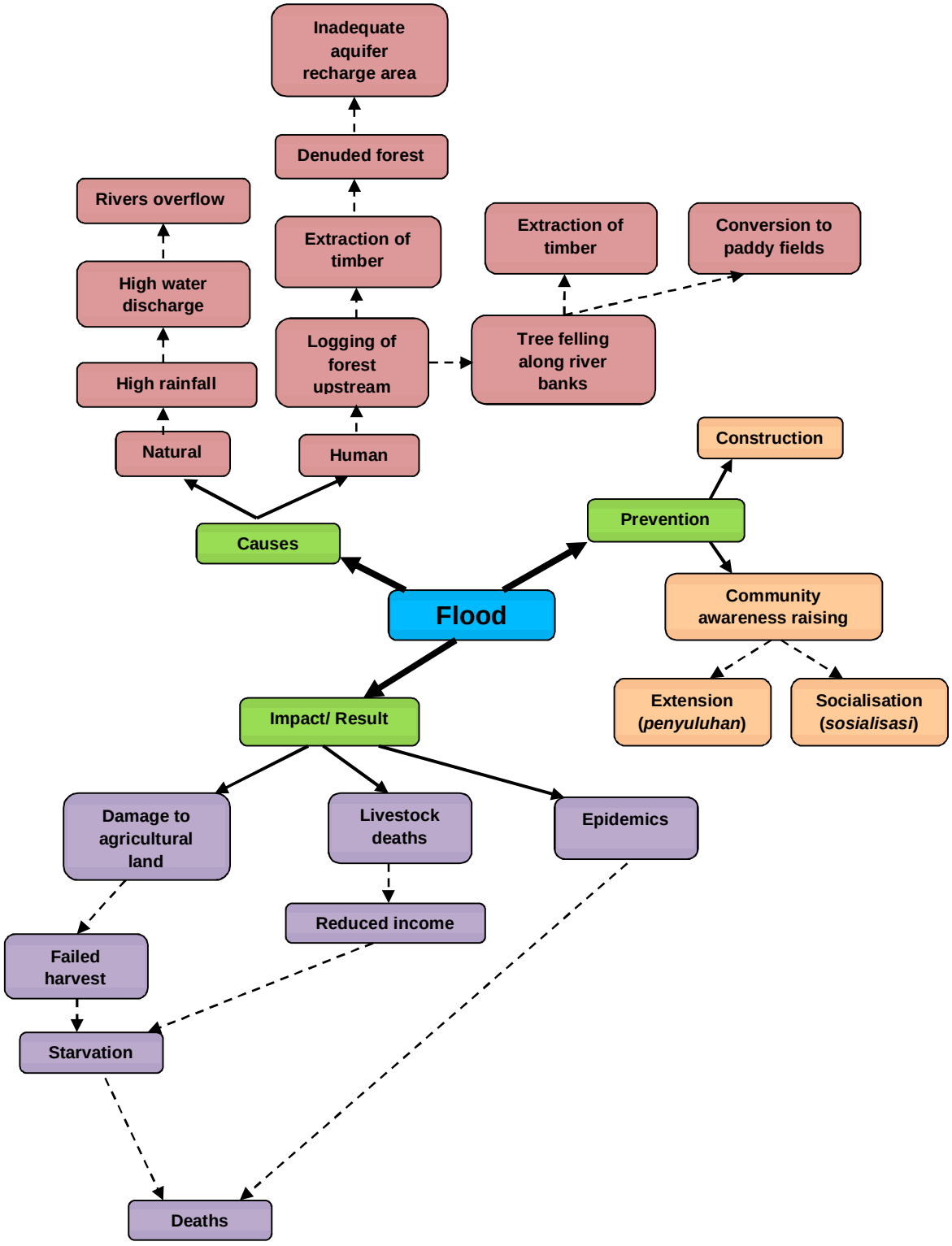


Figure 32. *Respondents' Perceptionof Disaster Impact in Desa Reroroja.*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

3.2.4.1.3 Sample Issue Tree for Desa Reroroja



3.2.4.2 Vulnerability in Desa Reroroja

A VCA analysis of Desa Reroroja was performed to determine the vulnerabilities of this village. After identifying the range of possible vulnerabilities, it was then possible to determine relevant solutions, i.e. by improving the community's capacity. A general picture of the vulnerabilities and capacities possessed by the people of Desa Reroroja can be seen in Table 30. In addition, a disaster risk analysis was conducted based on the Desa Reroroja community's level of vulnerability and capacity. The results of this analysis can be seen in Figure 33.

Table 28. Vulnerability and Capacity Matrix for the Desa Reroroja Community

Variable	Vulnerability	Capacity
Physical and Environmental Health (ecosystem)	1. Most homes are still semi permanent buildings which could collapse in the event of earthquake, hurricane, etc. 2. Farming still uses a system of shifting agriculture, which can degrade soil and environment 3. Some people still carry out fish bombing, which damages the marine environment 4. Livestock are not kept in cages, so can cause damage to paddy fields, dry fields and mangrove forest 5. Water sources are still inadequate 6. Sanitation facilities (*MCK*) are still limited 7. Some members of the community still burn forest to clear land 8. Mangrove forest requires reforestation	1. The villages possesses a village green, mosque, church and evaluation site in the hills 2. Some of the inhabitants have begun permanent cultivation 3. There is a spring in Dusun Duli but piping is needed 4. A mangrove planting group has been set up
Socio-Cultural	1. On average, each family has more than three children 2. Many of the people evacuated to the hills (in response to the 1992 earthquake) have returned to the coast 3. People have begun to ignore traditional *Adat* laws	1. A family planning program is now run at the nearest *Polindes* maternity clinic (Free of charge) 2. There is now a reforestation program for planting mangrove and beach plants 3. The *tuan tanah*and*mosalaki* still play an influential role
Economic	1. Inhabitants' incomes fall after a disaster 2. Shortage of job opportunities 3. The people's buying power is low, whereas commodity prices are still high	1. Provision of business capital by several agencies
Institutional	1. Community organisations (youth, religious) do not yet work together for environmental conservation 2. Local government has not been active in socialising the need to care for ecosystems	1. Programs from local NGOs (*LSM*) and government
Attitudes/ Motivation	1. Inadequate public awareness re mangrove reforestation 2. Inadequate public awareness re not burning forest 3. There is as yet no local regulation (*Perdes*) governing ecosystem management for conservation (still at draft stage)	1. Involvement of local (*LSM*) and international NGOs concerned with the environment 2. Local regulation (*Perdes*)is being drawn up 3. Traditional *adat* laws still exist, even though not as strict as in the past 4. There are now extension services, mangrove reforestation activities

Source: Results of identification in the field (2012)

Physical vulnerability, particularly that related to environmental conservation, such as forest, mangroves, soil health, etc., is strongly influenced by the behaviour of the local community. From information obtained in the field, it is known that their level of knowledge (educational level) is still quite low. Practices harmful to the environmental, such as the cutting down of mangroves, use of fish bombing and potassium, and the burning of land, are mostly the result of their ignorance of the role and function of ecosystem conservation in their lives. In addition, economic factors and the need to survive force them to extract greater harvests from nature even though this involves detrimental practices.

Motivational, economic and socio-cultural vulnerabilities in the village are also strongly affected by the quality of the community. Their low educational level makes them less open and only a few of them yet have a wider outlook or knowledge. This rather narrow outlook limits their range of expertise. As a result, the livelihoods from which they can earn money are also limited as their quality as human resources is low. Low incomes and the need for greater job opportunities are additional problems in Desa Reroroja. Moreover, the local government has not done as much as it could to address existing vulnerabilities, whether physical, social, cultural or economic, so it is still difficult to improve the community's attitudes and motivation to seek a better life. Therefore, one way of enhancing the Reroroja community's capacity to reduce their vulnerabilities as shown in Table 30, is to coordinate with a range of relevant parties.

Risk analysis results indicate that water resources and drought are the highest risks in Desa Reroroja (Figure 33). Besides these, the risks of forest fire, flood and health issues are also fairly high in this village. These results were obtained from field identification and the consolidation of information through direct interviews with members of the community. They are extremely anxious to get a solution to reduce these risks as they fear that they could become significant problems if ignored.

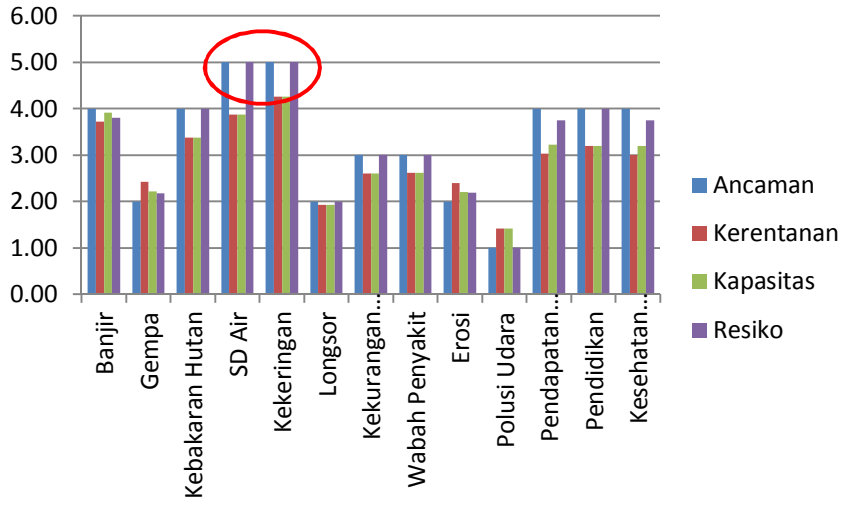


Figure 33. *Information on Disaster Risks in Desa Reroroja.*
(Source: Field identification 2012).
Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Flood (banjir), Earthquake (Gempa), Forest Fire (Kebakaran Hutan), Drought (Kekeringan), Landslide (Longsor), Lack of Food (Kekurangan Pangan), Epidemic (Wabah Penyakit), Erosian (Erosi), Air Pollution (Polusi Udara), Decreased Incomes (Pendapatan Menurun), Education (Pendidikan), Community Health (Kesehatan Masyarakat)

3.2.4.3 Community Capacity in Desa Reroroja

3.2.4.3.1 Early Warning System

As in other places, information on EWS is badly needed in the Desa Reroroja area in order to ascertain how prepared various elements of the community are to face disaster. An analysis of information obtained from interviews and questionnaires shows that most of the respondents said they did not know if there was an EWS in their village. The failure of such information to reach the public could be due to a break in the chain of communication. We know that Desa Reroroja does have a SIBAT-PMI whose task it is to provide EWS information to the village community and who are also volunteers prepared to help disaster victims. However, the analysis also showed that some respondents obtained EWS information from a number of sources, such as reading weather forecasts (20%), and from television or radio (7%). A small proportion of respondents also still obtain EWS information through traditional means such as the beating of the *kentongan* alarm, and information from the local church or mosque (3%). The full results of the analysis are presented inFigure 34.

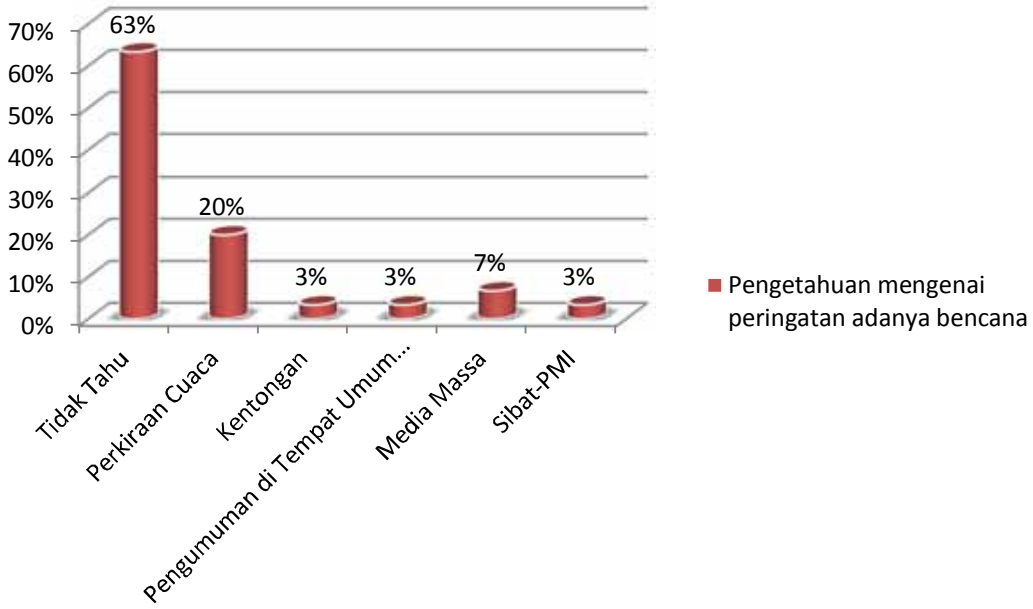


Figure 34. *Desa Reroroja Respondents' Knowledge of Disaster EWS*
Captions: Knowledge of Disaster Warnings (Pengetahuan Mengenai Peringatan Adanya Bencana), Didn't Know (Tidak Tahu), Weather Forecast (Perkiraan Cuaca), Kentongan Alarm (Kentongan), Announcement in Public Place (Pengumuman di Tempat Umum), Mass Media (Media Massa), Sibat-PMI

Further analysis shows that all the respondents said that they would respond well if they knew there was an early warning of disaster.Thus, it is essential that complete information reach all levels of the community and that this be improved in Desa Reroroja. This is because the EWS already formed in the village through SIBAT-PMI needs even better cooperation with all levels of the village community. If a disaster should occur and threaten their lives, the anticipatory action they consider safest is to stay at home. They believe that their home is the safest place to seek refuge in the event of a disaster. However, some of the other respondents said that they felt safer outdoors, especially in a wide open space such as a sports field, or in an open space higher up, such as a hill (Figure 35).

Since the earthquake and tsunami that forced them to stay in temporary shelters, where space, food and facilities were very limited, they would prefer to evacuate to the homes of neighbours/ friend and family living in safer areas.

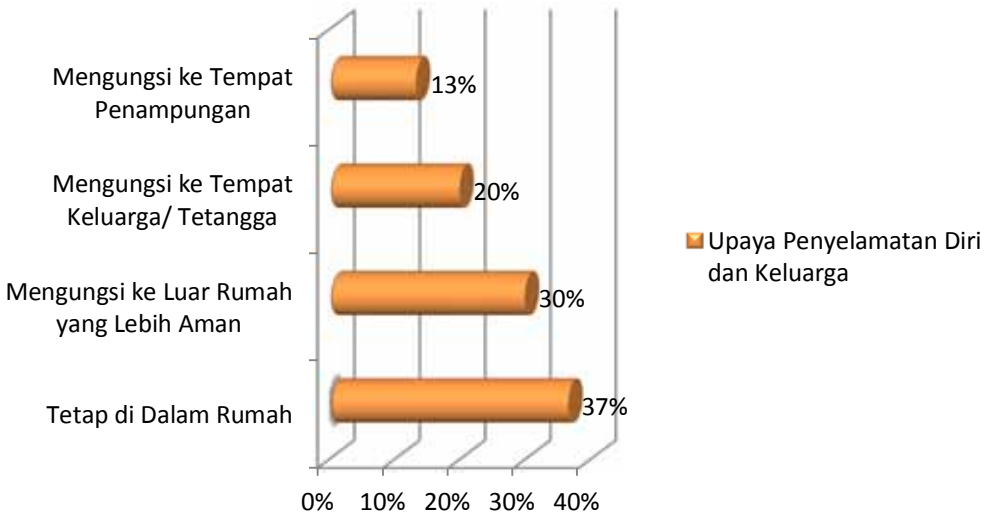


Figure 35. *Efforts that Desa Reroroja Respondents would Take to Save Self and Family*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family. Neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Stay Inside Home (Tetap di dalam Rumah)

The EWS in a region will not be effective if it is not supported by local government. The analysis in Desa Reroroja showed that not one of the respondents stated that EWS in the village was carried out by local government. This may be one of the reasons why the respondents said they did not know about EWS in the village. Local government took more action after a disaster had occurred. The most common activity was to distribute aid after a disaster had hit the village (50%). According to respondents, another activity frequently performed by local government was to provide shelter (23%) and evacuation equipment(10%). Seventeen per cent of respondents also stated that local government never did anything at the actual time of a disaster. After confirming this with local government, they said that post disaster evacuation had always been carried out but perhaps it had not reached everybody due to limitations in funds and facilities. Now, preventive activities have been started, such as planting mangroves, reforestation around water springs, a ban on cutting down trees, etc. These activities badly need cooperation among many elements, including government, community and third parties like local and international NGOs. As regards EWS already existing in the village, the government expects cooperation and coordination between SIBAT-PMI, government, and indeed the community since they are the ones who are to be saved from the detrimental effects of disasters.Full information on the results of the analysis of respondents' perceptions of government's role in mitigating disaster is presented in Figure 36.

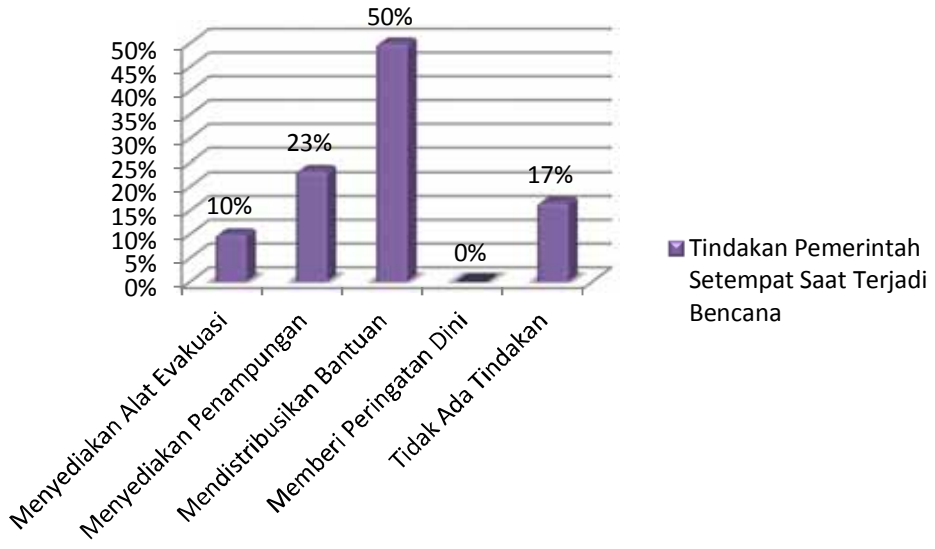


Figure 36. *Information on Action Taken by Desa Reroroja Government in Response to Disaster Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), Provided Evacuation Equipment (Menyediakan Alat Evakuasi, Provided Shelter (Menyediakan Tempat Penampungan), Distributed Aid (Mendistribusikan Bantuan), Gave Early Warning (Memberikan Peringatan), No Action Taken (Tidak Ada Tindakan*

3.2.4.3.2 Access to and Control of Community Assets

Information on access to and control of assets in Desa Rerorojais presented in Table 31. Analysis indicates that almost all assets, both privately and communally owned, can be accessed easily by the villagers. Severe difficulty had been experienced in accessing facilities and infrastructure at the time of the earthquake and tsunami.

Table 29. Access to and Control of Assets that can be Used by the Village Community when Facing Disaster in Desa Reroroja

Private Source of Ownership	Accessibility at Time of Disaster							Ownership Control
	Flood	Landslide	Forest Fire	Tornado	Drought	Earthquake& Tsunami	Epidemic	
Agricultural Land							Yes	Father
Homes	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Furniture	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother

Valuables	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Vehicles	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Clothes	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Food	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Fuel	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Valuable Documents	Yes	Yes	Yes	Yes	Yes		Yes	Father, Mother
Public Source of Ownership	**Accessibility at Time of Disaster**							**Ownership Control**
	Flood	**Landslide**	**Forest Fire**	**Tornado**	**Drought**	**Earthquake& Tsunami**	**Epidemic**	
Places of worship	Yes	Yes	Yes	Yes	Yes		Yes	Community
Roads	Yes	Yes	Yes	Yes	Yes		Yes	Community
Market	Yes	Yes	Yes	Yes	Yes		Yes	Community
Football field	Yes	Yes	Yes	Yes	Yes		Yes	Community
Village Hall/Office	Yes	Yes	Yes	Yes	Yes		Yes	Manager Concerned
Boats	Yes	Yes	Yes	Yes	Yes		Yes	Community
Water sources	Yes	Yes	Yes	Yes	Yes		Yes	Community
Public bathing, washing, toilet facilities	Yes	Yes	Yes	Yes	Yes		Yes	Community
School buildings	Yes	Yes	Yes	Yes	Yes		Yes	Manager Concerned

Source: Results of Identification in the Field (2012)

3.3. Desa Done – Kabupaten Sikka

3.3.1 Profile of Desa Done – Kecamatan Magepanda

3.3.1.1 General Description of Desa Done

Desa Done was created in 2003 as a result of the expansion of Desa Magepanda. Desa Done is the only village in Kecamatan Magepanda to be situated quite far from the sea and coast. Desa Done is divided into three dusuns, which are Dusun Watuwa, Ladublewa and Detunggawa. An administrative map of Desa Done is presented in Figure 17. The total area of Desa Done is 15.58 km^2 (1558 ha) or about 13% of the total area of the Kecamatan Magepanda district (*Kecamatan Magepanda Dalam Angka Tahun 2012*). However, according to a participative map integrated with spatial analysis, Desa Done covers 18.663 km^2 (1866.3 ha). The boundaries of Desa Done are as follow:

- North : Desa Reroroja, Kecamatan Magepanda
- South : Desa Parabubu
- East : Desa Magepanda
- West : Desa Tou, Kecamatan Kotabaru-Kabupaten Ende

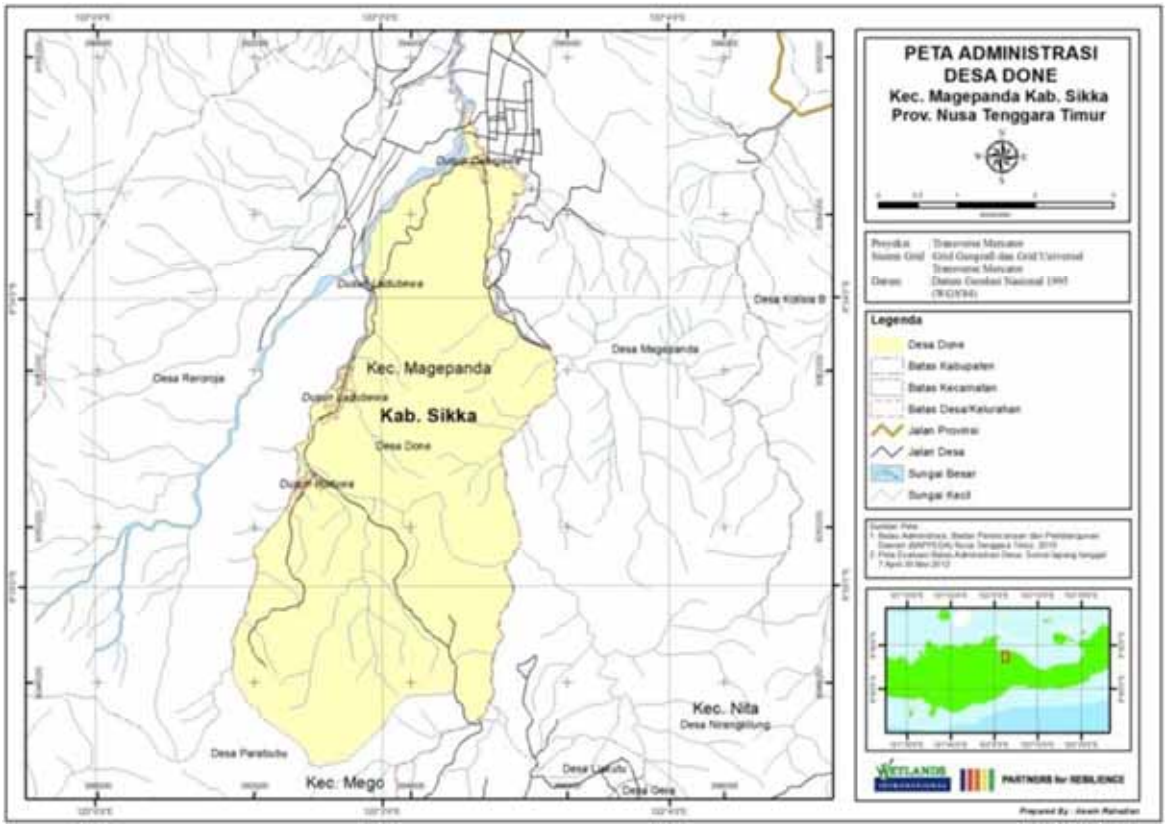


Figure 37. *Administrative map of Desa Done.*

The majority of Desa Done's inhabitants are farmers, because this area is in the mountains. They are of Lio ethnicity and still hold fast to their ancestral customs.Traditional ceremonies are still performed for certain activities, such as harvest, rice planting, weddings, etc. The population of Desa

Done rose by 3.21% from 2010 to 2011. The population numbered 1,403 in 2010 which increased to 1,448 in 2011. Population density in Desa Done at the end of 2011 was 92.94 persons/km^2. The majority of Desa Done inhabitants adhere to the Catholic faith.

Desa Done has quite good accessibility. It is reached by a tarmac road, although some parts of this road have been damaged and require repair and attention from the relevant government agency. The only educational facility in Desa Done is a primary school building. Those villagers wishing to continue to the next level (SLTP/ junior high) usually go to the one in Desa Magepanda while those who want to go on senior high school (SLTA) usually take lodgings in the town Kota Maumere. The only health facility in the Desa Done area is a *Poskesdes* village health post staffed by a midwife. The *Poskesdes* functions to provide first aid for Desa Done inhabitants who fall sick. More serious cases usually seek treatment at the *Puskesmas* Public Health Centre in Desa Magepanda. To obtain food, the villagers usually go to market, which is busy on Wednesdays only. The market is in Desa Reroroja. As regards lighting, not all of Done's inhabitants yet enjoy mains electric lighting from PLN. Infrastructural reasons, such as the erection of electricity poles and cables, are the main constraint for connecting every home to the grid.Moreover, economic limitations are the main reason for villagers not using mains electricity as it costs each household three million rupiah to have it installed.

The main agricultural commodity produced in Desa Done is wetland rice. This can be harvested up to twice a year because there are plenty of water sources in this area. Water for agriculture, plantation and everyday life all comes from springs. However, the spring in this village is not managed as well as it could be because it is still privately owned, being on land belonging to the *Mosalaki*. The *Mosalaki*or "land lord"is the highly respected traditional *Adat*elder in Desa Done. Besides wetland rice, the people of Done also plant dryland rice, which they consider to be sacred.Less dryland rice is planted than wetland rice due to land limitations. Dryland rice is usually planted in mountainous areas near the forest. Other common crops in Desa Done are maize, cassava, and sweet potatoes. In addition, some people plant vegetables both for their own consumption and also for sale in the market on Wednesdays. The plantation crops cultivated in this area are coconut and cashew. Other important commodities planted there are cacao, candlenut and pepper, which have economic value. These are usually sold to a receiver as additional income to pay for the family's necessities.

3.3.1.2 Institutions in Desa Done

Information on the institutions in Desa Done is presented in Table 32. These institutions comprise a range of stakeholders, each of whom has a role to play in the village's environmental management. From information obtained in the field, it can be ascertained that traditional *adat* institutions have a strong influence in determining policy on the management of natural resources in Desa Done. Several *adat* laws that protect the environment are still obeyed by the community. These include a ban on cutting down trees in the vicinity of springs, the system of dryland farming, the regulation of paddyfield irrigation, the prohibition of loggingand encroachment into the forest except with the permission of the *adat* leaders, etc.

Other institutions having an influential role in the management of the village's natural resources, in particular environmental management, are government agencies and local/international NGOs. Together, these run a number of activities that function to protect environmental conservation, and to improve the facilities and infrastructure that support the villagers' lives. Other institutions, such as financial, religious, extension, and educational agencies, also play a role in improving the quality

of the village's human resources. In the end, all these institutional elements are related to the disaster risk reduction (DRR) program. Together, they work to bring about environmental conservation and wise management, and to improve the quality of the village's human resources, facilities and infrastructure, all of which are part of improving community capacity. However, an institution badly needed in Desa Done is an early warning system, as this does not yet exist there. An EWS needs to be created and developed to provide information when disaster strikes the village, and to be a source of early warning before the disaster strikes. The creation of an EWS will require the participation of the community, government and other relevant agencies such as LSM/NGOs, and involve both facilities and infrastructure and an implementation procedure.

Table 30. Institutions in Desa Done

No	Type of Institution	Name of Institution	Activities	Ranking
1	LSM/NGO	Wetlands International Indonesia Programme (WIIP)	• Rehabilitation of coastal environment • Planting in forest • Community capacity building through economic activity • Improvement of rural human resources	4
		Ausaid/ TNA	• Clean water provision, through construction of facilities and infrastructure	2
		PLAN	• Educational activities for children • Child health program • Activities related to children's rights	3
		Yaspem	• Child health	1
2	Bank/ Financial Institutions	Kopdit, CU, UPK, PNPM, Bank Keliling (mobile bank)	• Savings and loans	1
3	Religious Institutions	OMK, KUB	• Religious activities for Catholic congregation • Religious education for Catholics	2
4	Extension Agency	Gabungan Kelompok Tani (Gapoktan) (Association of Farmers' Groups)	• Agricultural extension and 'socialisation' • Provision of seeds and fertilizers • Savings/loans activity within the farmers' group	3
5	Government Agencies	*Puskesmas, Polindes, Sospol*	• Public health services, • Maternity and infant health services, • Village security services	3
		Village Government	• Implements village government • Plans Annual Regional Budget (APBD) • Issues village bylaws and policy	4
		BPD	• Implements government together with village officials • Plans Annual Regional Budget (APBD)together with village officials • Issues policy and village bylaws • Monitors performance of village officials	4

No	Type of Institution	Name of Institution	Activities	Ranking
6	Educational Institutions	Playschool/ Early Learning (TK/ PAUD) (2), Primary school SD (1)	• Child education	1
8	Early Warning System (EWS)	-	• -	0
9	Traditional *Adat* Institutions	Lembaga Adat Desa Done (Desa Done *Adat* institution)	• Performs traditional ceremonies and rituals in the village • Determines various regulations related to village community life	4

3.3.2 Community Profile for Desa Done

The community profile for this village was analysed from the responses of a number of respondents. All these respondents were Catholics and of either Lio or Flores ethnicity. They included more men than women (Figure 39). They had lived in the village for an average of 28 years, with those aged over 50 having lived there all their life.Their average age was about 35 years, ranging from the youngest (23) to the oldest (52). Most were married, only a few being unmarried or divorced/widowed (Figure 39). The average number of dependents was 5.

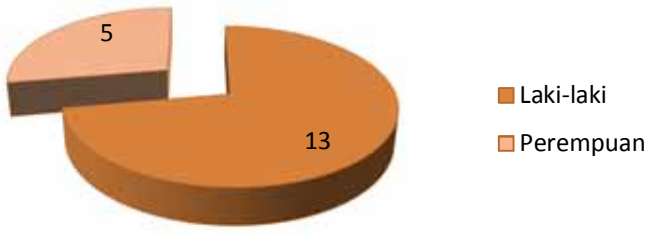


Figure 38. *Gender of Respondentsin Desa Done.*
Captions: Males (Laki-Laki), Females (Perempuan)

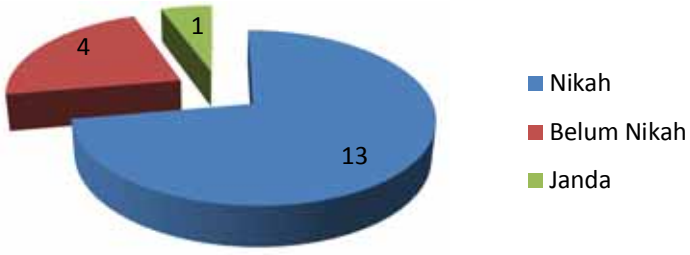


Figure 39. *Marital Status of Respondents in Desa Done*
Captions: Married (Nikah), Unmarried (Belum Menikah), Divorced/ Widowed (Janda)

The respondents' educational levels were low, most having only completed primary school (SD) and the remainder junior or senior highschool.None of them had ever entered a college of higher education. Nevertheless, all of them could read and write, although a few of them found this difficult. The numbers of respondents at each educational level are presented inFigure 40. At the time of the analysis, almost all the respondents were working as farmers, with just one (the Village Head) working as a village official (Figure 41). According to the Village Head, most of the villagers work as farmers, especially wetland rice farmers. Because of the large area of paddyfields and the easy access to water for irrigation, compared to the situation in other villages in Flores, more people in Desa Done farm paddyfields.Two rice harvests per year are possible in Desa Done, as against only one harvest/year in the other villages, which depend on rain.

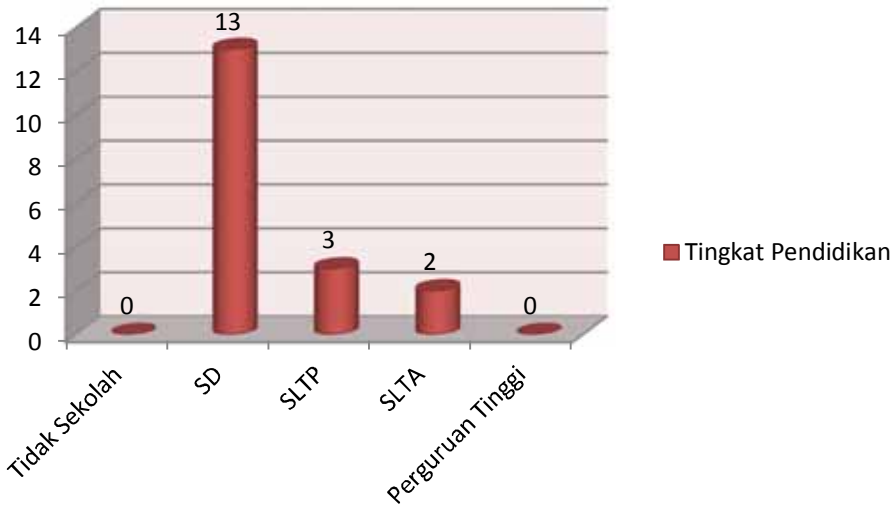


Figure 40. *Educational Level of Respondents in Desa Done*
Captions: Educational Level (Tingkat Pendidikan), Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi).

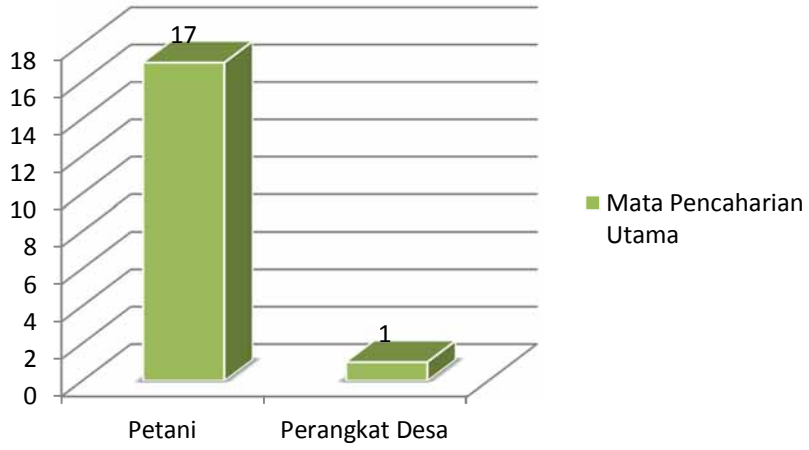


Figure 41. *Main Livelihood of Respondents in Desa Done.*
Captions: Main Livelihood (Mata Pencaharian Utama), Farmer (Petani), Village Government Official (Perangkat Desa)

Besides farming, the respondents also pursued additional occupations to increase their incomes. In addition, some were housewives.The distribution of secondary sources of income of Desa Done respondents is presented in Figure 42. For most respondents, average monthly income was less than one million rupiah, ranging to below 500 thousand rupiah for most. Average expenditure per respondent was mostly below 500 thousand rupiah. The number of respondents with expenditure of 1-1.5 million rupiah exceeded the number with incomes in the same range. This indicates that a few respondents still have problems with their financial circulation, with expenditure exceeding income. They fill this gap by borrowing money or foodstuffs from close family.Information on the average monthly income and expenditure distribution of respondents in Desa Done is presented in Figure 43. Further information on the circulation of the respondents' average monthly income and expenditure based on their livelihood is presented in Table 33. It is interesting to see in Table 33that the average monthly income gap for most farmers is smaller compared with the gap in their expenditure. This suggests that the lifestyle of the respondents is a little consumerist so they do not have enough money to pay for life's necessities like food and education.

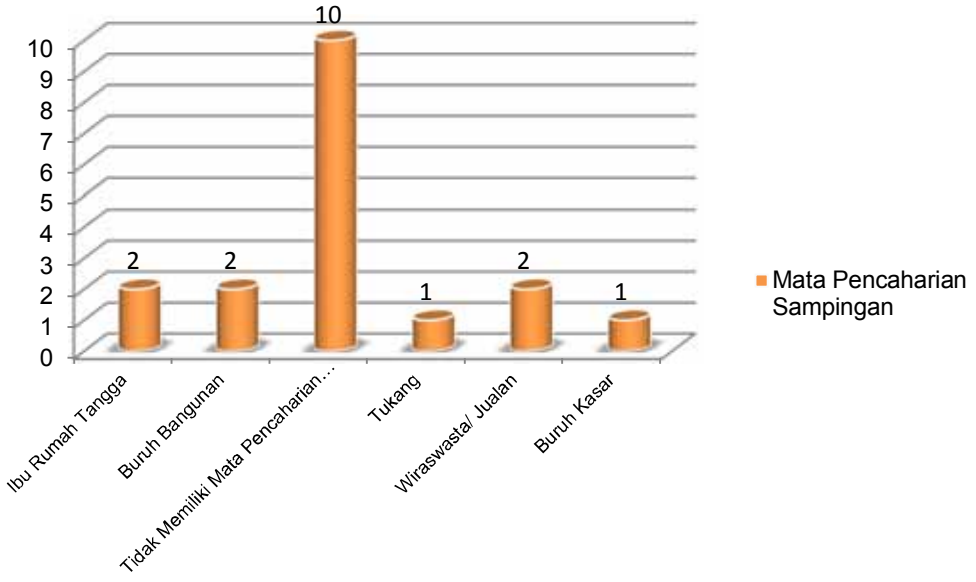


Figure 42. *Secondary Occupations of Respondentsin Desa Done.*
Captions: Secondary Occupation (Mata Pencaharian Sampingan), Housewife (Ibu Rumah Tangga), Construction Labourer (Buruh Bangunan), No Additional Source of Income (Tidak Memiliki Mata Pencaharian), Skilled Manual Worker (Tukang), Entrepreneur/ Trader (Wiraswasta/ Jualan), Unskilled Labourer (Buruh Kasar)

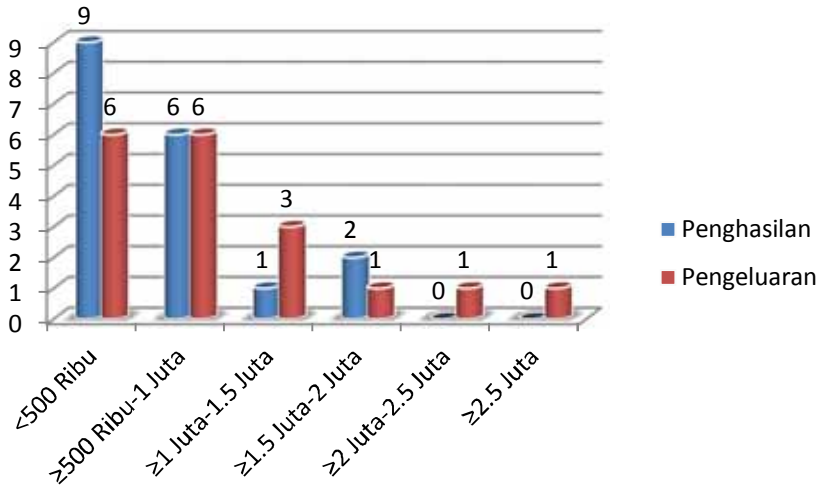


Figure 43. *Average Monthly Incomes and Expenditures of Respondents in Desa Done.*
Captions: Income (Penghasilan), Expenditure (Pengeluaran), Thousand Ruoiah (Ribu), Million Rupiah (Juta)

Table 31. Details of Financial Circulation of Respondents in Desa Done

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Occupation			
Farmer	Rp.100,000-Rp.1,000,000	Rp. 200,000-Rp.1,500,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed
Village Official	Rp.1,000,000	Rp. 700,000-Rp.1,000,000	Clothing, food, health, education, entertainment
Secondary Occupation			
Construction labourer	Rp. 100,000		Supplementary income. Usually done by farmers
Unskilled labourer	Rp. 500,000	-	Supplementary income
Skilled labourer	Rp. 1,000,000-Rp.1,500,000		Supplementary income
Entrepreneur/ Trade	Rp.500,000		Supplementary income
Housewife	Variable		Depends on size of husband's income

Source: Questionnaire and interviews with respondents (2012)

Other information that was analysed to describe the respondents was their assets and debts. Details of their assets can be seen in Table 34 and debts in Table 35. Both of these were used to obtain an economic assessment of their prosperity level. The results categorised almost all of them as poor, and just a few as having an average level of prosperity. The number of respondents with debts was fewer than those without, only 6 out of the 18 respondents having debts. These debts were usually incurred to pay for schooling and urgent needs. Another reason for taking out loans was to obtain additional working capital.

Table 32. Prosperity Parameters for Respondents in Desa Done, Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock per household	10 animals	5-9 animals	None
Agricultural yield/harvest (Rice)	More than 25 sacks	5-10 sacks	1 sack
Highest educational level of children	University	Junior-Senior Highschool (SLTP-SLTA)	Primary – Junior Highschool (SD-SLTP) or did not attend school
Type of house	Permanent building (Solid walls, ceramic tiled floor, zinc roof)	Semi Permanent (Timber walls, zinc roof, concrete or earth floor)	Non-permanent (Bamboo walls, thatched sagoo palm (rumbia) roof, earth floor)
Area of land owned	>10 ha (*Tuan Tanah* / "Land Lord")	1-9 ha	< 1 ha, or none
Income/month	More than Rp.3,000,000	Rp.1,000,000-2,000,000	< Rp. 1,000,000
Vehicle ownership	Car, motor cycle, motor boat, more than 2	Sampan and motor cycle, only 1	None
Agricultural equipment	Tractor	Plough and buffalo	Mattock, machete, hoe (tofa)
Communication devices	Television, handphone, satellite dish, radio,	Television, handphone, radio	Handphone, TV
Jewellery	Gold, Elephant tusk/ivory	Gold	None

Source: *Laporan PFR-NTT Tim WIIP*(PfR-NTT report by WIIP Team) plus field verification (2012)

Table 33. Information on Debts incurred by Respondents in Desa Done

Source of loan	Reasons for Borrowing from this Source				Annual Interest	Repayment system	Number of Respondents
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service			
Bank NTT	>10 million	Maumere (30 Km)	• Requires collateral • Complicated process	Good	2 %	• Depends on size of loan • Maximum is usually 5 years	1
PNPM	10 million	200 meter	• Must become a member of PNPM • A loan proposal must be submitted first • Relatively easy process	Good	1%-2%	• Depends on size of loan • Maximum is usually 18 months	4
Anggur Merah	10 million	50 meter	• Specific requirements • Must become a member first	Good	2 %	• Depends on size of loan	1

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

One of the assets analysed was home ownership. Most of the respondents owned their own home, just one still living with their parents (Figure 44). Most of the homes in Desa Done are built from either semi-permanent or non-permanent materials.This was reflected also in the analysis, which showed that the respondents' homes were either semi-permanent or non-permanent buildings (Figure 45). All respondents havetheir own sanitation facilities (WC and bathroom) even though most of these are makeshift constructions.They no longer defecate indiscriminately. Their daily source of water comes from a spring in the upland forest. This spring is on land belonging to the *Mosalaki* (*Adat* leader) and is therefore privately owned. Those respondents living far from the spring, i.e. in a dusunbordering on Desa Magepanda, get their water from dug wells because the pipe from the spring is not long enough to reach them. For lighting at night, the respondents use oil lamps because their village has no mains electricity as the relevant infrastructure has not yet been completed. However, a few of the respondents already use a generator as their source of electricity.

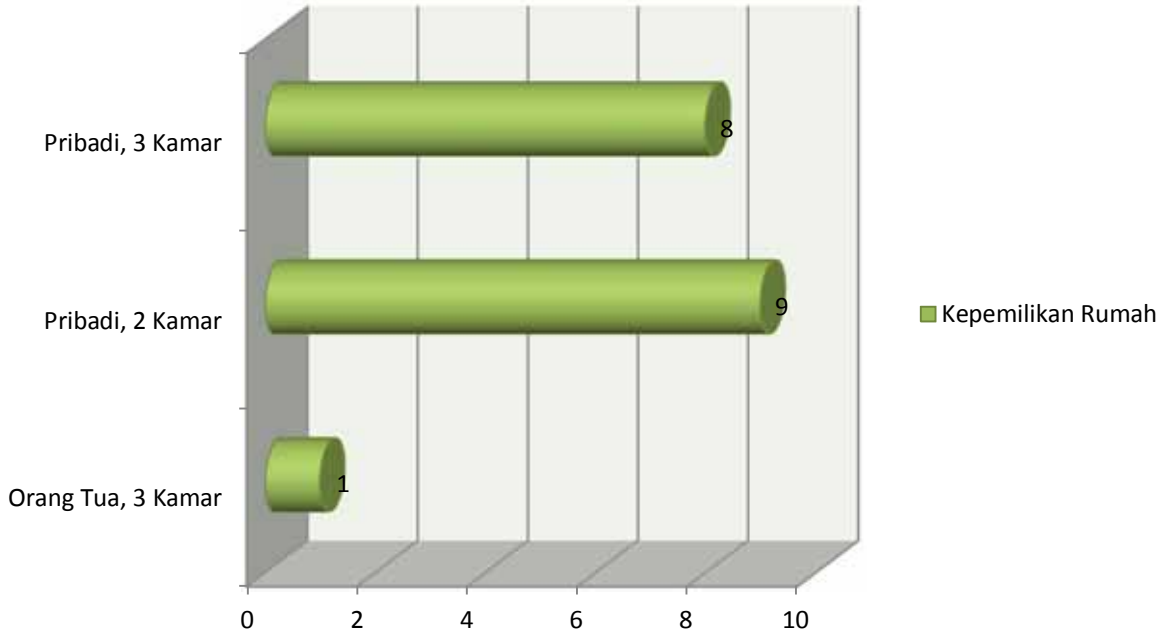


Figure 44. *Home Ownership among Respondents in Desa Done.*
Captions: Home Ownership (Kepemilikan Rumah), Own Home, 3 Rooms (Pribadi, 3 kamar); Own Home, 2 Rooms (Pribadi, 2 Kamar), Live with Parents, 3 Kamar (Orang Tua, 3 Kamar)

Figure 45. *Types of Housing of Respondents in Desa Done.*
Captions: Type of House (Jenis Rumah), Permanent Building (Permanen), Semi-Permanent Building (Semi Permanen), Non-Permanent Building (Darurat)

The respondents analysed in Desa Done were active in various organisations, both those from the village community and also several activities engineered by external agencies. Information on which organisations the respondents participated in can be seen in Figure 46. In Figure 46 it can be seen that most of them belonged to a farmers group because this is closely related to their daily livelihood. This organisation comesunder the Kabupaten Sikka district agricultural office. Its programs include the provision of assistance in the form of seeds, fertilizers, tractor, and guidance on good farming practices and on dealing with pests. Many respondents belonged to more than one organisation because of their enthusiasm for new things that would broaden their horizons. Nevertheless, respondents did not belong to any organisation, saying that they did not have enough time to participate in extra activities outside of their normal daily farming activities.

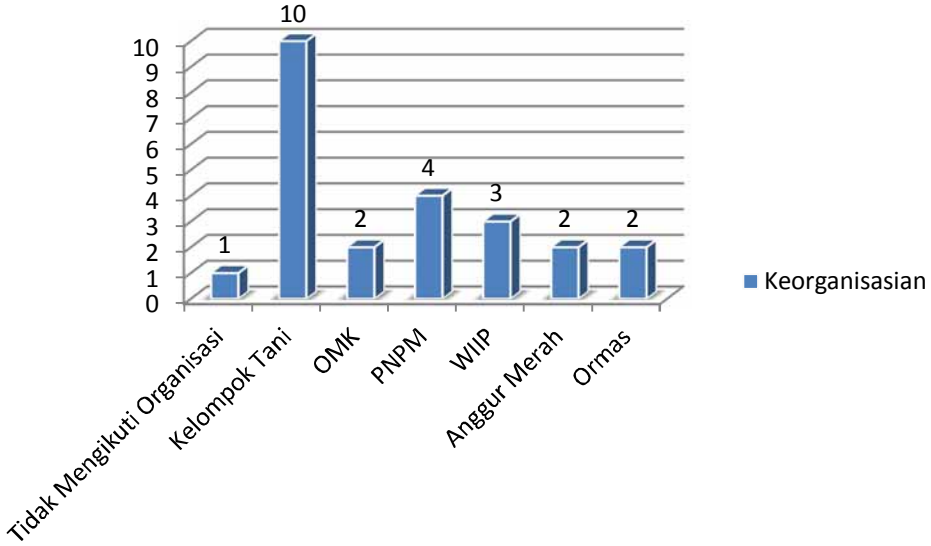


Figure 46. *Organisations to which Respondents in Desa Done Belonged.*
Captions: Membership of Organisations (Keorganisasian), None (Tidak Mengikuti), Farmers Group (Kelompok Tani), OMK, PNPM, WIIP, Anggur Merah, Ormas

3.3.3 Ecosystem Profile for Desa Done

3.3.3.1 Ecosystems and Natural Resources in Desa Done

Desa Done's topography is hilly, with a relatively narrow area of flat land. Maximum use is made of this flat land for irrigated paddyfields.These are mostly around the Lowotere river, use a semi-irrigated systemand rice crops are alternated with maize and mung beans. A topographical map of Desa Done is presented in Figure 47.

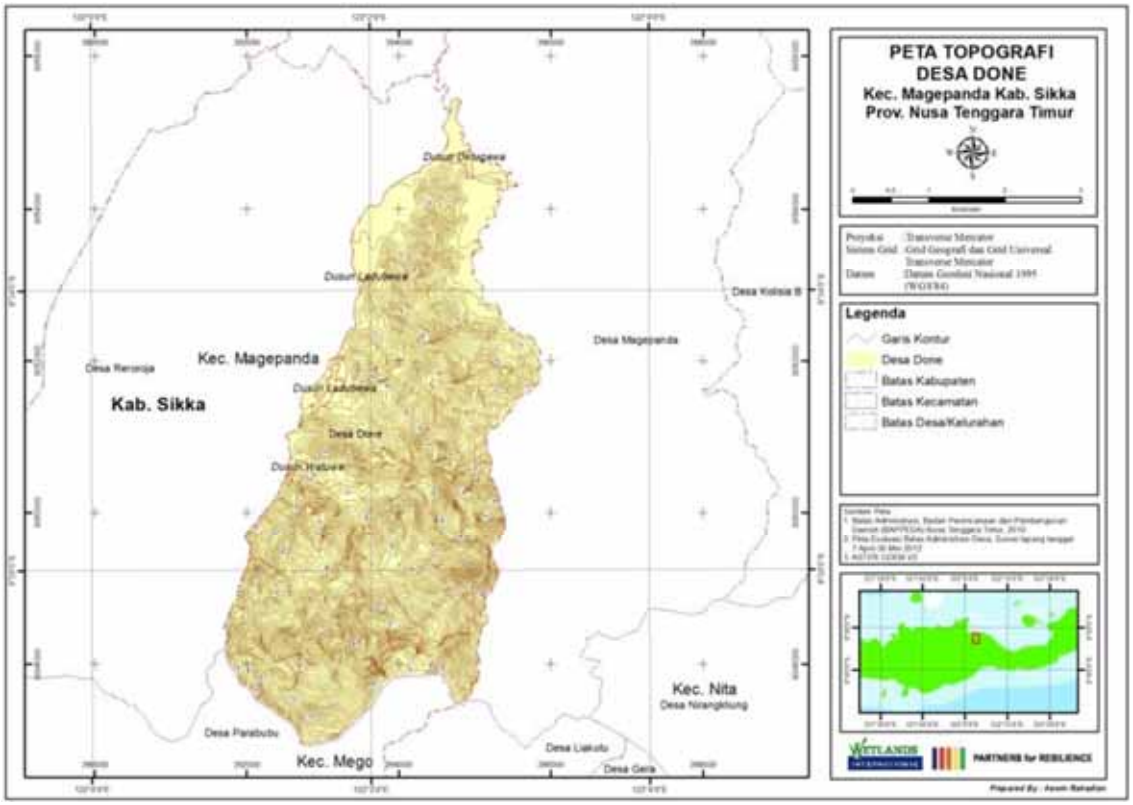


Figure 47. Topographical and Administrative Map of Desa Done.

The field survey and spatial analysis showed that most of Desa Done'stopography is steep or very steep. As much as 27.9 % of the total area has a steep gradient, and another 42% a very steep gradient. Such a topography is highly vulnerable to disaster, especially landslide. Information on Desa Done's topography can be seen in Table 36.

Table 34. Land Area of Desa Done Based on Topography

Gradient	Area (ha)	%
0-8%	169.01	9.1
8-15%	130.42	7.0
15-25%	262.18	14.0
25-40%	520.3	27.9
>40%	784.22	42.0
Total Area	1866.13	100.0

The assessment of ecosystems and land cover focussed on the whole of the Desa Done area.In terms of their formation process, the ecosystems found in Desa Done can be distinguished into two categories: natural ecosystems and man-made ecosystems. Both cover a range of land-cover classes: human settlement, mixed plantation, cultivation (dry fields and rice paddies), bush, river, hilly forest (mixed forest) and grasslands.The types and area of ecosystems mapped in the field are presented in Table 37.

Table 35. Types of Ecosystem in Desa Done

Type of Ecosystem	Area (Ha)	%
Dry land forest	1,133.00	60.7
Cultivation	714.56	38.3
Human settlement	18.57	1.0
Total Area	1,866.13	100

Village mapping was done with the participation of the community. Participative mapping had been performed several times previously in Desa Done by, among others, PNPM and PLAN and the WIIP field facilitator. The mapping done this time obtained further data, complementing and checking the accuracy of data already obtained with the community and village government through a focus group discussion and in depth interviews. Much of the land in Desa Done is used for agriculture and most of the inhabitants work as farmers. A large part of the natural resources are utilised directly by the local community. The relationships between the natural resources and their users in Desa Done can be seen in Figure 48.

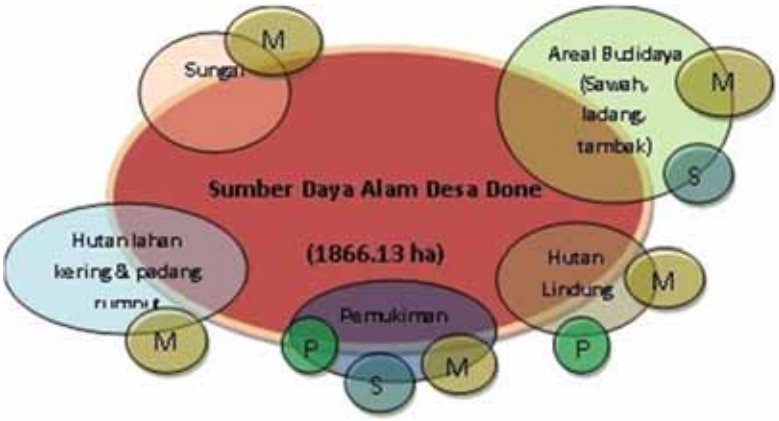


Figure 48. *Relationship between Natural Resources and their Users in Desa Done*
Captions: Natural Resources in Desa Done (Natural Resources in Desa Done), Rivers (Sungai), RiceFields/Farmland (Sawah ladang), Dryland Forest and Grassland (Hutan Lahan Kering dan Padang Rumput), Human Settlement (Pemukiman), Protection Forest (Hutan Lindung)
M = Community, P = Government, S = Private Sector

3.3.3.2 Spot Mapping

The participative mapping activities in Desa Done aimed to supplement information obtained from participative mapping done previously. That done with the WIIP facilitator had resulted in the production of a plan for each dusun, while that done with PNPM had produced a village plan. This village plan was not strictly to scale, however, and had not adhered to proper mapping principles, so was just a sketch. The village map produced was supplemented with disaster spot information and therefore called a spot map. The participatively produced spot map and ecosystem map are shown together in Figure 49.

Figure 49. *Spot Map of Desa Done.*

On this spot map of Desa Done, sites at risk of disaster are indicated by a red symbol. Frequent threats were found to be floods, tornado, river abrasion, landslide, illegal logging and forest fire. Floods usually occur during the months of January– February, resulting in the loss of livestock (±5 cows annually). Two villagers were also reported to have lost their lives as a result of floods several years ago.The flood peak can be as long as 2-4 days. Other threats in Desa Done include flash floods and the flooding of agricultural land during the rainy season, pest attack by green padi bug (*walang sangit*) and birds (*burung pipit*), and tornado (December - February).

3.3.3.3 Transect Mapping and Landscape Change

In addition to spot mapping, transect mapping was also carried out with the participation of the community. This was done by examiningthe area of the village to determine its natural condition. The results of transect mapping for Desa Done are presented in Table 38. The transect map was constructed on the basis of the ecosystem condition in the village. The information obtained from this transect analysis comprises: land status, current use, users, productivity, constraints and the efforts already taken to overcome them.

Table 36. Transect Map of Desa Done

Topic	Land Cover / Use			
	Agricultural Land	**Mixed Plantation**	**Springs**	**Hilly Area**
Land Status	Land certification done through the Prona project (except Ds Watuwa) Ds Detunggawa: Majority is freehold (SHM) Ds Ladu Blewa: 50% SPPT (land tax invoice) + 50% freehold (SHM) Ds Watuwa: Majority SPPT	Land certification done through the Prona project (except Ds Watuwa) Ds Detunggawa: Majority is freehold (SHM) Ds Ladu Blewa: 50% SPPT + 50% SHM Ds Watuwa: Majority SPPT	State owned 50 meter to the left and right of the river	State owned Land certification through Prona project (except Ds Watuwa) Ds Detunggawa: Majority freehold(SHM) Ds Ladu Blewa: 50% SPPT + 50% SHM Ds Watuwa: Majority SPPT
Current use	Irrigated rice paddyfields: Most are in the vicinity of the Lowotere river, system is semi-irrigated, rice is alternated with maize & mung beans. Rain-fed rice fields: Mixed with cassava, maize and coconut. (Dry) fields: Usually near to people's homes. Crops include: maize, cassava, beans; commodities most planted are rice and maize.	Land planted with pepper, coconut, cacao, banana, castor oil plant (*jarak pagar*), and cashew. Pepper farmers: Land is cleared, farmed for 2/3 years then abandoned, after which another area is cleared.	For irrigation, drinking water and daily needs	Extraction of firewood, timber for house construction, traditional ceremonies
User group	Most are of the local indigenous ethnic group (Suku Lio), plus a few other members of the general public	Most are of the local indigenous ethnic group (Suku Lio) , plus a few other members of the general public.	Community	Most are of the local indigenous ethnic group (Suku Lio), plus a few other members of the general public.

Topic	Land Cover / Use			
	Agricultural Land	Mixed Plantation	Springs	Hilly Area
Productivity	Irrigated rice: 3-4 ton/ha/season Dryland rice: ± 1 ton/ha unhuskedrice(for personal consumption) Candlenut :± 1ton/ha peeled Cashew: ±100-300 kg/ha Cacao: minor Maize: minor	Candlenut:± 1ton/ha peeled Cashew: ±100-300 kg/ha Cacao: minor Maize: minor Dryland rice: ± 1 ton/ha unhusked rice (for personal consumption)	Plentiful in rainy season Reduced flow in dry season Water source for 3 dusuns @3 tanks/dusun Ds Detunggawa uses wells	Candlenut:± 1ton/ha peeled Cashew: ±100-300 kg/ha Cacao: minor Maize: minor Dryland rice: ± 1 ton/ha unhusked rice (for personal consumption)
Constraints	Severe flooding Jan-Feb (victims ±5cattle/year, 2 people have also died) Flood peaklasts 2-4 days Flash floods Uncertainty of rainfall. Frequent flooding of agricultural land during rainy season. Attack by pests: green padi bug (*walang sangit*) & birds (*pipit*). Tornadoes often damage agricultural land during Dec-Feb. Irregular seasonal calendar	Severe flooding Jan-Feb (victims ±5cattle/year, 2 people have also died) Flood peak lasts 2-4 days Flash floods Irregular rainfall. Frequent flooding of agricultural land during rainy season. Attack by pests: green padi bug (*walang sangit*) & birds (*pipit*). Tornadoes often damage agricultural land during Dec-Feb. Irregular seasonal calendar	In the past, trees were cut down near springs. The community know the regulation regarding distance from both sides of river, but some of them do not obey it.	Illegal logging Irregular rainfall. Tornadoes often damage agricultural land during Dec-Feb. Irregular seasonal calendar
Solutions / efforts to overcome the constraints	Plant trees between paddyfields to strengthen the dykes Rainfall forecasts and information need to be updated Enforcement of law banning the felling trees on both sides of river and around springs. Plant trees around springs	Extension services on appropriate mixed plantation cultivation. Enforcement of law banning the felling trees on both sides of river and around springs. Plant trees around springs	Enforcement of law banning the felling trees on both sides of river and around springs. Plant trees around springs	Rehabilitation

Additional information obtained from transect mapping was the status of land in Desa Done. According to interviews with village officials and community leaders, the in habitants' land has been certified through the Prona project (except for Ds Watuwa). Most of the land in Dusun Detunggawa is freehold (*SHM*). In Dusun Ladublewa, 50% is freehold (*SHM*), while the other 50% only has land tax invoice (*SPPT*) as proof of ownership. In Dusun Watuwa, the majorityhas only SPPT. Land outside the settlement is considered to be *hak ulayat* communal land and is in the forest so no certificates have been granted for it. Most of the documents issued for such land have been annual land tax invoices (*Surat Pemberitahuan Pajak Tahunan/ SPPT*).

Analysis of changes to the natural landscape of Desa Done is presented in the form of maps like those in Figure 50. Based on participative analysis involving direct field visits, it was ascertained that Desa Done's centre of government and population concentration (including public facilities and infrastructure) are sited in a hilly area. The settlement expands from year to year, while the forest shrinks.

Key: (c) human settlement, (d) road, (e) cultivation area, (h) dryland forest

Figure 50. *Landscape Changes in Desa Done (1992-2012)*

The most important of Desa Done's potentials is its springs. Although these are plentiful, their use is not yet optimum. The springs are still controlled by the *tuan tanah*. Another constraint is that land around them has been converted for agriculture so the water discharge from some of the springs is declining. To date, these springs have been used not only by the Desa Done community but also by neighbouring villages Desa Magepanda and Desa Reroroja for agriculture and drinking water. Efforts at management and the prohibition of logging in the vicinity of the springs have been undertaken but have had little success. The people know about the ban on logging in protection forest and about the regulations governing the riparian buffer zone, but some still ignore these regulations.In addition to the forest conversion issue, the pattern of shifting cultivation for pepper is also a problem that must be addressed. This is because the farmers clear cut an area of forest for pepper cultivation then, after just a few years, abandon this land, cut down another area of forest and movethere. More attention needs to be paid to both of the community's farming methods because they are related to current efforts related to disaster risk reduction in Desa Done.

3.3.3.4 Water Quality

Water quality analysis in Desa Done was performed at only one site, a spring (Figure 51). This spring is owned by the *adat* chief or *mosalaki*, so his permission must be obtained before its water can be used. Water samples were taken from just one station in Desa Done as almost all the inhabitants use this spring water for their needs. Results of the water quality analysis in Desa Done are presented in Table 39.

These results showed that the condition of the water at station 1 was still very good. Its DO, temperature, salinity, pH, and TDS were still below the upper limit recommended by the Health Ministry. This shows that the water was still unpolluted and fit for human consumption. To be safer, however, the water should be filtered before consumption, as its TDS was close to the upper limit for drinking water recommended by the Health Ministry.

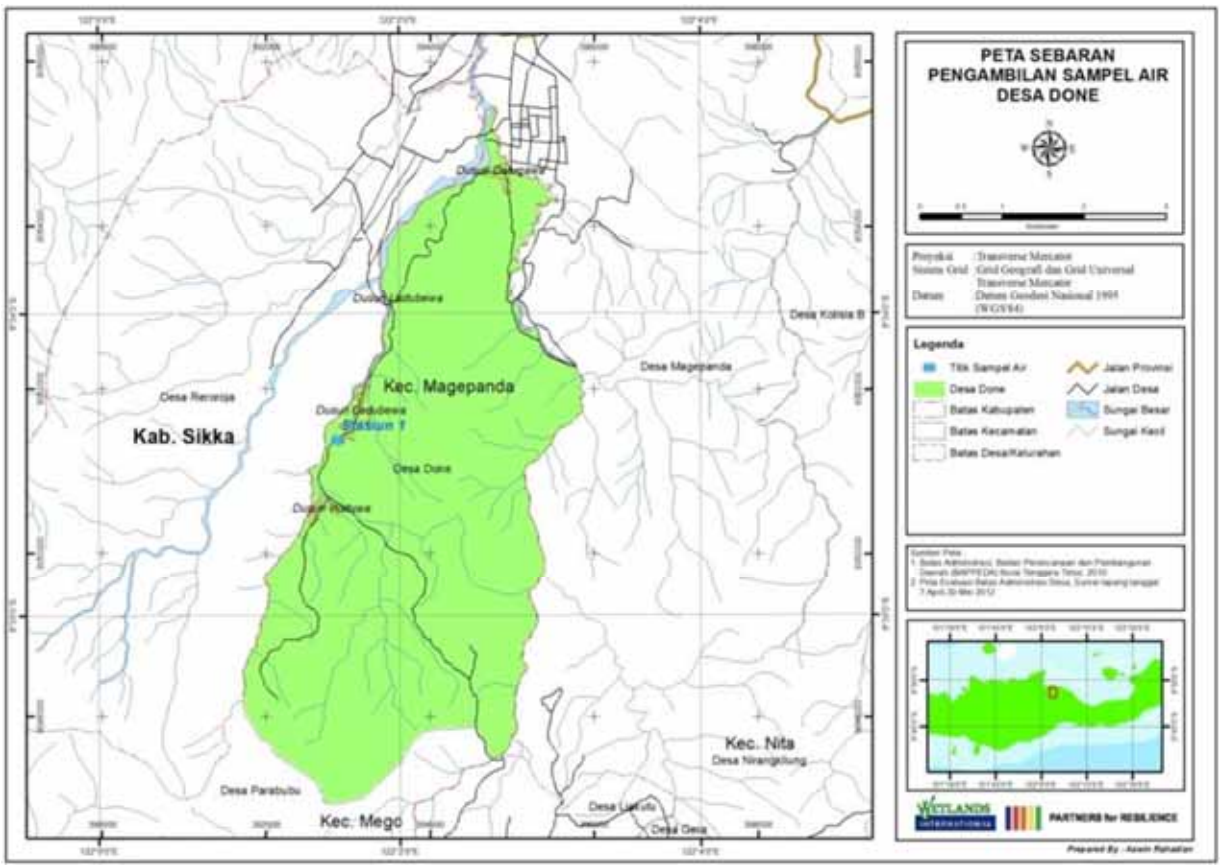


Figure 51. *Map Showing Distribution of Water Sampling Stations in Desa Done.*

Table 37. Results of Water Quality Analysis for Desa Done

Parameter	Unit	Station	*		**	
		1	Min	Max	Min	Max
DO (mg/L)	mg/L	5.9	2	-	-	-
Temperature (°C)	°C	28.4	-	-	-	Air temperature ±3
Salinity (ppt)	ppt	0.2	-	-	-	-
TDS (mg/L)	mg/L	417.9	-	1000	-	500
pH	-	7.97	6	9	6.5	8.5

Notes:

Station 1 : Spring

* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Quality Control

** : Potable Water Quality Standard according to Indonesian Health Minister regulation RI NO.492/MENKES/PER/IV/2010

3.3.4 Disaster, Vulnerability and Capacity of the Desa Done Community

3.3.4.1 Information on Disaster in Desa Done

3.3.4.1.1 History of Disasters and Seasonal Events in Desa Done

Desa Done is the only village mentored by WIIP that does not border directly on the sea, so it does not have a coastal area or mangrove forest. Abrasion never occurs in Desa Done. Nevertheless, it does experience several types of disaster similar to those in the other villages, such as flood, landslide, earthquake, etc. Details of Desa Done's disaster history are presented in Table 40. This information was obtained from in depth interviews with members of the community as well as a range of other sources including information from the village government.

Table 40. History of Disasters in Desa Done

Time of Occurrence	Type of Disaster	Remarks	Impact
1965	Landslide	• Continuous rain for several days • River overflowed, causing the nearby soil to become labile	• Damage to crops • Loss of many livestock
1966	Famine	• Drought caused harvest to fail • Harvest failure led to food shortage, which led to famine	• People experienced food shortages and starvation • People consumed flour made from gebang palm trees
1991	Failed Harvestand Famine	• Continuous rain throughout one month	• Damage to crops • Failed harvest and famine
1992	Earthquake and Tsunami	• At around 2pm the air felt very hot, then sudden tremors (quake) occurred • Earthquake was followed by tsunami	• Damage to agricultural land • Two homes destroyed • Villagers lost many of their belongings
2008	Flood	• Continuous rain for several days, causing river to overflow	• Damage to agricultural land • Loss of cattle • One person died – a primary school child
11-13 February 2008	Tornado		• Losses totalled Rp. 788,500,000.- • 300 ha Ricefield was destroyed • Vllage road 800 m (Reroroja (Mageloo) todusun Tanah Merah) was destroyed • No loss of life
2009-2010	Landslide	• Caused by continuous rain which made soil labile	• Damage to cashew and candlenut plantations resulted in failed harvest
2012	Tornado	• Rain for 3 consecutive days • On the night following the rain, strong winds destroyed everything in the vicinity • These winds are thought to be the result of climate change	• Four homes badly damaged by the disaster • Failed plantation harvest due to damage to trees . • These trees included coconut, cashew and other estate crops • Mains electricity grid damaged so no electricity for one week

Source: Laporan PFR-NTT Tim WIIP(PfR-NTT report by WIIP Team) plus field verification(2012)

Since 1965 (according to information received), landslides and floods have struck this village more often than other types of disaster. Several years previously, tornados (called typhoons by the local people) frequently hit the village. Floods and landslides occurred in the forest and hills while typhoons usually struck the inhabited areas and plantations. In 1992, almost the whole north coast of Flores Island was hit by earthquake and tsunami. Even Desa Done was affected although the wave did not reach this village. Desa Done experienced losses only as a result of the earthquake.

Failed harvests resulting in food shortages in this village had occurred several times prior to the year 2000. Most of these were caused by drought which killed the rice plants. Dwindling supplies of food, especially rice, led to hunger and epidemics. Besides drought, floods and continuous heavy rain have also caused harvests to fail in Desa Done. It is well known that NTT, especially Flores, has a dry season that is longer than the rainy season. Another factor that makes it difficult to find sources of water is the type of soil, which cannot hold or absorb rain water. Desa Done has extensive areas of agricultural land, particularly wet and dry rice fields. In anticipation of such disasters, (failed harvests, drought and famine), the local government needs to construct and activate irrigation channels, so that the paddyfields in Desa Done will no longer depend so heavily on rain as the only source of water. It is only the fields in the hills that depend solely on rain. The source of irrigation water is from springs that flow all year round. These springs are capable of supplying almost all of Desa Done's demand for water (domestic and agricultural) even though their existence is under threat from forest fire and from illegal logging around the springs.

In addition to disaster history, information was also obtained on seasonal disasters in the village. These occur in turn throughout the year. They have become frequent since climate change has started to be felt, with the seasons (wet and dry) becoming unpredictable. Information on seasonal disasters in Desa Done can be seen in Table 41. Disasters that occur in the rainy season include landslide, tornado and flood. Landslides occur in hilly forest. They are caused by heavy rain falling almost every day, and are most frequent during January to March, when the rains are at their most intense (according to interviews with villagers). Besides landslides, these months are also highly prone to flooding, especially near the river banks. Paddyfields stretch all along the length of the river in Desa Done and are therefore the most affected by floods.Livestock, such as buffalo, goats and cattle also fall victim to these floods. They are usually bathing in the river or standing close to it and are then swept away by the strong current. During the last few years, in January to March, there have often been strong winds, called Thyphoons by the local people. These winds batter trees and houses, and usually come at night and midday.

Table 38. Information on Frequent Seasonal Disasters in Desa Done

Type of event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Landslide													• Landslides occur as a result of heavy rainfall • Continuous rain causes soil to become labile, especially on steep slopes
Failed Harvest													• Occurs during main harvest time, which is April-May • Harvest failure can be caused by heavy rain which submerges the crops, or by very low rainfall resulting in drought
Famine													• Occurs as a result of failed harvest, due to either drought or flood
Tornado													• Occurs during rainy season • Usually occur suddenly and cause devastation to the area
Epidemic													• Malaria occurs throughout the year as it is endemic in NTT • Acute respiratory tract infections, diarrhoea and diseases caused by poor sanitation usually during the transition between seasons
Fire													• Occurs during dry season, peak during June-September • High air temperatures cause grasses to catch fire • Intentional fires are also a cause.
Flood													• Occurs at the peak of the rainy season, i.e. January-March • Floods usually damage agricultural land

Type of event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Pest attack	●	●	●	●									• pests include caterpillars, brown plant-hopper [*wereng*], green padi bug [*walang sangit*] and stalk borer [*penggerek batang*] • Usually attack estate crops such as coconut, cashew, cacao, etc. • Brown plant-hopper [*wereng*], mainly attacks rice
Withered flowers (cashew)								●	●	●			• Occurs during dry season

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

Common disasters in the dry season include fire, drought and famine. Forest fires usually result from very high air temperatures, with fires suddenly flaring up in the hills. At these times, the air feels extremely hot and can easily spark off fires in the forest and hills. In addition, people still deliberately burn land to clear it. The cleared land will then be planted with rice and maize. Drought occurs as a result of low rainfall which causes water sources to dry up, affecting both agricultural and domestic use. Drought in farming areas can be disastrous because it can cause harvests to fail.The failed harvest can then lead to another disaster, famine. Several years ago, the village frequently experienced famines, so the community began taking measures to prevent this disaster from happening again. One way was to start reforesting the area around the springs. Another was to improve the system for storing the harvest to ensure that the amount solddid not exceed the amount retained for personal consumption. The flowers of the cashew tree also often wither in the dry season thus resulting in a reduced harvest.Another problem is pest attack as harvest-time approaches. Pests that still frequently attack plants in this village include the brown plant hopper (*wereng*), locusts, caterpillarsand rats. However, government agencies have now initiated a number of measures to reduce the population of these pests, especially just prior to harvest-time. These include the provision and distribution of pesticides and training on methods of farming and pest eradication. While seasonal disasters come and go with the wet and dry seasons, epidemics attack the people of Desa Done throughout the year. Malaria has become a part of village life.As it is endemic to NTT, particularly to Flores,almost everybody in the village has suffered malaria at some time. Other illnessesthat the villagers frequently contract are respiratory diseaseslike flu and coughs, especially during the transition between seasons.

3.3.4.1.2 Disaster Impact

Information on the impact of disasters in Desa Done is presented in Table 42, along with measures that the local government and villagers have taken to reduce the impact. All the information was obtained from a variety of sources including members of the community, local village government, and other credible sources.

Table 39. Disaster Impact in Desa Done

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on tree felling in upstream (forest) areas and in the vicinity of springs, imposed by village government and local *adat* institutions
Landslide										• Banon tree felling in upstream (forest) areas and in the vicinity of springs, imposed by village government and local *adat* institutions Ban on using landslide-prone areas for agriculture/plantation
Earthquake & Tsunami										• Move people in earthquake-prone areas to a safer site
Typhoon										• Keep away from areas with many trees
Fire										• Ban on the intentional burning of forest and land, imposed by village government and local *adat* institutions • Extension services and socialisation concerning the impact caused by illegal/irresponsible burning of land and forest
Famine										• Crop diversification • More effective treatment of land and plants, assisted by technology from government and relevant agencies • Farmers have started to reserve a part of their harvest for use during times of shortage

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Drought										• Plant trees in spring area • Construct water storage tanks and dig wells
Epidemic										• Extension services promoting a healthy lifestyle • Public sanitary facilities (*MCK*)have been built • Construction of water sources such as a well at each house
Pest attack										• Extension services on pest eradication, plant treatment and land treatment, provided by relevant agency • Provision of pesticides or pest eradication technology by relevant agency

Key: High Medium Low

Analysis indicates that the disaster having a big impact on people and facilities in the village has been earthquake. The people suffered great losses, mainly of possessions as nobody died as a result of this disaster. The reason for this is that Desa Done is on higher ground and was therefore not reached by the tsunami triggered by the earthquake; the villagers only felt the earthquake itself. Floods and landslides have also had a big impact, particularly as regards the work field, because both these disasters affect farmland. Many villagers lose their occupation because their activities become crippled due to the damage done to their land or paddy fields by floods or landslides (For details, see Table 42). Typhoons are very hazardous for people as the strong winds can blow down buildings and big trees, which can fall on people and kill them. Moreover, plantations do not escape, so their owners may suffer severe economic losses. Fires and drought, especially extended drought, can damage agricultural land and crops. The village economy then suffers and this can lead to famine, which impacts directly on the people, who have insufficient food or even no food at all due to the failed harvests caused by drought. As with famine, epidemics also impact heavily on the people, particularly on their health and education. Their health deteriorates and, in the case of schoolchildren, their education is disrupted.Pests impact heavily on crops and land. Rats, in particular, indirectly damage the land by digging nests in paddyfields.

As well as identifying impacts using field and secondary data, information on the villagers' perceptions of the impact disasters had had on their village in the past was also analysed. This information was obtained through respondents' completion of a questionnaire accompanied by an in-depth interview. The results are presented in Figure 52, which shows that almost 80% of the respondents agreed that sites prone to disaster should be evacuated and the inhabitants moved to a

safer location. For example, agricultural land near the river should be left to function as an aquifer recharge zone so as to avoid losses from floods every year. However, a small number did not agree to being relocated to a safer area, their reason being that they had lived there for a long time and that the land had been passed down to them from their ancestors. All the respondents felt that their lives had gradually changed as a result of the recurrent disasters hitting their village. These changes included changes in planting times, harvest, livelihood activities, habits, etc. A change they all felt to be positive was their increased alertness to various warning signs of impending disaster.They were now more proficient and vigilant if nature showed signs that a disaster was about to occur. For example, if it rained heavily every day, they would reduce their activities near the river and hills so as to avoid possible floods and landslides.For this reason, 67% of respondentsagreed strongly and 33% agreed to being given guidance on what they should do in the event of disaster. They badly needed extension services, education (*"sosialisasi"*) and training on early warning systems, how to save themselves during a disaster, and how to cope after a disaster. In addition, they were very enthusiastic about being given activities related to disaster risk reduction and disaster prevention measures.

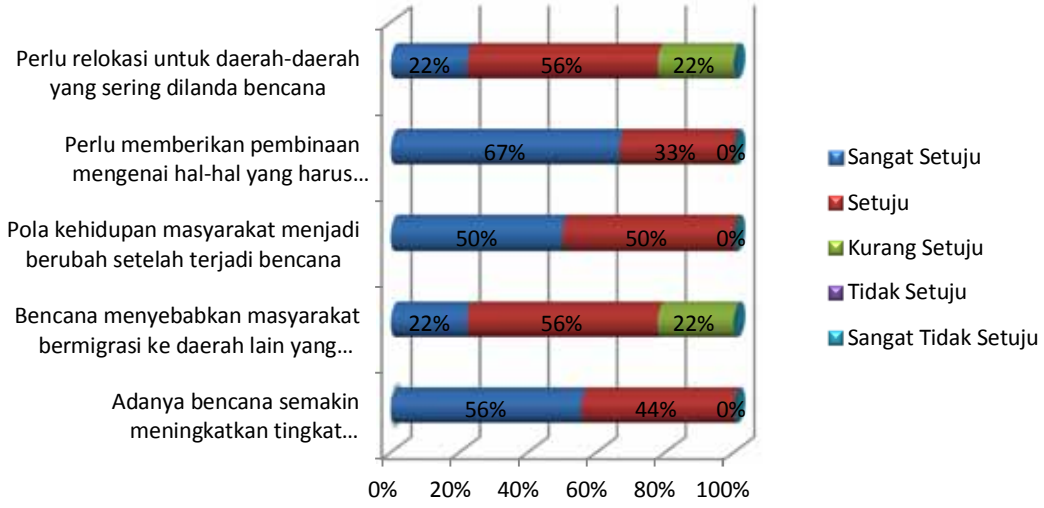
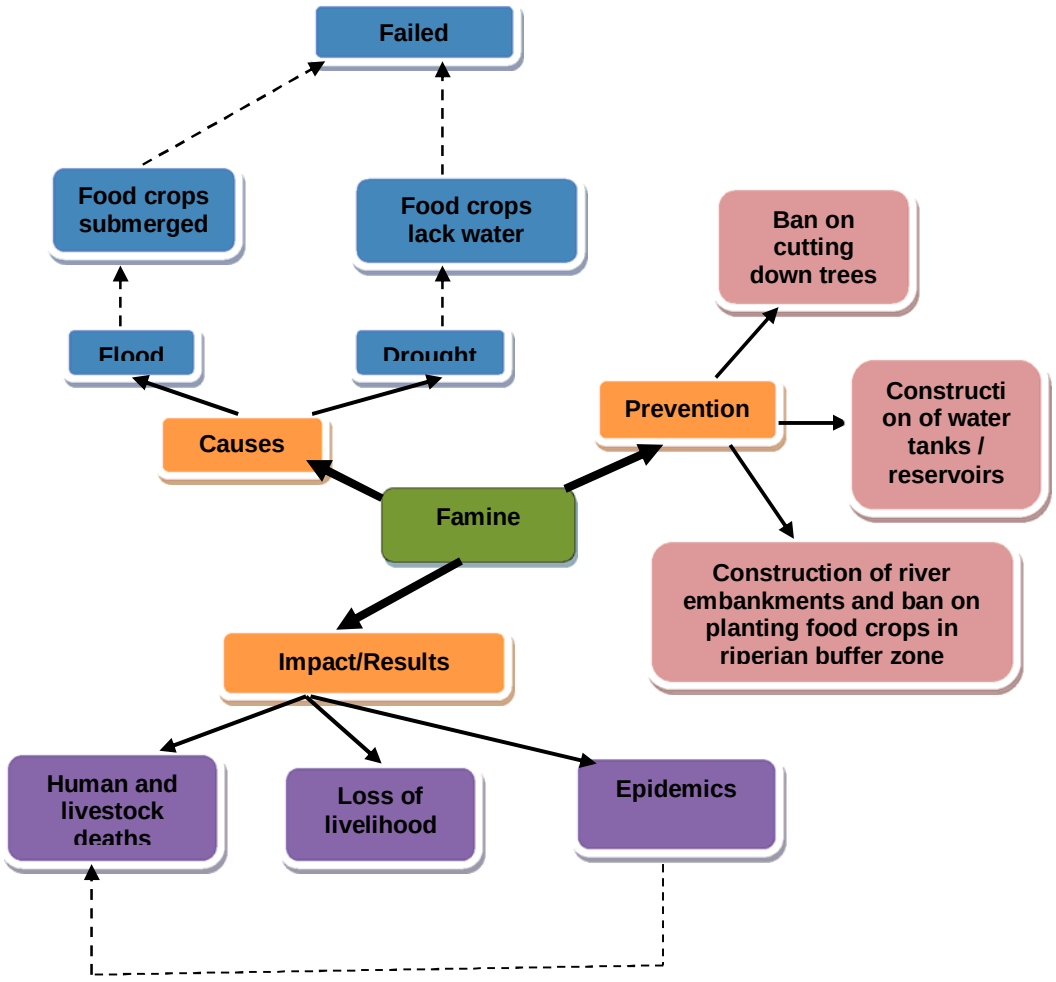


Figure 52. *Respondents' Perception of Disaster Impact in Desa Done.*

Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)

Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

3.3.4.1.3 Sample Issue Tree for Desa Done



3.3.4.2 Vulnerability in Desa Done

Vulnerability is the degree to which people, structures, services or geographical areas could potentially be damaged or disrupted by the impact of certain hazards due to their nature, construction or proximity to hazardous or disaster prone areas. Vulnerability analysis itself focuses on the physical conditions of an area and the impact of the local community's socio-economic conditions (Diposaptono 2005). Vulnerability is part of disaster risk assessment. Disaster risk is the potential for loss resulting from disaster at a particular place and time. This risk could be in the form of human deaths, injuries, disease, psychological threat, feeling of insecurity, evacuation, damage or loss of property, and disruption of human activity (Bakomas 2007). The vulnerabilities analysed cover the five categories presented in the matrix in Table 43. Most of these vulnerabilities could be overcome by the local community. Nevertheless, this does not mean that Desa Done is safe from vulnerabilities or risks, because the measures already implemented must be maintained and further upgraded.

Table 40. Vulnerabilities and Capacities of the Desa Done Community

Variable	Vulnerability	Capacity
Health, Physical condition,and Environment	1. Spring dries up 2. Logging in forest and around spring 3. No mains electricity 4. Extended dry season 5. Epidemics of malaria, acute respiratory infections, and skin diseases 6. Environmental sanitation and sanitary facilities (*MCK*)	1. Reforestation around springs, and ban on logging in the vicinity of springs 2. Ban on tree felling in upstream (forest) areas and in the vicinity of springs, imposed by village government and local *adat* institutions 3. People use oil lamps and generators as a source of lighting. 4. Mediation to the State Electricity Board (PLN)has begun to connect the village to the national grid 5. Construction of water tanks, and wells 6. Awareness raising and training on hygiene, people have begun to live more hygienically, and do not defecate indiscriminately
Socio-cultural	1. Children drop out of school 2. Low quality of human resources 3. Social jealousy 4. Gambling and alcoholism	1. - 2. Improvement of expertise (soft skill), improvement of education 3. – 4. Prohibition of these activities in public places, enforcement of religious laws
Attitudes and Motivation	1. Disaster response 2. Indifference 3. Laziness 4. Insufficient awareness on environmental conservation 5. Non-useof sanitation (*MCK*) facilities	1. Still done traditionally from person to person and using mobile phones 2. Religious guidance 3. Guidance from traditional *adat*, community and religious leaders 4. Guidance from *adat*, community and religious leaders, extension services and 'socialisation' (*sosialisasi*) 5. 'Socialisation' and extension services on hygiene

Variable	Vulnerability	Capacity
Institutional/ Organisational	1. Improvement needed to inter-institutional relationships 2. Improvement needed to the activities of various institutions 3. Institutions not yet fully accepted 4. Egocentricity prevalent	1. Coordination and negotiation 2. 'Socialisation' 3. 'Socialisation' 4. Extension services
Economic	1. Lack of employment opportunities 2. Inhabitants' incomes still low 3. Insufficient innovation and technology for agricultural, fishery and animal husbandry products 4. Many inhabitants still live in poverty 5. High unemployment	1. Extension services and provision of business capital 2. Income diversification 3. Extension services, 'socialisation', and dissemination of information and technology 4. Cash hand-outs (*BLT)* and Family of Hope program*(PKH)*, rice for the poor (*beras raskin*), State health insurance scheme (*jamkesmas*) 5. 9 years free compulsory education

Source: Results from observation in the field (2012)

In addition to the vulnerability information in the matrix above, information on disaster risks prevalent in this village is presented in Figure 53. Analysis indicates that the highest risk is for floods, which have considerable impact on the village. Second highest are landslides and tornados. These three types of disaster occur there almost every year, particularly during the rainy season, but the villagers' capacity is as yet unequal to the high vulnerability and risk posed by such disasters.

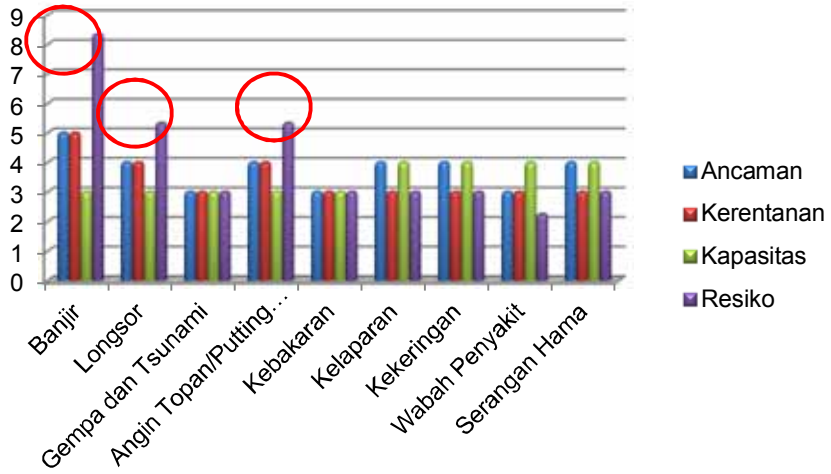


Figure 53. *Information on Threats, Vulnerability, Capacity, and Disaster Risk based on Type of Disaster in Desa Done.*

Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Flood (banjir), Landslide (Longsor), Earthquake and Tsunami (Gempa Bumi dan Tsunami), Typhoon/ Tornado (Angin Topan/ Puting Beliung), Fire (Kebakaran),Femine (Kelaparan), Drought (Kekeringan), Epidemic (Wabah Penyakit), Pest Attack (Serangan Hama)

3.3.4.3 Community Capacity in Desa Done

Current disaster risk reduction programs are still centred on the relevant institutions and government agencies. As yet, the local community have not been fully involved. In fact, the local people's abilities and capacity for dealing with disaster could become an important point in disaster risk reduction. For this reason, more serious attention is now being given to upgrading the local community's capacity in disaster risk reduction in Desa Done.

3.3.4.3.1 Early Warning System

Desa Done community's knowledge of early warning of disaster was ascertained through in-depth interviews and analysis using a questionnaire.This information was obtained from a number of respondents. Analysis indicated that the majority of respondents did not know about EWS in their village. Only a very few did know about EWS through weather forecasts and information from the mass media (Figure 54). As a result, impact and losses due to disasters in the Desa Done area have been quite high.

Further investigation indicated that they would respond well if they knew there was an advance warning of disaster. They were keen to receive knowledge of EWS for the various disasters that often occur in their village. They wanted to know, for example, what they should do when a disaster is about to happen, what preparations need to be made, the safest places to use for emergency shelters. Most of the respondents chose evacuation to the homes of family or neighbours in the event of a disaster (Figure 55). Nevertheless, a few others still said they would stay in their own home, because they were afraid of losing their possessions if they left the house empty.Moreover, they said, what they own now had been inherited from their ancestors so must not be abandoned.

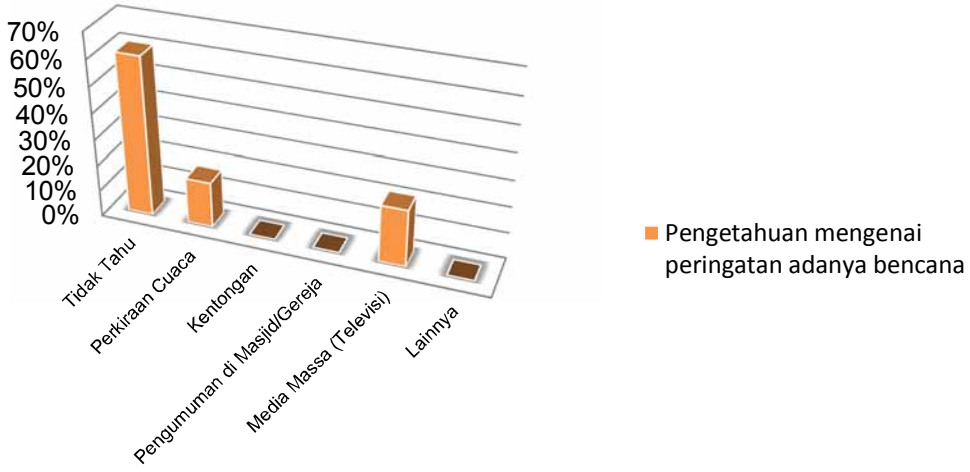


Figure 54. *Desa Done Respondents' Knowledge of Early Warnings of Disaster*
Captions: Knowledge of Disaster Warnings (Pengetahuan Mengenai Peringatan Adanya Bencana), Didn't Know (Tidak Tahu), Weather Forecast (Perkiraan Cuaca), Kentongan Alarm (Kentongan), Announcement in Mosque/ Chruch (Pengumuman di Masjid/ Gereja), Mass Media (Media Massa), Other (Iainnya)

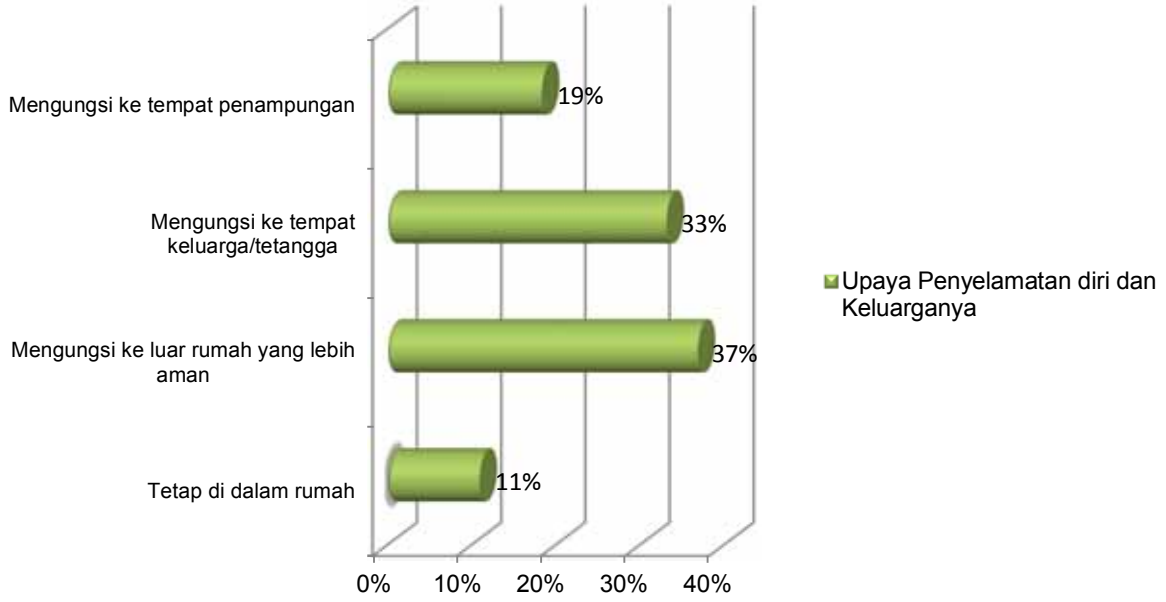


Figure 55. *Efforts that Desa Done Respondents would Make to Save Self and Family*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family/ Neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Stay Inside Home (Tetap di dalam Rumah)

Local government has begun taking disaster risk reduction measures, but these activities have been directed more towards aid for disaster victims. Most activities aimed at disaster prevention have been performed by outside agencies like local NGOs and non-government financial institutions. According to information from respondents, government action is more often the provision of emergency shelters and distribution of aid (Figure 56). This aid consists of food and first aid medications. In addition, evacuation equipment has also been provided to help disaster victims.According to the respondents, local government has never given information related to early warning of disaster. After local government officials were asked to confirm this, they said that difficulties in accessing information and lack of knowledge had been the main reasons why they had not received information on EWS. Besides this, 11% of respondents felt that the government concerned had never given any help whatsoever.

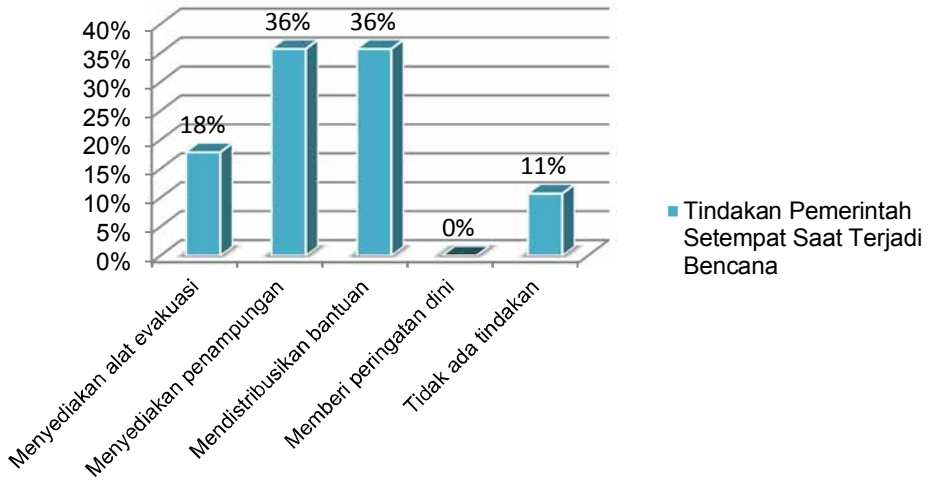


Figure 56. *Information on Action Taken by Desa Done Government in Response to Disaster Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), Provided Evacuation Equipment (Menyediakan Alat Evakuasi), Provided Shelter (Menyediakan Tempat Penampungan), Distributed Aid (Mendistribusikan Bantuan), Gave Early Warning (Memberikan Peringatan),No Action Taken (Tidak Ada Tindakan),*

3.3.4.3.2 Access to and Control of Community Assets

Information on access to and control of community assets in Desa Done was obtained from interviews and questionnaire completion. The results of this analysis are presented in Table 44. According to the information obtained, almost all of the private assets owned by each respondent could be accessed in the event of flood, landslide, tornado, fire and pest attack. However, when floods and landslides hit the village, the agricultural land affected by these disasters cannot be accessed. Other agricultural land, far from the disaster points, can be accessed with the prior permission of the owner.In the event of tornado and forest fire, agricultural land cannot be accessed when seeking a place of safety. The reason for this is that the trees on this land are themselves a hazard.At times of famine and drought, food cannot be accessed because these disasters threaten the community's food supplies. The disaster with the greatest risk and impact is earthquake, because it makes access to assets difficult.The force of an earthquake cannot be predicted and is often so strong that it destroys everything in the vicinity, thus making access to both private and public assets difficult.

During almost all of the disasters that have occurred in Desa Done, public assets have been accessible, the only exception being during earthquake. The ease of using various assets is an important point that needs to be maintained and further improved. It is extremely important to know who controls and/or is responsible for these places, so as to avoid new problems arising when assets need to be used. In the event of earthquake, however, only a part of the public assets can be used as the rest will have been damaged or destroyed by the earthquake.

Table 41. Information on Access to and Control of Assets that can be Used in the Event of Disaster in Desa Done

Private Source of Ownership	Accessibility at Time of Disaster									Ownership Control
	Flood	Landslide	Earthquake& Tsunami	Tornado	Fire	Famine	Drought	Epidemic	Pest Attack	
Agricultural Land	**	**		**	**			Yes	**	Father
Homes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Furniture	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Mother
Valuables	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Vehicles	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father
Clothes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Food	Yes	Yes		Yes	Yes				Yes	Father, Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Fuel	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Valuable Documents	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Public Source of Ownership	**Accessibility at Time of Disaster**									**Ownership Control**
	Flood	Landslide	Earthquake& Tsunami	Tornado	Fire	Famine	Drought	Epidemic	Pest Attack	
Places of worship	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Community
Roads	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Community
Market	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Football field	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Community
Village Hall/Office	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Village Government
Boats	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community with Prior Permission from Owner
Water sources	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Community
Public bathing, washing, toilet facilities	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Community
School buildings	Yes	Yes	**	Yes	Yes	Yes	Yes	Yes	Yes	Community with Prior Permission

Source: Findings from questionnaire and direct observation in the field

3.4 Desa Darat Pantai – Kabupaten Sikka

3.4.1 Profile of Desa Darat Pantai – Kecamatan Talibura

3.4.1.1 General Description of Desa Darat Pantai

Desa Darat Pantai is an extension from Desa Darat Gunung and was officially created in 1999. Administratively, Desa Darat Pantai covers an area of 23.1 km^2 (2310 ha) or around 8.88% of the total area of Kecamatan Talibura subdistrict (*Kecamatan Talibura Dalam Angka Tahun 2012*). According to spatial analysis (based on village ecosystem cover) its area is 26.641 km^2 (2664.1 ha). Darat Pantai is divided into 3 dusuns, which are Dusun Wairwua, Blatat, and Napong Gelang. An administrative map of Desa Darat Pantai can be seen in Figure 57. The administrative boundaries of Desa Darat Pantai are as follow:

- North : Flores Sea
- South : Desa Darat Gunung (Kec. Talibura-Kab. Sikka)
- West : Desa Bangkoor (Kec. Talibura-Kab. Sikka)
- East : Desa Talibura (Kec. Talibura-kab. Sikka)

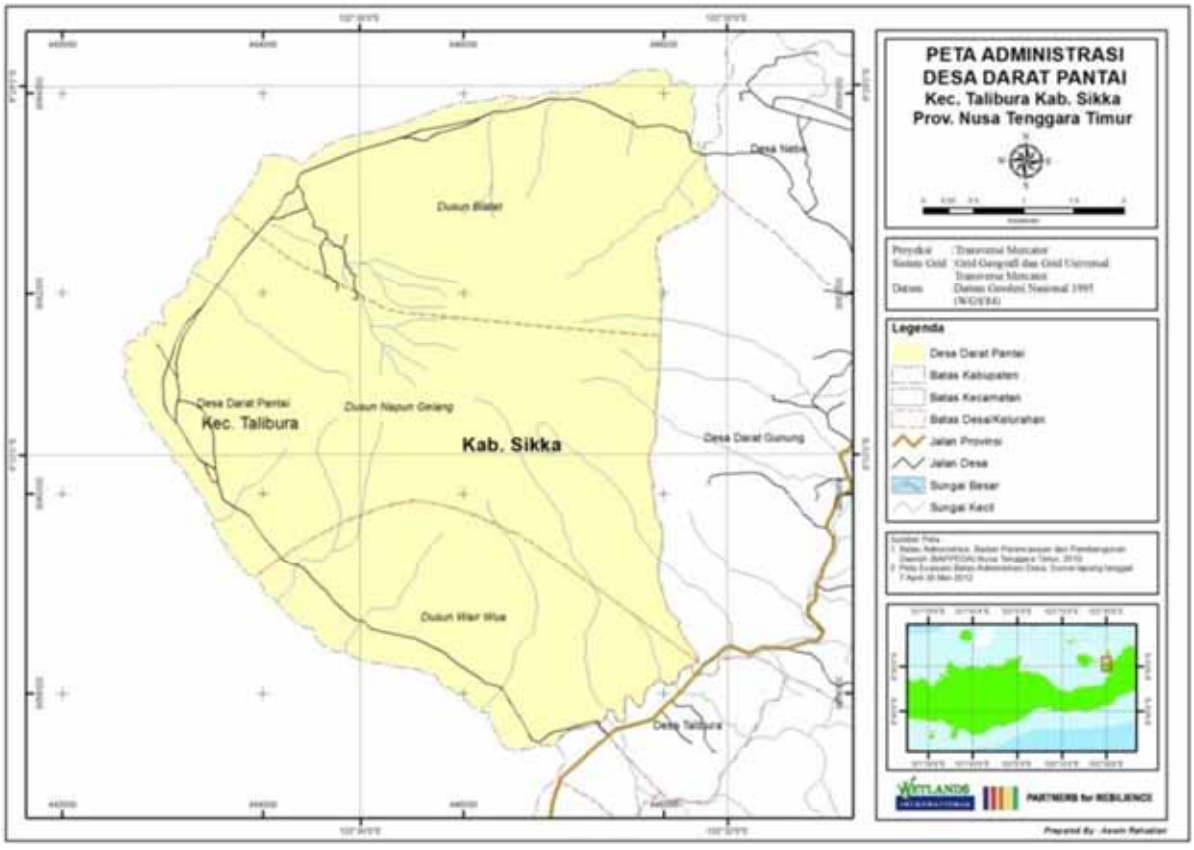


Figure 57. *Administrative Map of Desa Darat Pantai.*

The topography of the Darat Pantai area comprises gentle lowland slopes (coast) and hills.The lowland area stretches along the northern part of the village and almost all of it supports a mangrove forest which is about 4 km thick. The hills are in the southern part, which borders directly onto Desa Darat Gunung. Access to and from Desa Darat Pantai is still poor. The road linking the village to the kecamatan town is also in poor condition. Most of it is made from stones and earth, only a few parts having been surfaced with a type of concrete. The distance from Desa Darat Pantai to Desa Talibura is around 4.5 km and can be covered in about 30 minutes by car or motorcycle. However, the distance from Desa Darat Pantai to Kota Maumere– the district capital of Kabupaten Sikka–is 48.7 km, a journey of 2 hours (*Kecamatan Talibura dalam Angka Tahun 2011*).

Educational facilities in Desa Darat Pantai comprise only a primary school (SD) and early learning centre (PAUD) in Dusun Blatat. For secondary schools (SLTP and SLTA), the villagers have to go to Desa Talibura or Kota Maumere. Health facilities in Desa Darat Pantai consist of a *Polindes* and a *Posyandu*. For more serious diseases, they usually go to the public health centre in Desa Talibura. Sources of clean water in Desa Darat Pantai comprise wells and *Pamsimas* (water piped from springs). Not all the villagers yet enjoy *Pamsimas* piped spring water as the pipe infrastructure is limited and has reached only as far as Dusun Wairwua. The inhabitants of the other two dusuns still use wells despite the very poor water quality. Electricity has not yet reached all parts of the village. Installation of mains electricity did not begin until about 2010 and so far has reached only two dusuns, which are Dusun Wairwua and Blatat. Delays in building the network and erecting electricity poles are the main reason why it has not yet reached the whole village. These delays have been due to difficulty in obtaining permission from the owners of land and coconut trees.

The inhabitants of Desa Darat Pantai consist of indigenous people and migrants.The indigenous ethnic groups include Sikka, Ende, Maumere, Tanah Ai, and Rowe. The migrants have come from places outside Flores, such as the Suku Buton, Bugis, Bowe, andBadjoethnic groups. Nowadays, the people of Desa Darat Pantai are no longer closely bound by traditional *adat* rules and customs. If a traditional ceremony has to be performed, it will usually be done in Desa Darat Gunung. If it is performed in Desa Darat Pantai , then an *adat* elder will be brought in from Desa Darat Gunung. The ceremony which is still common is *belis*, which is the giving of a dowry to the bride prior to the wedding ceremony.The *Belis* nowadays is not as strict nor as large as it used to be. Today, the goods given for *belis* are usually discussed first and adjusted in accordance with the groom's family's financial status.

3.4.1.2 Institutions in Desa Darat Pantai

Information on the institutions in Desa Darat Pantai can be seen in Table 45. This shows that government institutions, in particular the village government and BPD (Village Parliament) play an important role in village decision making. These two bodies form the main gateway for the entry of all the programs and policies to be applied in the village, both those from central government and those from social organisations like local and international NGOs. A fair number of such NGOs have entered Desa Darat Pantai,and their activities cover a range of issues, especially those related to the environment, the economy, and the provision of facilities. PLAN and WIIP are two of the NGOs active in community empowerment. PLAN empowers the community through programs for children and women, while WIIP is concerned with the conservation of coastal environments, in particular mangroves.

Quite a few financial institutions have opened up in the village, and the people have started to make use of them in managing their finances. They usually become members first and then borrow money. This money is mostly used either as business capital or to pay for important necessities such as schooling for their children, or building a house.Extension service agencies, religious and educational institutions all contribute to improving the community's capacity. The public usually acquire knowledge, information and guidance from these agencies, which therefore indirectly influence the decisions and policies made.

The extension agencies in the village have been very useful to the community, in particular through the provision of seeds and information on how to grow the plants. Other institutions playing an important role in the community, which include financial (banks and cooperatives), religious and educational institutions, *pamsimas* and PNPM, are concerned more with improving the community's capacity.They build community capacity in economic and spiritual matters, knowledge, etc to help equip the people to deal with the various disasters that occur in the village.

Early warning systems (EWS) have been formed in Desa Darat Pantai, both through the Indonesian Red Cross (PMI)and through procedures originating from the people themselves, i.e. *ojeg* (motor-cycle taxis). Both these EWS systemsin principle work together to provide early warning in Desa Darat Pantai. Nevertheless, they both still require development, particularly concerning their technical and connection systems in facing disaster, so that every member of the community understands and can carry out their intended function. It should be pointed out that Desa Darat Pantai does not possess an official traditional institution. *Adat*-type regulations are implemented more in neighbouring Desa Darat Pantai. However, the people have become highly aware of the importance of several such *adat* regulations and have begun to apply them. These include the prohibitions on logging in upland forest, burning grasslands, and cutting down mangrove forest along the coast, etc.

Table 42. Institutions in Desa Darat Pantai

Type of Institution	Name of Institution	Activities	Ranking
NGO/LSM	Binadaya	• Housing aid • Food aid	2
	Plan	• Economic empowerment (fishers, farmers) • Provision of building materials • *Furades*	3
	Coremap 11	• Coral reef conservation	1
	Wetlands International Indonesia Programme (WIIP)	• Mangrove conservation and rehabilitation • Community economic empowerment • Ecosystem management training	3
	PMI (Sibat)	• Disaster response training	1
Banks/Financial	BRI	• Savings and loans	1

Type of Institution	Name of Institution	Activities	Ranking
Institutions	Bank NTT	• Savings and loans	1
	Kopdit Obor Mas	• Savings and loans	1
	Kopdit Pintu Air	• Savings and loans • Insurance services	2
Religious Institutions	Remaja Masjid	• Religious education • Religious activities	2
	Mudika (Muda-Mudi Katolik / Young Catholics)	• Religious education • Religious activities	2
Extension Agencies	PertanHut / Agriculture & Forestry	• Provision of seeds and fertilizers • Agricultural extension and training	2
	Peternakan / Animal Husbandry	• Provision of young livestock and vaccination • Agricultural extension and training	2
Government Agencies	DISHUT	• Mangrove reforestation • Mangrove reforestation • Extension services	3
	DISTAN	• Extension services	1
	Village Government	• Implements village government • Plans Annual Regional Budget (APBD) • Issues village bylaws and policy	4
	BPD / Village Parliament	• Implements government together with village officials • Plans Annual Regional Budget(APBD) together with village officials • Issues policy and village bylaws • Monitors performance of village officials	4
Educational Institutions	PAUD	• Early (pre-school) learning	1
	Primary school (SD)	• Education	1
EWS	'*ojeg*'motor-cycle taxi	• To seek outside help in the event of disaster • To make announcements throughout the village in the event of disaster	2
Other	PNPM	• Provision of food • Health services • Savings and loans	3
	Pamsimas	• Clean water and sanitation services	1

3.4.2 Community Profile for Desa Darat Pantai

The community profile for Desa Darat Pantai was obtained through the analysis of responses from 28 respondents deemed to be generally representative of the community. Respondents were selected on the basis of a number of criteria, including gender, age, educational status and income, in order to minimise possible bias and to obtain accurate information. A VCA analysis was conducted through Focus Group Discussion (FGD) and interviews with several key informants. The respondents comprised more men than women and the average age was 40 years (Figure 58). Most of them were married (Figure 59) and had an average of 4 dependents. Despite the family planning program, many of the villagers had more than 2 children. The respondents had lived an average of 32 years in the village, i.e.since before Desa Darat Pantai had separated from Desa Darat Gunung and before the 1992 earthquake and tsunami.

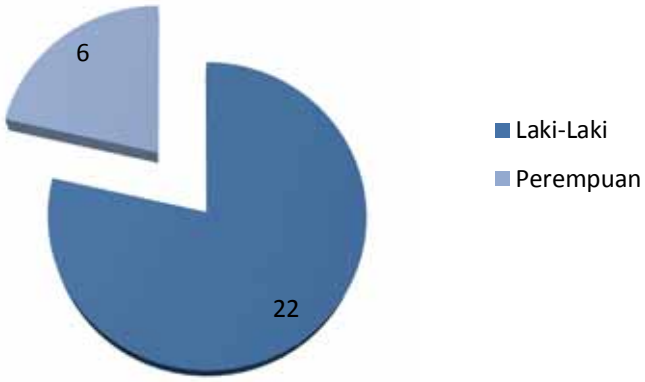


Figure 58. *Gender of Respondents in Desa Darat Pantai*
Captions: Males (Laki-Laki), Females (Perempuan)

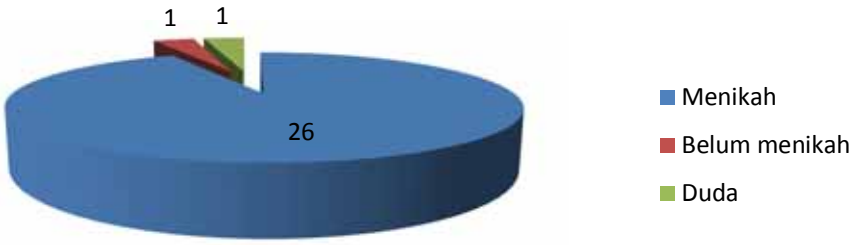


Figure 59. *Marital Status of Respondents in Desa Darat Pantai*
Captions: Married (Menikah), Unmarried (Belum Menikah), Divorced/ Widowed (Duda)

Most of the respondents were Catholics (Figure 60). The majority of the inhabitants of this village were Catholics, only those in Dusun Napong Gelang being Moslems. Respondents belonged to various ethnic groups, the dominant groups being Krowe and Tanah Ai, both of which are indigenous to the Darat Pantai area (Figure 61).

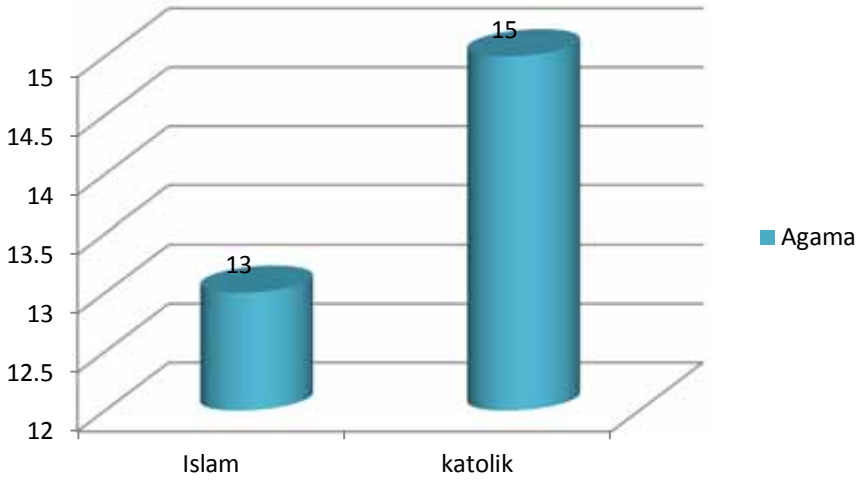


Figure 60. *Beliefs of Respondentsin Desa Darat Pantai*
Captions: Religion (Agama), Islam (Islam), Catholic (Katolik)

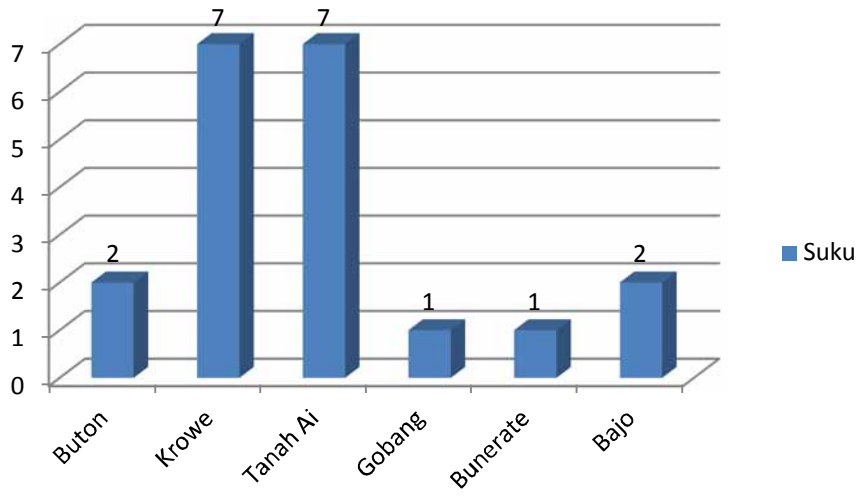


Figure 61. *Ethnicities of Respondents in Desa Darat Pantai.*
Captions: Ethnic Group (Suku)

Although most of the respondents had successfully completed primary school (SD), one had never been to school at all (Figure 62). A few had gone on to complete secondary school (SLTA), but none had studied at tertiary level. Due to their low level of education, most of the respondents worked as farmers (Figure 63). They usually had side-jobs as a supplementary source of income (Figure 64) to cover their living costs. Sometimes a wife would help her husband by farming, going to fish at sea, or raising livestock to add to the family's income.

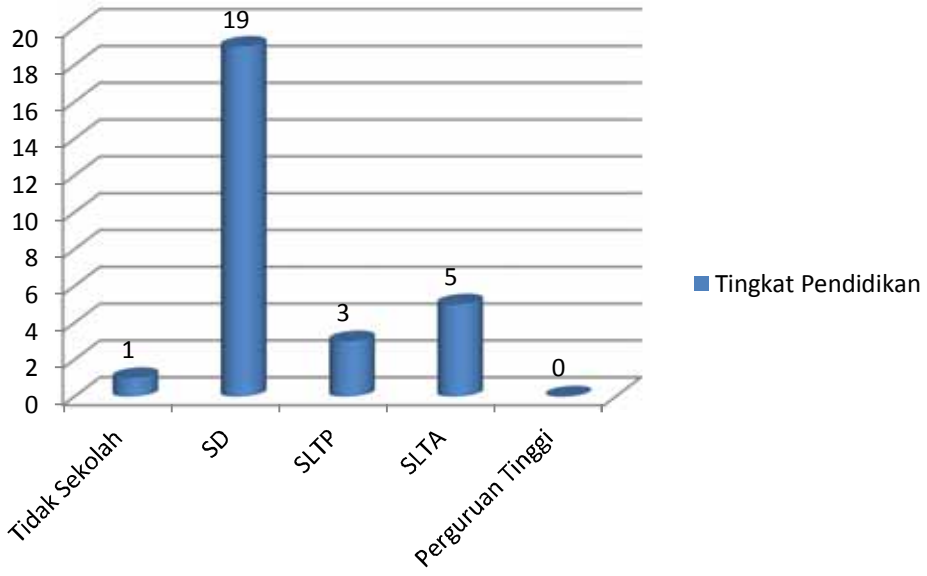


Figure 62. *Educational Level of Respondents in Desa Darat Pantai*
Captions: Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi).

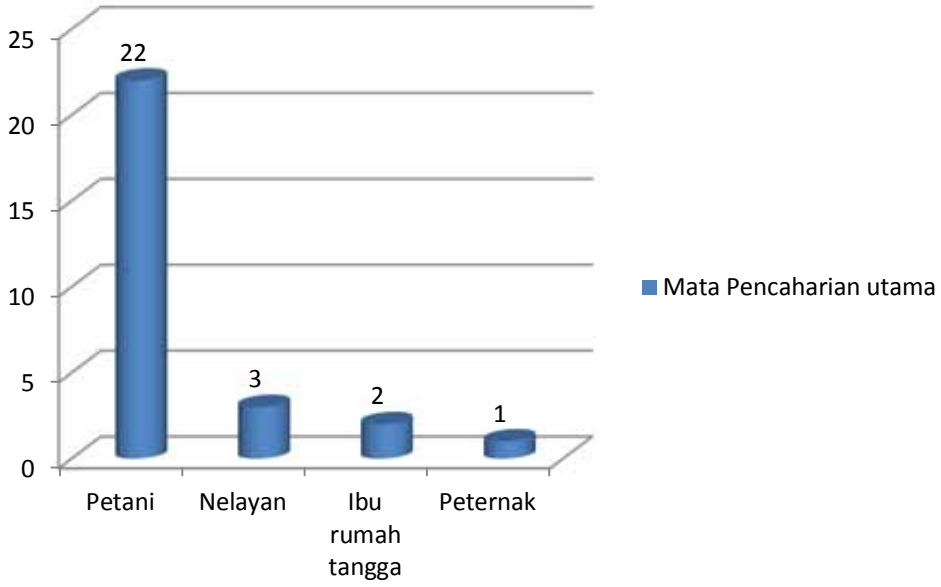


Figure 63. *Main Occupation of Respondents in Desa Darat Pantai*
Captions: Main Occupation (Mata Pencaharian Utama), Farmer (Petani), Seafaring Fisher (Nelayan), Housewife (Ibu Rumah Tangga), Livestock Farmer (Peternak)

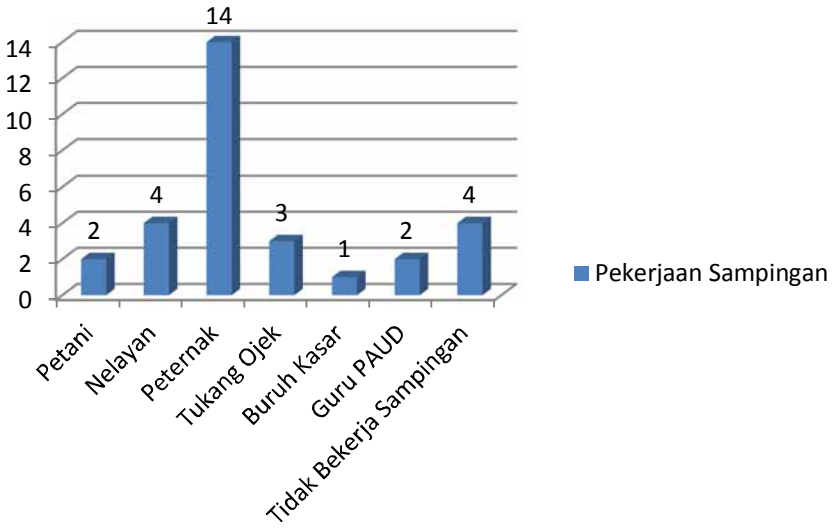


Figure 64. *Secondary Sources of Income of Respondentsin Desa Darat Pantai*
Captions: Side Jobs (Pekerjaan Sampingan), Farmer (Petani), Seafaring Fisher (Nelayan), Livestock Farmer (Peternak), Motor-Cycle Taxi Order (Tukang Ojek), Unskilled Laboure (Buruh Kasar), PAUD Teacher (Guru PAUD), NO-Side Job (Tidak Bekerja Sampingan)

Each respondent's average monthly income and expenditure varied from less than Rp.500,000 to Rp. 2.5 million (Figure 65). The highest average incomes ranged from Rp.500,000 to Rp.1,000,000, while average monthly expenditures were mostly below Rp.500,000. Figure 65 shows that the villagers' pattern of consumption was relatively frugal. This can be seen from the fact that the majority of respondents had an average incomeof Rp.500,000 to Rp.1,000,000 but an average expenditure of less than Rp.500,000. Moreover, those with incomes above Rp.1,000,000 also had lower expenditure. Their monthly incomes came from the money they earned from their main and secondary occupations.Their monthly expenditures were for food, children's school expenses, and daily necessities such as water in the dry season. Details of the respondents' financial circulation, based on livelihoods, can be seen in Table 46.

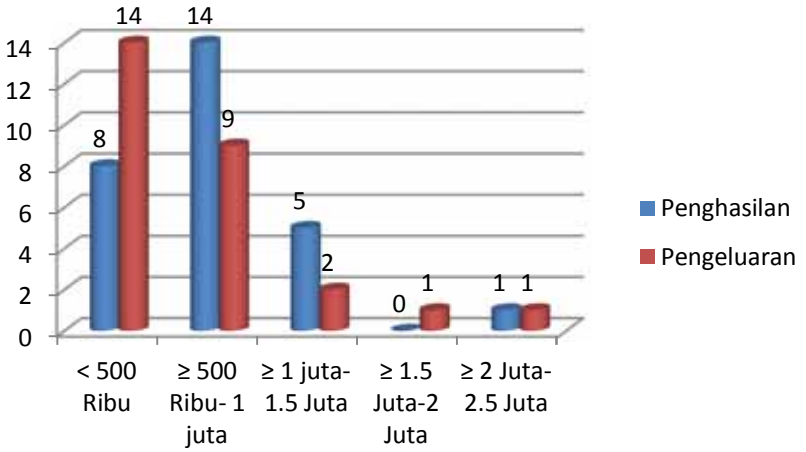


Figure 65. *Average Monthly Incomes and Expenditures of Respondents in Desa Darat Pantai.*
Captions: Income (Penghasilan), Expenditure (Pengeluaran), Thousand Rupiah (Ribu), Million Rupiah (Juta)

Table 43. Details of Financial Circulation of Respondents in Desa Darat Pantai

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Occupation			
Farmer	Rp.100,000-Rp.900,000	Rp. 100,000-Rp.800,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed
Fisher (fish)	Rp.500,000-Rp.1,000,000	Rp. 500,000-Rp.800,000	Clothing, food, health, education, entertainment, capital to repair fishing tackle and boat
Fisher (octopus)	Rp.1,500,000	Rp.1,500,000-	Clothing, food, health, education, entertainment, capital to buy bait and repair fishing tackle and boat
Housewife (Stay at Home)	Rp.1,000,000	Rp.1,000,0000	Clothing, food, health, education, entertainment,
Livestock farmer	Rp. 800,000-Rp. 1,000,000	Rp. 1,000,000	Clothing, food, health, education, entertainment, livestock farming expenses
Secondary Occupation			
Motor-cycle-taxi driver	Rp. 500,000-Rp.1,000,000		Supplementary income. Usually done by farmers
Unskilled labour	Rp.1,500,000	-	Supplementary income
PAUD Teacher	Rp. 200,000-Rp.300,000		Supplementary income

Source: Questionnaire and interviews with respondents

All the respondents owned their own homes (freehold). On average these had 2-4 bedrooms. Most of their homes were non-permanent or semi-permanent buildings. Only a few of the respondents could afford to build a permanent house (Figure 66). Despite being mostly non/semi-permanent buildings, most homes did have a toilet and bathroom, although these were generally make shift and not in very good condition (Figure 67). For cooking, respondents used firewood and kerosene stoves, though most used firewood as they could obtain this for free.

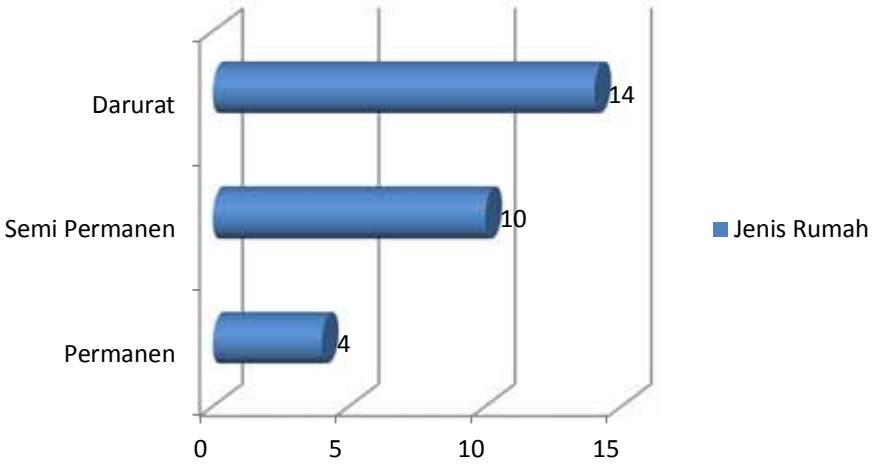


Figure 66. *Types of Housing of Respondents in Desa Darat Pantai.*
Captions: Type of House (Jenis Rumah), Non-Permanent Building (Darurat), Semi-Permanent Building (Semi Permanen), Permanent Building (Permanen)

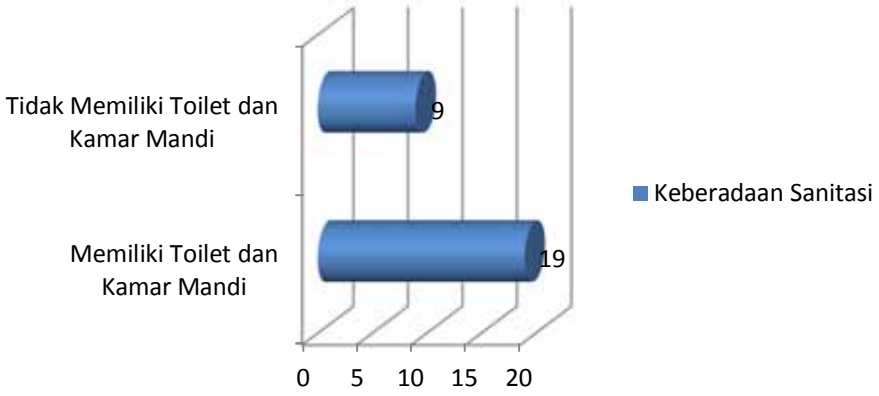


Figure 67. *Sanitation Facilities Possessed by Respondents in Desa Darat Pantai.*
Captions: Sanitary Facilities Ownership (Kepemilikan Sanitasi), No Toilet or Bathroom (Tidak Memiliki Toilet dan Kamar Mandi), With Toilet and Bathroom (Memiliki Toilet dan Kamar Mandi)

Respondents living in Dusun Napong Gelang and part of Blatat did not have mains electricity from PLN for lighting so used oil lamps at night (Figure 68). A few respondents did have their own electricity generator, however. For clean water, respondents in Dusun Napong Gelang and Blatat used dug wells. Piped water to taps (*Pamsimas*) was already available in Desa Darat Pantai, but had so far reached only part of Dusun Wairwua (Figure 69).

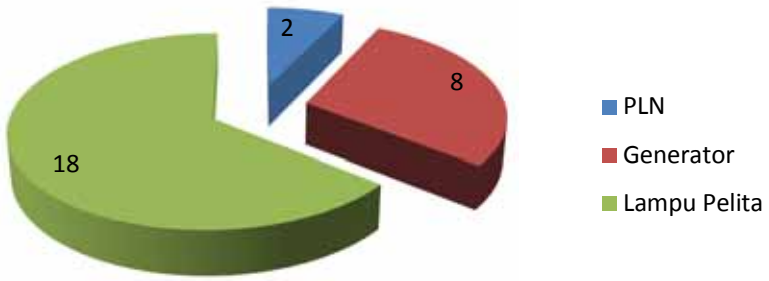


Figure 68. *Energy Sources used by Respondents in Desa Darat Pantai.*
Captions: PLN Mains Electricity (PLN), Own Generator (Generator), Oil Lamps (Lampu Pelita)

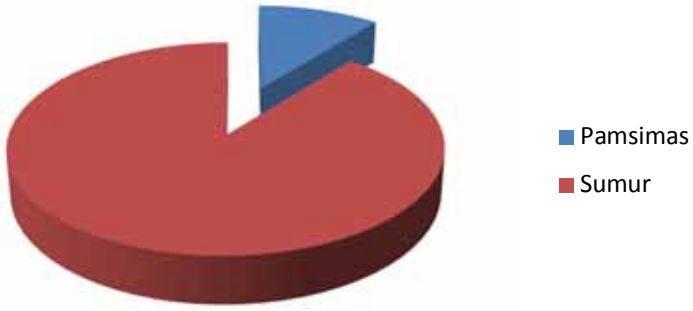


Figure 69. *Water Sources used by Respondents in Desa Darat Pantai.*
Captions: Pamsimas Piped Water (Pamsimas), Wells (Sumur)

Information on assets and debts also formed part of the analysis (Tables 47 and 48). This information was used to measure the villagers' level of prosperity. On average, respondents owned 0.5-2 ha of land (farmed by themselves or others). Of the 28 respondents, only 3 possessed more than 4 ha. Two of these used their land to graze their cattle and the other used it for estate crops and farming. The farming implements used were still very simple, usually machete, hoe, mattock, etc. Other assets included in the analysis were vehicles, valuables, and children's education. Only 9 respondents owned a motor-cycle and 2 of them also owned a motor boat. Respondents with higher incomes could afford to educate their children through high school(SLTA). Goods considered valuable were gold. Only 6 of the 28 respondents possessed any gold items. The results of the analysis categorised some of the respondents as 'poor' and only 2 as 'rich'.

Table 44. Prosperity Parameters for Respondents in Desa Darat Pantai, Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock per household	30-50 animals	10-20 animals	Fewer than 10 animals
Agricultural yield/harvest (Rice)	More than 50 sacks	20-50 sacks	1-10 sacks
Highest educational level of children	University	Junior-Senior Highschool (SMP-SMA)	Primary – Junior Highschool (SD-SMP)
Type of house	Permanent building (Solid walls, ceramic tiled floor, zinc roof)	Semi Permanent (Timber walls, zinc roof, concrete or earth floor)	Non-permanent (Bamboo walls, rumbia roof (sagoo palm), earth floor)
Area of land owned	>10 ha	1-9 ha	< 1 ha, or none
Fishing equipment	Motor boat, Fish trap (*Kelong*), Net	Sampan and Net (*Pukat*)	Rod and line, Net
Income/month	More than Rp.4,000,000	Rp.1,000,000-1,500,000	< Rp. 1,000,000
Vehicles owned per household	Car, motor cycle, motor boat,	Sampan and motor-cycle	None
Communication devices perhousehold	Television, handphone, satellite dish, radio	Television, handphone, radio	Handphone, TV

Source: Field verification (2012)

Table 45. Information on Debts incurred by Respondents inDesa Darat Pantai

Source of Loan	Reasons for Borrowing from this Source				Annual Interest	Repayment system	Number of Respondents
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service			
BRI	>10 million	Talibura (5 km)	• Requires collateral • Complicated process	Good	1.4%	• Depends on size of loan • Maximum is usually 5 years	1
PNPM	25 million	Talibura (5 km)	• Must become a member of PNPM • A loan proposal must be submitted first • Relatively easy process	Good	1.1%-1.3%	• Depends on size of loan • Maximum is usually 18 months	17
Kopdit Pintu Air	10 million	Maumere (30 km)	• Specific requirements	Good	2 %	• Depends on size of loan	1
Coremap	1 million		• Specific requirements • Must become a member ofCoremap	Good	1.5%	• Depends on size of loan	1

From questionnaire responses and interviews, it was ascertained that 9 of the 28 respondents did not have any debts, while the others had loans from a range of different institutions. Interviews revealed that respondents took out loans in response to urgent needs, and also to use as working capital, to repair boats, etc.They did not object to the interest charged by the lending institution and felt capable of repaying the loan in the monthly instalments set.

In between their daily activities, the respondents still found time to participate in organisations. Almost all of them were involved in an organisation and one respondent even managed to participate in more than one. The organisations in which many of them were active can be seen in Figure 70. Their activities included direct fieldwork involvement in the organisation's program as well as savings-loan activity. In interviews, it became clear that respondents were keen to take part in such activities because they felt that this could improve their knowledge and "soft skills".

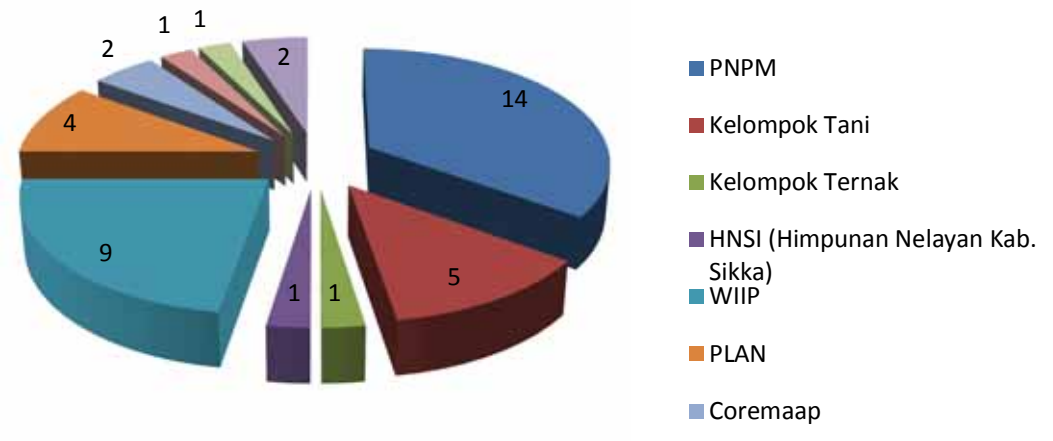


***Figure 70**. Organisations in which Respondents in Desa Darat Pantai were Active*
Captions: PNPM, Farmer's Group 9Kelompok Tani), Livestock Farmer's Group (Kelompok Ternak), HNSI (Sikka Association of Seafaring Fishers)(Himpunan Nelayan Kabupaten Sikka), Wetlands International Indonesia Programme (WIIP), PLAN, Coremap

3.4.3 Ecosystem Profile for Desa Darat Pantai

3.4.3.1 Ecosystems and Natural Resources in Desa Darat Pantai

A spatial analysis and field survey showed that thetopography of the Desa Darat Pantai area ranges from flat to very steep, with 22.1% of the area having a gradient of 0-8% (flat). This makes the village highly vulnerable to flood and abrasion, but less vulnerable to landslides. Information on gradient in Desa Darat Pantai is presented in Figure 71 and Table 49.

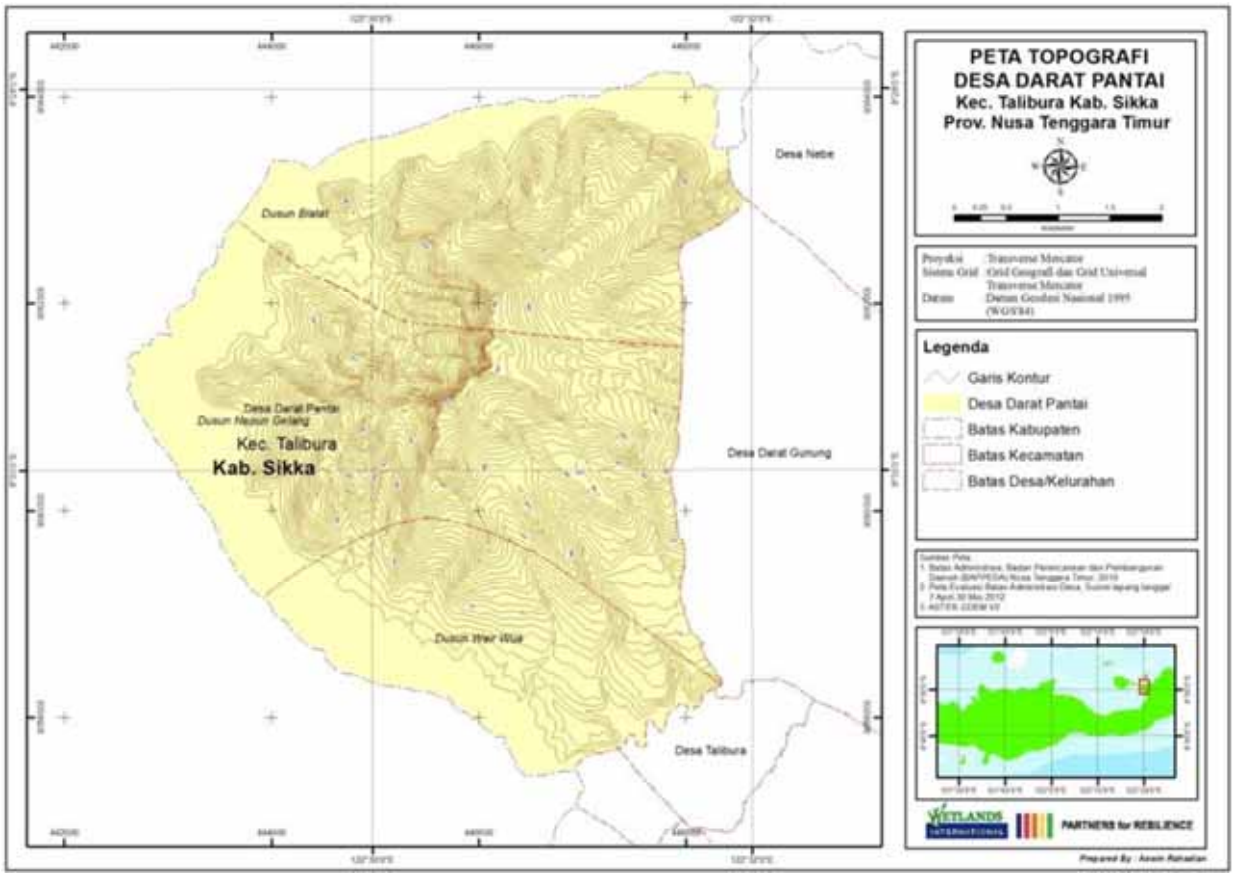


Figure 71. *Topographical Map of Desa Darat Pantai.*

Table 46. Land Area of Desa Darat Pantai Based on Gradient

Gradient	Area (ha)	%
0-8%	587.68	22.1
8-15%	396.6	14.9
15-25%	497.51	18.7
25-40%	665.93	25.0
>40%	516.28	19.4
Total Area	2,664.01	100.0

The assessment of ecosystems and land cover focussed on the whole of the Desa Darat Pantai area. The various ecosystem types and area mapped are presented in Table 50. Lack of conformity in data on the administrative boundaries and definitive map was a constraint for the team when performing the field assessment. The existing map and boundary information for Desa Darat Pantai were not in digital form but just in the form of sketches without any coordinates or scale. Participative mapping had been performed several times previously in Desa Darat Pantai by, among others, PLAN, PNPM, COREMAP and the WIIP field facilitator. From the results of these, the assessment team found links between the natural resources and their users in the Desa Darat Pantai area.

Table 47. Information on Land Cover according to Ecosystem Assessment in Desa Darat Pantai

Type of Ecosystem	Area (Ha)	%
Dry land forest	1246.83	46.8
Cultivation	945.23	35.5
Grassland / savannah	92.31	3.5
Human settlement	19.51	0.7
Coastal	127.15	4.8
Mangrove	186.99	7.0
Marine	46.12	1.7
Total Area	2664.1	100.0

The mangrove ecosystem in Desa Darat Pantai covers a wide area, around 186.99 ha. The community's perception of mangroves has improved since the occurrence of the 1992 tsunami, when they experienced the benefit of the mangroves along the coast slowing down the velocity of the water. They also believe that mangroves can be a defence against abrasion and change the direction of wind. Moreover, the local community could also reap the benefits of mangrove's other function as a habitat for mangrove crabs and fish. In Desa Darat Pantai there still grows a plant called Santigi, which is said to be very rare, growing only in the Kab.Sikka district. Field assessment indicated that a large part of the land in Desa Darat Pantai is used for agriculture and livestock grazing. Much of these natural resources is utilised directly by the local inhabitants. The relationships between natural resources and their users in Darat Pantai can be seen in Figure 72.

Figure 72. *Relationship between Natural Resources and their Users in Desa Darat Pantai*
Captions: Natural Resources in Desa Darat Pantai (Natural Resources in Desa Darat Pantai), Rivers and Springs (Sungai dan Mata Air), Cultivation (Ricefields, Farmland, Aquaculture Ponds), Dryland Forest (Hutan Lahan Kering dan Padang Rumput), Protection Forest (Hutan Lindung), Human Settlement (Pemukiman)
M = Community, P = Government, S = Private Sector

3.4.3.2 Spot Mapping

Spot mapping of Desa Darat Pantai was done through community participation. The spot map produced is presented in Figure 73. Sites at risk of disaster are marked by red symbols on this spot map. The most frequent of these disasters are abrasion, flood, tornado and community health. The area that most often suffers disasters is Dusun Napong Gelang, such that this area needs to be given top priority in the event of abrasion and flood. During very high tide, road access to Desa Bangkoor is cut off by the tidal waters, which can be up to 70cm deep. During the dry season, Desa Darat Pantai suffers from a shortage of clean water because it has no springs. Daily water needs are met from wells, but in the dry season the well water becomes salty and unfit for consumption. In such dry conditions, forest fires break out in the hills, which disturb the livestock and ecosystem.

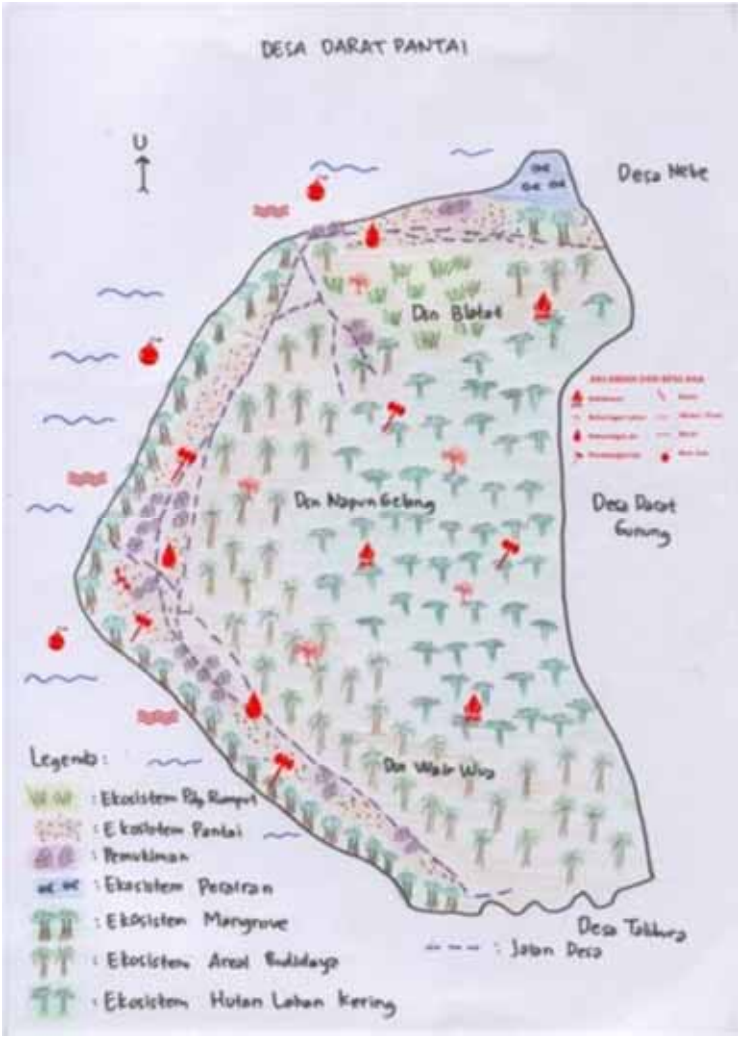


Figure 73. *Spot Map of Desa Darat Pantai.*

3.4.3.3 Transect Mapping and Landscape Change

As in the previous villages, transect mapping in Desa Darat Pantai was done through community participation.The information obtained is presented in a matrix which can be seen in Table 51.

Table 48. Transect Map of Desa Darat Pantai Based on Ecosystem Cover

	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
Land Status	In Desa Darat Pantai there are no paddyfields. Dryland fields are owned by individuals (with SPPT tax status but no land certificate yet) Land certification is currently in process.	Land used for mixed plantation is owned by individuals (with SPPT tax status but no land certificate yet) Land certification is currently in process.	State-owned for 50 meterson each side of river. Public well (Well that use community) on privately owned land.	State-owned Privately owned land onto which mangroves have expanded naturally are not logged.	State-owned &traditional *adat*-owned	State-owned
Current Use	Fields planted with rain-fed rice, maize, cassava, sweet potato, peanuts, mung beans	Land planted with coconut, cashew, cacao, banana. Timber crops planted: teak (2008)&mahogany (2008)	Dec-April river water May – November Wells Spring source in Desa Talibura	Crabs Snails Clams Firewood Building materials&medicines	Livestock grazing State: protection forest Hunting of jungle fowl Honey collecting	Fishing for grouper, octopus, squid, sea slug & tuna (main marine commodities)
User Group	People from Desa Darat Pantai. Farmer groups started to be formed in 2012	People from Desa Darat Pantai For teak and mahogany only, each person plants 10 trees.	Community	Community (Not as main source of income)	Traditional *adat*community. Current farmer groups: Maju Bersama & Bangkit Bersama	Community, especially those of Bajo ethnicity, and the seafaring fishers' group
Productivity	Rice is planted for 4 months, only 1 harvest per year. A good harvest will yield 50 x 50kg sacks	Coconut: 1 ha (9x9 m) yields 0.75-1 ton of copra. Copra selling price: Rp.1500-	3 water bore-holes for drinking-water. Demand: Drinking water ± 20 L/day/house-	Snails most commonly exploited. In some places, the mangrove forest grows landwards	Honey: 1 year 2x harvest in July-Oct @ honey collector ±100 bottles/year	Fish trap boat (kelong): 3-4 ton/18 nights (1 season = 18 nights) Small boat

	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
	(=2500kg) per hectare. In a bad year, there will be no crop at all. Members of farmers' groups tend to find it easier to obtain seeds, fertilisers and knowledge about farming Last 2 years, dry season (*fuso*) rice Maize planted on 0.5ha of land can yield 75 bundles in a good harvest, or nothing at all in a bad one. 1 bundle of maize comprises 100 ears of corn or around 8 kg	5000. High quality copra (A), i.e. dry copra, sells for Rp.5000, medium quality (B) Rp. 4500-4750. Cacao: 5 trees can produce around 3 kg. Quality A sells for 20,000/kg quality B for 18,000/kg. Coconuts can be harvested every 3 months. Cashew harvested 1/year in August 0.5 ha of coconut trees can bring in aroundRp.5 million (500 kg) at a selling price of 8000-10,000/kg. Bananas sell for Rp.15,000-20,000/stem (*tandan*) Monthly harvest can be at least 1 stem/*tandan* per plant. 1 month can yield at least 10 stems/*tandan* per person.	holdin the dry season. Water for washing ± 60 L/day/household.	(not seawards)	1 plot of forested land ±4 sacks of cattle feed per day (rainy season)	50 thousand rupiah per day Rod & line ±5 bundles/day Net 10-20 bundles/day
Constraints&threats	Dry fields: pests seasonal constraints / rainfall	pests seasonal constraints/ rainfall	Ds Wairua suffers water shortage in dry season (Distance ± 3km) Logging in hill	High demand for firewood ±20 kg wood/household (Gathered from	Drought, Pests: maggots, brown plant-hopper, grass-	Fish bombing, , potassium, *tuba*roots(natural poison). In one month there are

	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
			forest causes reduction in water resources (since 1993) Forest fire every year around July– Aug. Water overflows ditches &floods road in Napunggelang in rainy season: Road access becomes difficult	mangrove, gardens&hill forest) Mangrove seedlings threatened by livestock Abrasion. Village regulations on plant protection already exist but are general and ignored.	hoppers. Fire	±500 fish bombsthat each destroy an areaof 25 meter diameter
Solutions/ efforts to overcome the constraints/threats	Extension services; provision of seeds and fertilizers; private purchase endeavours; seed preservation (maize dried then soaked in preservative or kitchen ash)	Extension services; provision of seeds and fertilizers; private purchase endeavours	Large reservoir tank: proposal has been submitted to*Pemda*but received no response so far. Sink more wells. Optimise aid from PKS PPBM (2005) Optimise aid from PLAN: @3 wells per dusun. Optimise *Pamsimas*aid for drinking water	Prevent abrasion near road through reforestation / rehabilitation. Optimise village regulations*Perdes*on preventing livestock from damaging plants in reforested areas.	Rehabilitation. Regulation of forest honey extraction.	

Additional information obtained when conducting transect mapping with the community was the status of land in Desa Darat Pantai. According to interviews with village officials and community leaders, all of the land in the settlement has now been issued with certificates as proof of ownership. For land outside the settlement, however, which is considered as traditional *hak ulayat* and is within the forest, the people have not been given certificates. The document most commonly used as proof of ownership is the annual land tax invoice (*SPPT*). Other information gleaned during the transect mapping was changes to Desa Darat Pantai's landscape. This information was obtained from the local people, both old and young, and shows a dynamic change in the village from age to age. Information on these landscape changes is presented in Figure 74.

From observation in the field, it was ascertained that the centre of government and population concentration in Desa Darat Pantai (including public facilities and infrastructure) is situated on the lowland plain near the coast. The distance between coastline and settlement is very close, varying between 10 - 200 meter. It was observed that the shore is mainly sandy beach and is interspersed with pebbly and muddy beaches.

Key: (a) sea, (b) mangrove, (c) settlement, (d) road, (e) cultivation, (g) grassland (h) hill forest

Figure 74. *Landscape Changes in Desa Darat Pantai*

Before 1991, the Desa Darat Pantai area contained plenty of forest (mangrove, &highland plateau forest). Then in 1992, an earthquake and tsunami occurred which destroyed much of Desa Darat Pantai's mangrove. From 1992 until the present, however, there has been a positive trend in the growth and expansion of the mangrove forest growth. The community are aware of the importance of mangrove forest as a defence against tsunami and abrasion, but while some of them know the regulations banning the felling of trees in protection forest and mangrove forest, some ignore the ban. Moreover, despite the fact that mangrove forest management has the support of regional (*Perda*) and village (*Perdes*) regulations, efforts to maintain and expand the mangrove forest need to be optimised. The method of extracting the wood is an indirectone. Loggers do not simply cut down healthy mangrove stands, but make a circular incision around the trunks (as done in teak forests in Java). After some time, the trees dry up and die; only then do the loggers cut them down. Although the volume is not great, illegal logging still occurs in Desa Darat Pantai. During field observation, logging was detected in mangrove forest, bush, and other areas in the hills. In general, such logging was limited to fulfilling the villagers' need for building materials and firewood. Species frequently extracted for building were *Sonneratia*, *Kayu Merah*, Tamarind (*Asam*), and Mahogany (*Mahoni*). This issue needs more attention because it is very closely related to disaster risk reduction activity in Desa Darat Pantai.

3.4.3.4 Water Quality

Water analysis was performed in Desa Darat Pantai at several sampling stations whose water is used by the villagers for drinking and other purposes. In addition, water analysis was also carried out in mangrove forest and in the reforestation sites where mangrove seedlings had been planted during WIIP activities (Figure75). The results of the water analyses in Desa Darat Pantai are presented in Table 52. According to the information received, the water at station 1 is consumed by the inhabitants of Dusun Wairwua and Napon Gelang. The people in these two dusuns have difficulty obtaining water, especially for consumption.The only water they consider fit for consumption is that from station 1, because the water from all the other wells tastes salty or very salty. However, the analysis showed that this water contains TDS above the level recommended by the Ministry of Health. Therefore, before it can be consumed it must be treated to reduce the TDS concentration. Alternatively, it could be filtered through fabricwith a very close weave capable of reducing the TDS content.

Stations 2 and 3 were in Dusun Blatat. The water at station 2 is used only for daily uses while that at station 3 is used for drinking and cooking. The water at station 2 was also found to be of poor quality due to high TDS which damages the domestic utensils and clothes washed in it. Interviews in the field revealed that as a result of usingthis water utensils had become covered in scale and rust, particularly those made from metal. The water at station 3 was found to meet the water quality standards, but its TDS concentration was very close to the maximum level recommended by the Ministry of Health. It therefore still needs to be filtered prior to use as it could be harmful to health if consumed in the long term. The condition of water at station 4 was similar to that at station 2, but its salinity and TDS levels were both found to be extremely high; it is therefore strongly not recommended for consumption. The high TDS concentration is caused by the high salinity. It also tastes quite salty, so the people do not drink it.This water is also not recommended for daily uses as it could damage items in the long term.

Water conditions at stations 5 and 6 were very similar. The DO concentration of both met the minimum water quality standard thus making it possible for organisms to grow there, the dissolved oxygen reserves being sufficient to support plant growth. In addition, the water temperature and pH still complied with the standard. There would therefore be no problem in using the station 6 area for rehabilitation and nursery because its conditions were found to be almost the same as those in the station 5 environment, where mangroves grow naturally. The salinity and TDS levels at both stations were also almost identical and considered to fulfil the criteria for mangrove growth. This is because mangrove grow best in areas inundated with water having a salinity level of around 30 ppt; if salinity is too high, this will threaten their survival.

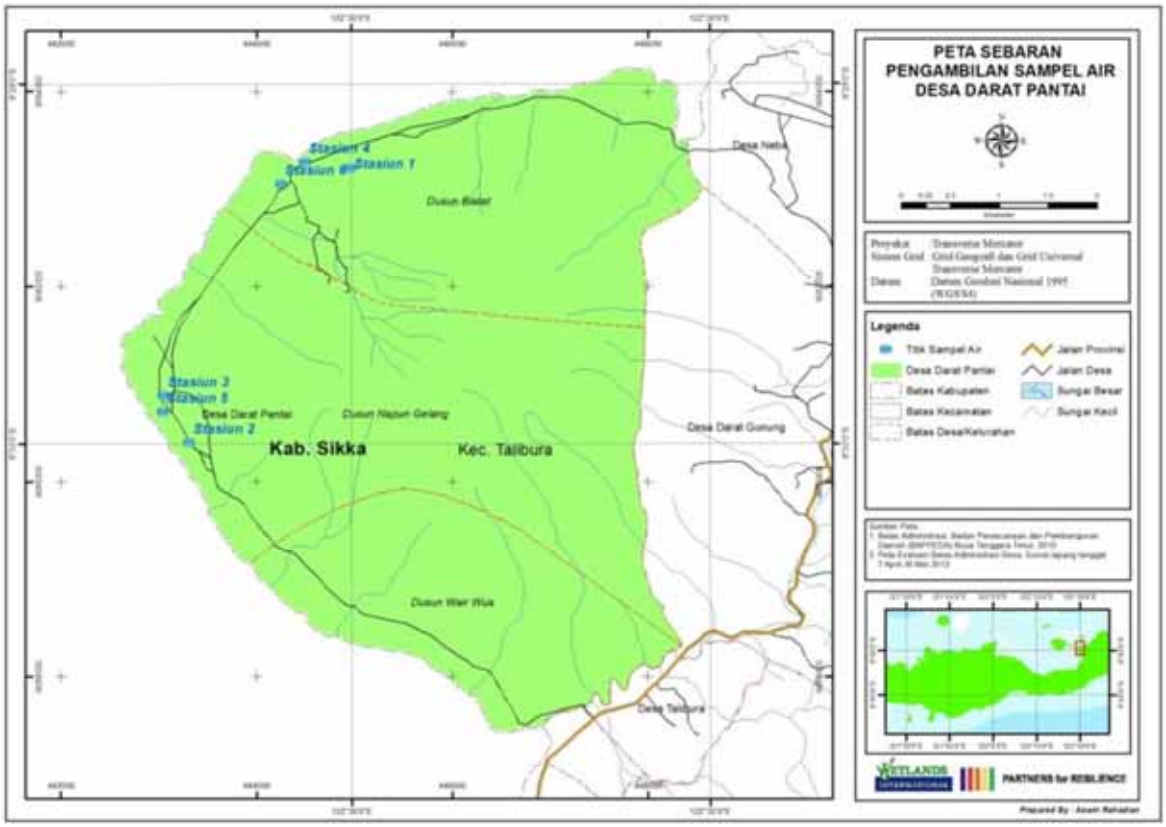


Figure 75. *Map Showing Distribution of Water Sampling Stations in Desa Darat Pantai.*

Table 49. Results of Water Quality Analysis for Desa Darat Pantai

Parameter	Unit	Station						*		**	
		1	2	3	4	5	6	Min	Max	Min	Max
DO (mg/L)	mg/L	6.5	6.8	7.1	5.9	6.1	5.5	2	-	-	-
Temperature (°C)	°C	26.1	26	25.9	26.3	26.3	26.2	-	-	-	Air temperature ±3
Salinity (ppt)	ppt	0.3	1.3	0.2	5	31.6	29.1	-	-	-	-
TDS (mg/L)	mg/L	600	2437	476.1	8990	48400	45060	-	1000	-	500
pH	-	7.76	8.35	7.9	8.54	8.22	8.38	6	9	6.5	8.5

Notes:

Station 1 : Well for drinking water (used by the inhabitants of Dusun Wairwua and Napong Gelang)
Station 2 : Community well (Dusun Blatat)
Station 3 : Well for drinking water only (Dusun Blatat)
Station 4 : Water in mosque
Station 5 : Water in mangrove forest
Station 6 : Water in mangrove forest rehabilitation area
* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Quality Control
** : Potable Water Quality Standard according to Indonesian Health Minister regulation RI NO.492/MENKES/PER/IV/2010

3.4.4 Disaster, Vulnerability and Capacity of the Desa Darat Pantai Community

3.4.4.1 Information on Disaster in Desa Darat Pantai

3.4.4.1.1 History of Disasters and Seasonal Events in Desa Darat Pantai

Desa Darat Pantai has suffered a variety of disasters during the last 22 years, but not as frequently as the other villages. Details of the kinds of disaster that have struck Desa Darat Pantai can be seen in Table 53. Flood and abrasion are the two most common of these. Floods usually come from the hills (Desa Darat Gunung) and abrasion from the sea, mainly affecting Dusun Napong Gelang. Flooding in the village is usually the result of deforestation, as the land becomes denuded. Heavy rainfall on hilly areas with labile soil causes floods which also bring attributes such as soil and tree trunks. These floods damage only plants, land and livestock. They do not injure people, but they do cause great suffering to people as a result of failed harvests and subsequent hunger. Abrasion is more frequent in the Napong Gelang area. The coastal area of this dusun is quite open because dense mangrove forest grows along the length of dusun Wairwua and Blatat. The abrasionin Dusun Napong Gelang erodes the beach; during 2007-2008 the beach receded 20 metres as a result of abrasion.In addition, it causes inundation in the residential area thus disrupting people's activities.

The earthquake and tsunami that occurred in 1992 also devastated Dusun Napong Gelang. Although the damage to Desa Darat Pantai was not as great as in the other villages bordering the Flores Sea, the one part that was badly hit, with significant loss of human life and material goods, was Dusun Napong Gelang, because its mangroves were much sparser than those in the other dusuns.In 2009, the village was hit by cyclone Lena, but the storm did not claim any human lives. The worst losses were suffered by plantation owners (coconut and cashew) because the storm uprooted the trees. In 2012, Desa Darat Pantai was hit by tornado, which damaged facilities and infrastructure, such as homes and a chapel. The worst damage was in Dusun Blatat, the other dusuns only suffering damage to trees.

Table 50. History of Disasters in Desa Darat Pantai

Time of Occurrence	Type of Disaster	Remarks	Impact
1990	Flood	• Flood caused by 3 days continuous rain	• Many plants damaged • Many livestock deaths
12 December 1992	Earthquake and Tsunami	• Weather in the village changed prior to the disaster. • The sky became dark, then suddenly there was an earthquake and huge wave (tsunami)	• Human settlement destroyed in Dusun Napong Gelang • Many livestock died and lost • Disaster caused loss of human life
January 1993	Abrasion and Flood	• Two days continuous rain accompanied by high tides caused seawater to overflow	• Plants damaged • Beach eroded by seawater
2001	Flash flood	• Floodwaters descended from the hills. • Floodwaters carried soil and tree-trunks	• Damage to plants and land

Time of Occurrence	Type of Disaster	Remarks	Impact
2007-2008	Abrasion	• Big waves on Dusun Napong Gelang coast	• Almost 20 metres eroded from the coastline as a result of abrasion
2009	Cyclone Lena	• Whirlwinds blew away whatever was in the vicinity	• Many trees uprooted • No loss of life
December 2010	Landslide	• Non-stop rain for one week • Rain caused soil in the hills to become labile	• Dusun Napong Gelang (RT 09)
April 2011	Abrasion	• Big waves	• Dusun Napong Gelang (Wairpapan)
17 March 2012	Rain, High Tides and Tornado	• Rain for 4 days, accompanied by big waves and whirlwinds	• Dusun Napong Gelang (Wairpapan) • Sea water flooded the settlement. • Dusun Blatat suffered from tornado / whirlwinds. • Heavy damage incurred by 4 homes and one chapel • Slight damage to 5 homes, 1 mushola and 1 primary-school toilet

Source: Laporan PFR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification

Besides information on disaster history, details of seasonal disasters are also included in this discussion. These are presented in Table 54. The disasters that occur almost every year, usually when the rainy season arrives, are floods and abrasion. As a result of heavy rainfall and chalky soil, which is relatively impervious to water,the rainwater is poorly absorbed by the soil. Another factor is the degraded condition of the hill forest, which also contributes to the floods that often hit this area. Frequent coastal abrasion is caused by high waves whipped up by strong sea winds. High rainfall also causes seawater to spill over onto the land. During the last few years, Desa Darat Pantai has frequently experienced strong winds, better known as tornadoes. These usually arrive suddenly. They tend to occur in the rainy season, particularly during January-March. There have been several such tornadoes in the village, but they have not resulted in any loss of life.

In the dry season, it is drought that frequently hits the village as water sources dry up. Some places do still have clean water, however, but it tends to taste salty.In times of water shortages, the community have to be prepared to pay out money to purchase fresh water from other areas. Drought also puts a stop to the cultivation of plants. These seasonal disasters lead to a variety of diseases. The most common of these are malaria and colds/coughs. Malaria, which is endemic to East Nusa Tenggara,occurs almost all the year round, during both the wet and dry seasons. Even though the local government has been promoting hygiene, some of the villagers still fall victim to this disease. Coughs and colds, mostly prevalent in children, tend to be more frequent during the transition from one season to the next. Poor air conditions and changeable weather are the main cause of the diseases that affect Desa Darat Pantai.

Table 51. Information on Frequent Seasonal Disasters in Desa Darat Pantai

Type of event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Flood													• Flood results from high rainfall • River water discharge becomes high, so river overflows onto neighbouring land
Abrasion													• Occurs during rainy season (west wind) • High sea waves accompanied by strong winds
Storm winds/ Typhoon													• Occur at the beginning of the year during west wind season. • Very strong winds
Drought													• Occurs in the dry season • Waters sources dry up and plants die
Malaria													• Malaria occurs all year round • Malaria is endemic to NTT
Coughs and colds													• Frequent during dry season / or during transition between seasons • Poor air conditions and changeable weather

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

3.4.4.1.2 Disaster Impact

The various disasters described above have had a significant impact on Desa Darat Pantai. The worst was the earthquake and tsunami in1992. Floods and abrasion have had almost as severe an impact on the community because they occur almost every year. Information on the impact of disasters in Desa Darat Pantai can be seen in Table 55.

Table 52. Disaster Impact in Desa Darat Pantai

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on tree felling in upstream (forest) areas, imposed by village government and local *adat* institution
Abrasion										• Plant mangroves and beach plants • Assistance for victims of abrasion
Earthquake& Tsunami										• Move people in earthquake-prone areas to a safer site
Typhoon										• Keep away from areas with many trees • Insufficient assistance has yet been received by typhoon victims, particularly for building homes
Cyclone Lena										• Keep away from areas with many trees
Landslide										• Ban on tree felling in upstream (forest) areas, imposed by village government and local *adat* institution
Drought										• Dig wells in hill area • Construct water storage tanks • Purchase clean water from other areas
Epidemic										• Extension services promoting a healthy lifestyle • Public sanitary facilities (*MCK*) have been built • Construction of water sources such as a well at every home

Key: High Medium Low

The various impacts of these disasters have led to a variety of perceptions among the village community. An analysis of some of the perceptions from a number of respondents can be seen inFigure 76. All the respondents agreed that they were now more alert as a result of the disasters that had already occurred. They were beginning to be able to interpret natural warning signs of flood, abrasion, etc. and to use them as a basis for taking steps to save themselves if the predicted disaster was considered to be really dangerous. However, all the respondents also said that they needed guidance and knowledge about what must be done when facing a disaster and how to handle post-disaster conditions.

With the frequent disasters striking their village, the way of life of the respondents andthe community in general had gradually changed. For example, in the past, fishers would still take to sea in their boats if the weather looked bad, but now they rarely do this but prefer to stay at home for reasons of safety. Abrasion has made the people aware of the importance of mangroves to life, and they have begun to prohibit the felling of mangrove trees. The frequent floods due to heavy rain have made the people more appreciative of the environment; in particular, they now have a regulation banning the felling of trees, although some still disobey the ban. However, when people living in disaster-prone areas, such as the beach, are offered the chance to move, many of them refuse. As can be seen in Figure 76, 43% of the respondents stated their disagreement to being relocatedand having to migrate to a safer area. They would prefer to stay in their present home, with the excuse that they were used to it and could not live far from the sea and the beach.

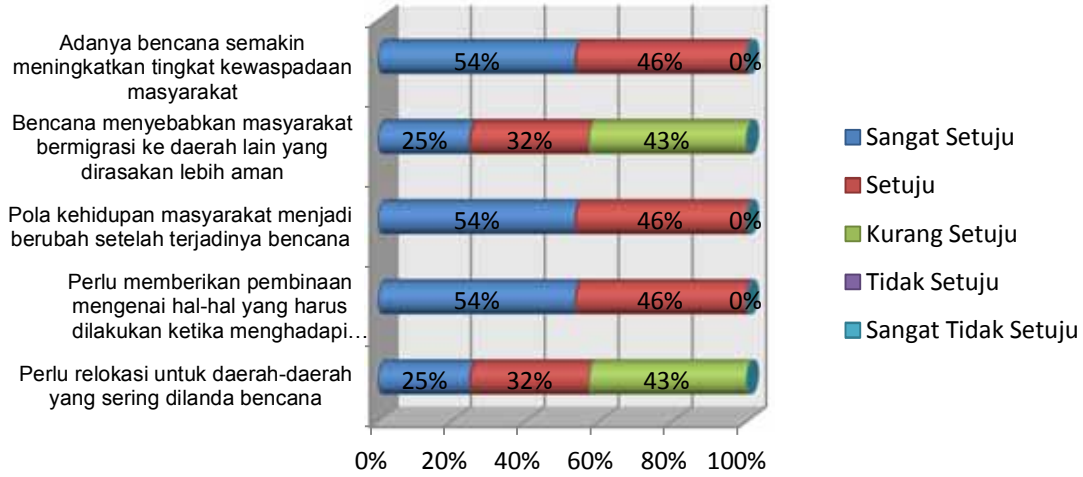
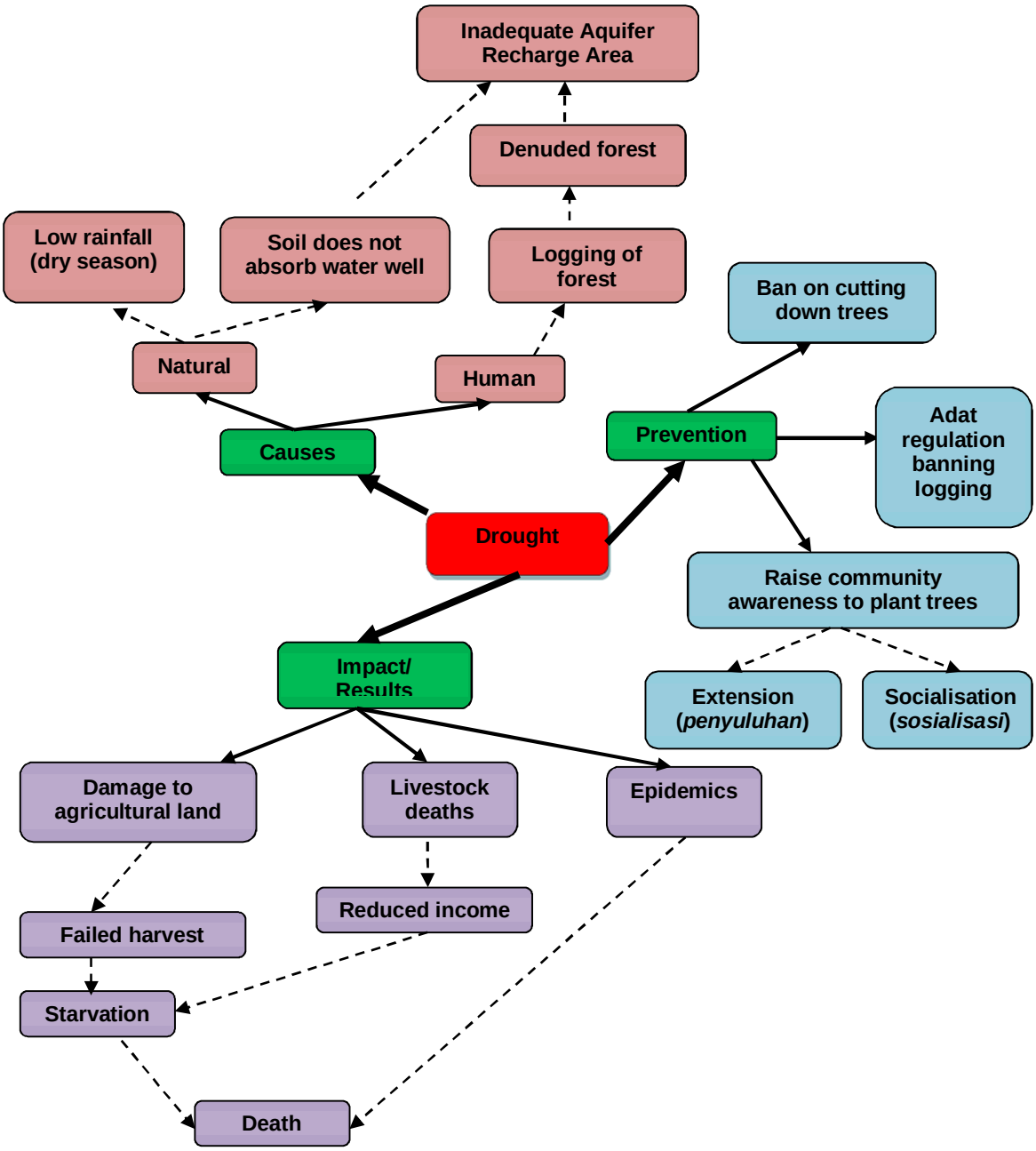


Figure 76. *Respondents' Perception of Disaster Impact in Desa Darat Pantai.*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

3.4.4.1.3 Sample Issue Tree for Desa Darat Pantai



3.4.4.2 Vulnerabilityvin Desa Darat Pantai

Vulnerability in Desa Darat Pantai was analysed on the basis of five categories: physical, socio-cultural, attitudinal and motivational, institutional/organisational, and economic. Vulnerability information obtained from observation in the field was combined with information on capacity, both pre-existing and recommended. Details on the vulnerabilities and capacities possessed by the Desa Darat Pantai community can be seen in Table 56.

Table 53. Vulnerabilities and Capacities of the Desa Darat Pantai Community

Variable	Vulnerability	Capacity
Health, Physical condition,and Environment	1. Infertile/arid soil 2. Inferior road construction (still mostly dirt tracks) 3. Logging of hill forest 4. Long dry season 5. Difficulty finding water sources 6. Epidemics of malaria, acute respiratory tract infectionsand skin diseases 7. Environmental sanitation and sanitary facilities (MCK) still few 8. People defecatejust anywhere(Sea, Forest, etc) 9. There are still many homes on the beach 10. No source of lightin/ Electric Lighting	1. Soilpreparation equipment, extension services from relevant institutions, dryfield agriculture 2. Some roads have been compacted/tarmacked, but this is limited to about 20% of total road length 3. Create *Adat* and village regulations banning the felling of trees in hill forest 4. Community construct water storage tanks and some have dug wells in the hills 5. Natural resources 6. Extension services on hygiene, people are beginning to pay more attention to hygiene &do not defecatejust anywhere. 7. Villagers have begun to make their own private sanitary facilities (MCK), 2 public ones have been built. 8. There is a public toilet near the village office 9. – 10. Mains electricity has been installed in Desa Namun as far as Dusun Wairwua, 2 other dusuns use oil lamps and generator
Socio-cultural	1. School drop-outs 2. Low quality human resources 3. *Adat* customs , traditions and ceremonies are beginning to lose their importance	1. - 2. Improve expertise (soft skill), improve education 3. Bring in elders/ *adat* leaders from Desa Darat Gunung

Variable	Vulnerability	Capacity
Attitudes and Motivation	1. Disaster response 2. Indifference 3. Laziness 4. Insufficient awareness ofneed for environmental conservation 5. Non-use of sanitation(*MCK*) facilities	1. Stilldone traditionally from person to person and using mobile phones 2. Religious guidance 3. Guidance from traditional *adat*, community and religious leaders 4. Guidance from traditional *adat*, community and religious, extension services and 'socialisation'(*sosialisasi*) 5. 'Socialisation'and extension services on hygiene
Institutional/ Organisational	1. Improvement needed to inter-institutional relationships 2. Improvement needed to the activities of various institutions 3. Institutions not yet fully accepted 4. Egocentricity still prevalent	1. Coordination and negotiation/discussion 2. 'Socialisation' 3. 'Socialisation' 4. Extension services
Economic	1. Lack of employment opportunities 2. Inhabitants' incomes still low 3. Insufficient innovation and technology for agricultural, fishery and livestock products 4. Many inhabitants still live in poverty 5. High unemployment	1. Extension services and provision of business capital 2. Livelihood diversification 3. Extension services, 'socialisation', and dissemination of information and technology 4. Cash hand-outs (*BLT)* and Family of Hope program*(PKH)*, rice for the poor (*beras raskin*), State health insurance scheme (*jamkesmas*) 5. 9 years free compulsory education

Source: Results from observation in the field (2012).

Of the five categories of vulnerability detailed in the table above, it can be ascertained that physical, environmental and health vulnerabilities rank highest, as this category has the longest list of vulnerabilities. Information on other vulnerabilities according to disaster type can be seen in Figure 77. This information includes the risk value for each disaster. The risk of a disaster will be low if the community's capacity is high, even though the vulnerability and threat are high. High capacity will reduce the loss of life and goods.

From the analysis it is known that the greatest risk to Desa Darat Pantai is earthquake and tsunami. Even though there have been no more earthquakes or tsunamis since 1992, the probability of another one occurring is very high because it cannot be predicted. Moreover, this community's low capacity for coping with disaster puts themat greater risk. The second highest risk is from abrasion. The risk is high due to the frequency of the abrasion, together with the community's lack of

awareness about not building along the coast. In addition, the people on the coast seem indifferent to this risk, considering abrasion as something normal. As a result, their preparedness to deal with disasters is low.The third highest risk is from flood. Floods often occur during the rainy season. Often they are caused by the cutting down of trees in the hills, so the floods originate up in the hills. Sometimes the floodwaters bring mud and the trunks of fallen trees. However, the people do not yet feel particularly threatened by this as the damage so far has been restricted to land and crops. Consequently, they have been more relaxed in their response to it, so have done almost nothing to prepare for such disaster. Nevertheless, a start has been made in that there is now a ban on felling trees in upstream areas.

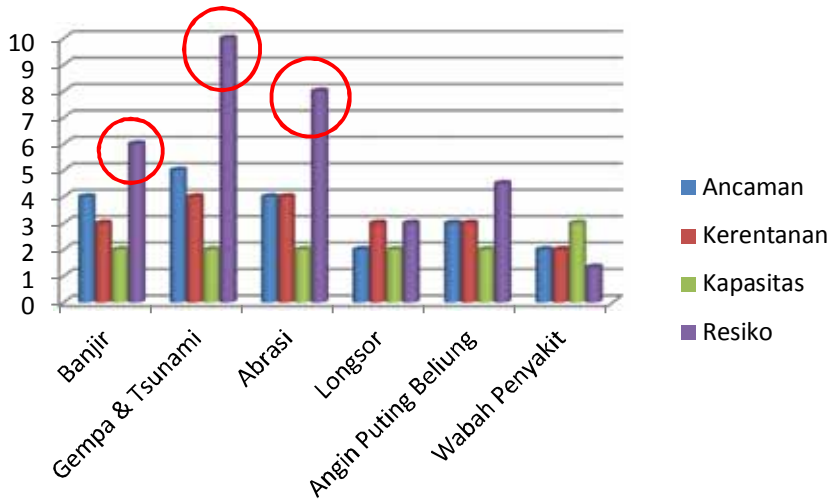


Figure 77. *Information on Threats, Vulnerabilities, Capacities and Risks of Disaster, according to Disaster Type, in Desa Darat Pantai.*
Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Flood (banjir), Earthquake and Tsunami (Gempa dan Tsunami), Abrasion (Abrasi), Landslide (Longsor), Tornado (Angin Puting Beliung), Epidemic 9Wabah Penyakit)

3.4.4.3 Community Capacity in Desa Darat Pantai

3.4.4.3.1 Early Warning System

An early warning system is part of community capacity. So far, the people of Desa Darat Pantai have used only traditional warning methods. They usually predict disaster by reading the signs in nature, though their predictions are not always correct.They also spread the alarm simply by telling each other orally and using simple warning instruments.Now with more advanced technology, some use mobile phones for this purpose.Another electronic medium for EWS is through television if a large-scale high-intensity disaster is expected.

A perspective on the community's EWS knowledge was obtained from information provided by a number of respondents. This included their knowledge of EWS, their response to it, and their

preparations for facing disaster. The first, information on their knowledge of EWS in Desa Darat Pantai in the event of disaster, can be seen in Figure 78. Analysis indicates that most of them did not know when a disaster was about to strike, particularly the frequent seasonal disasters. Only a very few knew, from weather forecastsor from reading the signs in nature. In Figure 78 it can be seen that the "*kentongan*" alarm, announcements in the mosque, and mobile phones are the media/instruments used to inform the public that a disaster is imminent.

Figure 78. *Desa Darat Pantai Respondents' Knowledge of Disaster EWS.*
Captions: Knowledge of Disaster Warnings (Pengetahuan Mengenai Peringatan Adanya Bencana), Didn't Know (Tidak Tahu), Weather Forecast (Perkiraan Cuaca), Kentongan Alarm (Kentongan), Announcement in Mosque/ Chruch (Pengumuman di Masjid/ Gereja), Mass Media (Media Massa), Mobile Phone (Handphone, HP)

The second point analysed was their response to EWS. Almost all the respondents stated that they would respond well, only a few saying they would just respond normally if given warning of disaster. They would prepare supplies, such as food, clothing, drinking water, for use if the disaster occurred. They would also take steps to save their family and material possessions. So far, however, because the frequent seasonal disasters only occur on farmland, most of the respondents just let it happen without taking steps to save their crops. If their fields are destroyed by flood, they just let them be, then farm them again when the next rainy season arrives. However, if any of their crop survives the flood, they will do their very best to save what is left.

To save themselves and their family from disaster, most respondents chose to evacuate to a safe place outside their home and to the homes of people they knew, provided these were in places considered to be safe (Figure 79). Others chose to evacuate to emergency shelters if local government had actually provided any. However, a few chose to stay in their own home, feeling that this was the safest place to be. This attitude needs to be changed because we never know how strong the disaster will be.

Figure 79. *Efforts that Respondents would Make to Save Self and Family*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Stay Inside Home (Tetap di dalam Rumah), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Evacuate to Family Neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to Shelter (Mengungsi ke Tempat Penampungan)

Efforts to improve the community's capacity require local government cooperation. Government functions as an instigator and facilitator for a range of activities. According to the respondents interviewed, government efforts towards disaster risk reduction were through 'socialisation' (*sosialisasi*) and extension services. These were consolidated through programs initiated by local and international NGOs, such as coastal rehabilitation through mangrove reforestation, road construction, and the construction of water supply facilities, etc. In the event of a disaster occurring, said respondents, local government had also begun to respond by providing evacuation equipment and emergency shelters. However, they had done little in the way ofdisaster prevention, other than activities based on aid by other agencies such as NGOs. Details of actions taken by Desa Darat Pantai government in response to disaster are presented in Figure 80.

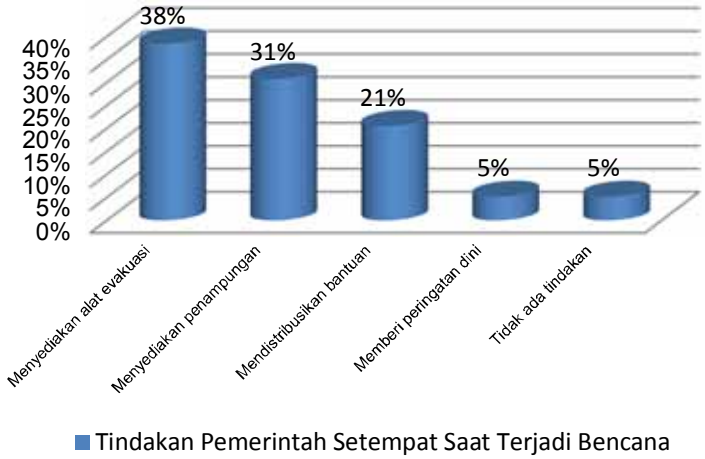


Figure 80*. Information on Action Taken by Village Government in Response to Disaster*
Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana),), Provided Evacuation Equipment (Menyediakan Alat Evakuasi), Provided Shelter (Menyediakan Tempat Penampungan, Distributed Aid (Mendistribusikan Bantuan), Gave Early Warning (Memberikan Peringatan), No Action Taken (Tidak Ada Tindakan)

3.4.4.3.2 Access to and Control of Community Assets

Access to and control of assets is part of community capacity. Facilities that are always available and easy to access are important capital in community capacity building. These assets or facilities, both private and public, can be used when needed to escape from disaster and following a disaster. Besides, it is important to know who has control of each asset, as this relates to obtaining permission to use it. Information on access to and control of community assets can be seen in Table 57. This information was obtained from observation and interviews with respondents in the field. Analysis indicates that most of the assets owned privately by the respondents have been accessible in the event of disaster, exceptduring earthquake or tsunami. In this case, only savings could be accessed, provided that they had been saved in another place, such as a bank or cooperative. Agricultural land hit by disasters such as flood, earthquake and tsunami, Cyclone Lena, landslide, typhoon or drought, were obviously not accessible. Similarly, during earthquake and tsunami public assets would probably also be inaccessible due to the force of the disaster, but could be accessedto escape other disasters.

Table 54. Information on Access to and Control of Assets that can be Used in the Event of Disaster in Desa Darat Pantai

Private Source of Ownership	Accessibility at Time of Disaster								Ownership Control
	Flood	Earthquake and Tsunami	Abrasion	Cyclone Lena	Landslide	Typhoon	Drought	Epidemic	
Agricultural Land			Yes					Yes	Father
Homes	Yes			Yes	Yes	Yes	Yes	Yes	Father, Mother
Furniture	Yes		Yes		Yes		Yes	Yes	Mother
Valuables	Yes		Yes		Yes		Yes	Yes	Father, Mother
Vehicles	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father
Clothes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Food			Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Fuel	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Valuable Documents	Yes		Yes		Yes		Yes	Yes	Father, Mother
Public Source of Ownership	**Accessibility at Time of Disaster**								**Ownership Control**
	Flood	Earthquake and Tsunami	Abrasion	Cyclone Lena	Landslide	Typhoon	Drought	Epidemic	
Places of worship	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Roads	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Market	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Football field	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Village Hall/Office	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Village Government
Boats	Yes				Yes	Yes	Yes	Yes	Communitywith Prior Permission
Water sources	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Public bathing, washing, toilet facilities	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
School buildings	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Communitywith Prior Permission

Source: Findings from questionnaire and direct observation in the field (2012)

3.5 Desa Talibura – Kabupaten Sikka

3.5.1 Profile of Desa Talibura – Kecamatan Talibura

3.5.1.1 General Description of Desa Talibura

In 1962, Desa Talibura was called Desa Gaya Baru. This then changed to Desa Lumbung Desa in 1974. Then in 1980 it was renamed again as Desa Talibura, and this name has remained unchanged until the present. In 1998, Desa Talibura was split into two villages: Desa Talibura and Desa Nangahale. Subsequently in 1998, Desa Talibura grew to become Desa Talibura and Desa Ilin Medo. As a result of these expansions, the area of Desa Talibura itself has shrunk from 29 km^2 (2900 ha) to 24 km^2 (2400 ha) and then to 18.74 km^2 (1874 ha) (*Kecamatan Talibura dalam Angka Tahun 2011*). However, according to spatial analysis, the area of Desa Talibura is slightly different at 17.4526 km^2 (1745.26 ha). Today, Desa Taliburais divided into 4 dusuns: Dusun Kampung Baru, Talibura, Habihodot, and Tanah Merah. The administrative map of Desa Talibura is presented in Figure 81. The boundaries of Desa Talibura are as follow:

- North : Flores Sea
- South : Desa Ilin Medo
- West : Desa Nangahale
- East : Desa Darat Gunung and Desa Darat Pantai

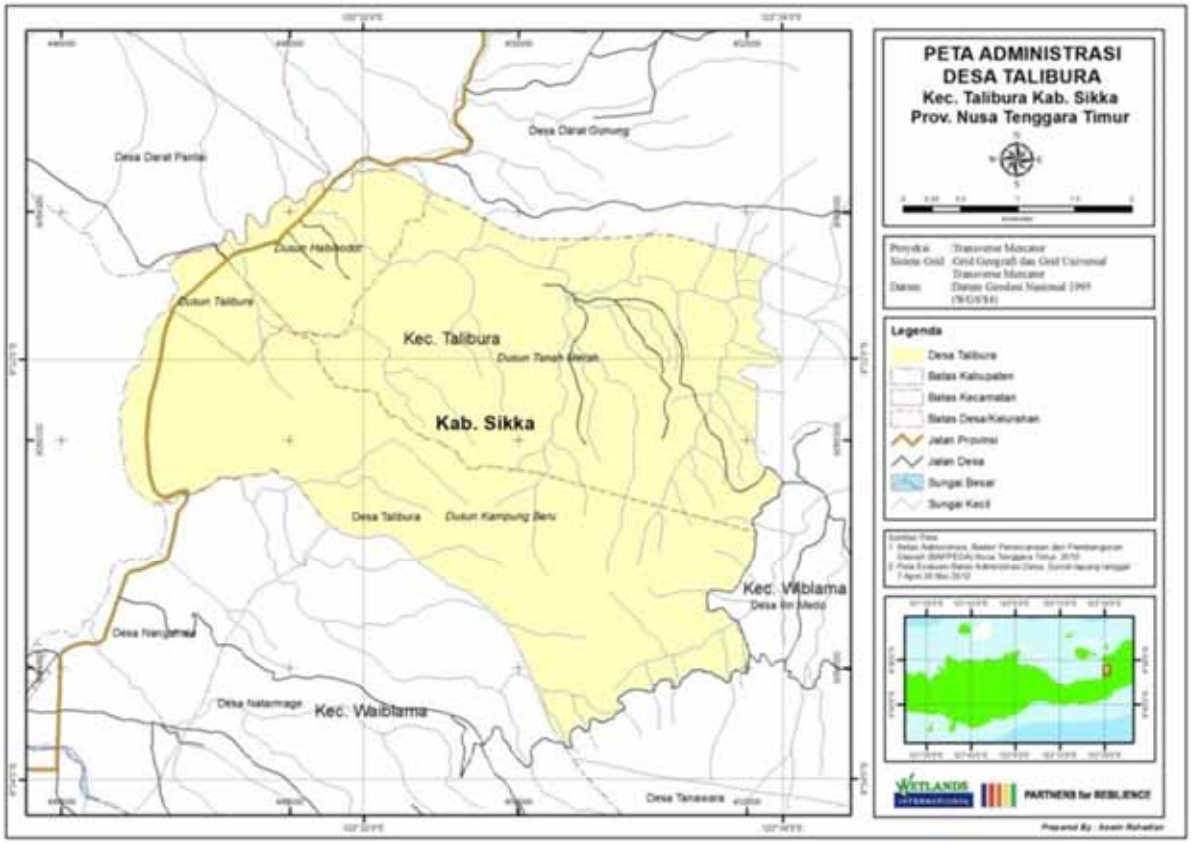


Figure 81. *Administrative Map of Desa Talibura.*

Access to and from Desa Talibura is quite good. Dusun Kampung Baru and Dusun Talibura stretch along the coast and are passed by the main road which links Kabupaten Sikka to Kabupaten Flores Timur. Public transport through the village is quite good, particularly vehicles like minibuses which carry a large number of passengers. The distance from the village to the district capital (Kota Maumere) is around 40.8 km. Facilities and infrastructure in Desa Talibura are fairly comprehensive. Health facilities comprise a public health centre (*Puskesmas Kecamatan*) in Dusun Kampung Baru and 4 integrated health services posts (*posyandu*) which are in each dusun. People living in this subdistrict (*Kecamatan*) go to this *Puskesmas* for treatment as it has a range of medical staff including doctor, midwife and nurses. The area also has a good range of educational facilities, comprising pre-school (TK), primary (SD), junior high (SMP) and senior high (SMA) schools. As regards economic activity, the village has a market that opens every Thursday and Saturday.

To obtain clean water, the people of Desa Talibura normally use springs or wells. There is currently a *Pamsimas* program to pipe water from the spring to each storage tank. This program is implemented by the local village government. The people of Dusun Kampung Baru, Habihodot, and Tanah Merah use spring water for their needs. This water can only be enjoyed by the communities of these three dusuns because of limitations in infrastructure and distance. The water does not reach Dusun Talibura because it is further away. Most of the villagers can enjoy electric lighting. Only a few are as yet unable to use mains electricity from PLN. As the capital of the subdistrict, Desa Talibura possesses several other facilities, including banks, such as BRI and Bank NTT, as well as post office, church, PNPM office, etc.

From the registration of inhabitants carried out in March 2012, the population of Desa Talibura was known to be 2,505 individuals, comprising 1,297 males and 1,512 females. The number of households was 642. Most of the inhabitants had completed primary school, but very few had continued to diploma or degree level. Details of the villagers' educational level can be seen in Figure 82.

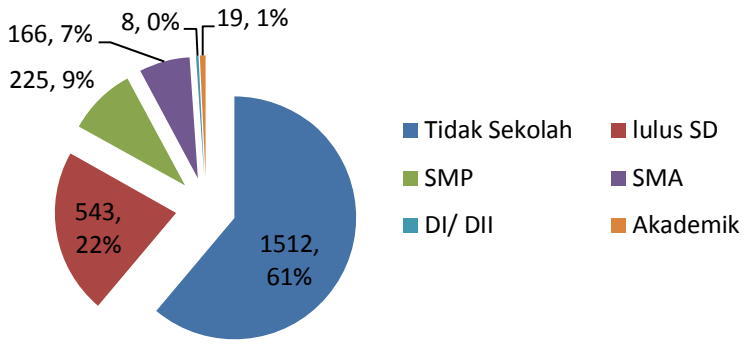


Figure 82. *Educational Level of Desa Talibura Inhabitants*
Captions: Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Diploma I/II (DI/DII), Academic Study (Akademik)

Most of the villagers are farmers. They farm dry land, with just a few farming wetland (paddyfields). The commodities most cultivated are rice and maize. Rice is grown on both dry and wet lands, but both depend on rainfall for their water supply. For this reason, rice farming in Talibura, in fact in almost all the villages mentored by WIIP, is done only in the rainy season. As well as farm produce, the villagers also get additional income from estate crops, including coconut, cacao and cashew. They usually sell copra which they process from the coconut, and the nuts which they remove from the cashew fruit. As the village is near the sea, many of the villagers also earn a living by fishing at sea. For some this is their primary source of income, while for others it is supplementary. They usually fish at sea in the evening or very early in morning (when the sky is dark). They may sell the fish they catch, or eat them.

3.5.1.2 Institutions in Desa Talibura

Institutions in Desa Talibura make an important contribution to the management of environment and human resources in this village. Information on institutions or stakeholders in Desa Talibura is presented in Table 58. From information obtained from the field plus information in Table 58, it is known that there are quite a few local and international NGOs working in Desa Talibura. They are active in several fields, particularly WIIP and the Indonesian Red Cross (PMI), who work directly on disaster risk reduction. These twocontinuously work together with local government, with the latter playing a highly important role in village ecosystem management. Government agencies, in particular village government and theVillage Parliament (BPD), form the main gateway by which programs enter from outside, especially for activities related to the environment and community.

Other institutions, like economic, educational, religious and extension agencies, contribute to the enhancement of community capacity as part of disaster risk reduction in the village. Strengthening of the community's economic, education and spiritual sectors is important capital for improving the quality of the village's human resources. All these stakeholders work together, both through direct interaction and indirectly, with the common goal of creating a village that can stand firm against the potential disasters that often strike it. The EWS in the village is the result of assistance from PMI, who managed the program and activities, while the village community and government were expected to participate actively in carrying out the disaster response program. Apart from the PMI EWS, no other traditional or community-produced early warning system has been formed.

Table 55. Institutions in Desa Talibura

Type of Institution	Name of Institution	Activities	Ranking
NGO/LSM	Bangwita	• Loans • Help with public health facilities	2
	Yasbida	• Public health	1
	Sanres	• Public health	1
	Wetlands International Indonesia Programme (WIIP)	• Rehabilitation of coastal environment • Mangrove reforestation • Enhancement of community capacity through economic activities • Improvement of the village's human resources	4
	Indonesian Red Cross (PMI)	• Disaster response training	2
Bank/ Financial Institutions	BRI	• Loans	1
	Bank NTT	• Savings and loans	1
	Kopdit Obor Mas	• Loans	1
	Kopdit Pintu Air	• Loans • Insurance services	2
Religious Institutions	KUA	• Weddings	1
	Parish Office	• Religion	2

Type of Institution	Name of Institution	Activities	Ranking
Extension Agencies	PertanHut / Agriculture & Forestry	• Provision of seeds and fertilizers	2
	Peternakan / Animal Husbandry	• Provision of young livestock and vaccination	2
Government Agencies	DISHUT	• Planting of 5000 mangrove seedlings	2
	DISTAN	• Extension services • Provision of seeds and fertilizers	1
	Village Government	•	4
	BPD Desa Talibura / Village Parliament	•	3
Climatology Station	-	• -	-
Education	PAUD / Early learning	• Education, food	2
	SD/ Primary school	• Education	1
	SMP/ Junior high	• Education	1
	SMA/ Senior high	• Education	1
Business companies	-	• -	-
EWS	-	• -	-
Other	PNPM	• Food, Health, Loans	3
	Pamsimas	• Sanitation, drinking	1

3.5.2 Community Profile for Desa Talibura

Information for the community profile of Desa Talibura came from interviews with respondents, and information and data from the village monograph. The respondents comprised men and women of different ages ranging from old to young.As can be seen in Figure 83, there were more male respondents than female. All were Catholic by religion, but came from different ethnic groups: Key, Flores, and Tanah Ai. Their average age was 47, the youngest being 24 years old and the oldest 68. Most of them were married (Figure 84) and had an average of 4 dependents.

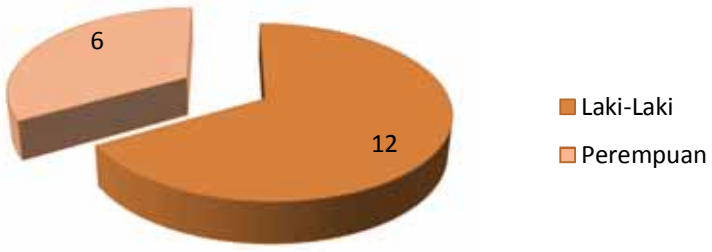


Figure 83. Gender of Respondents in Desa Talibura
Captions: Male (Laki-Laki), Female (Perempuan)

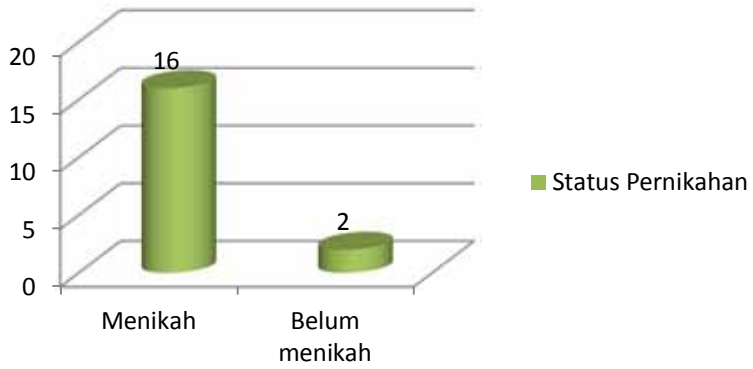


Figure 84. *Marital Status of Respondents in Desa Talibura*
Captions: Marital Status (Status Pernikahan), Married (Menikah), Unmarried (Belum Menikah)

Most of the respondents had completed senior highschool. This became obvious during discussions, as they interacted very actively and it was easy to get information from them. Nevertheless, a significant proportion had only completed primary or junior highschool but they were just as enthusiastic as those who had completed senior highschool. This information can be seen in Figure 85.

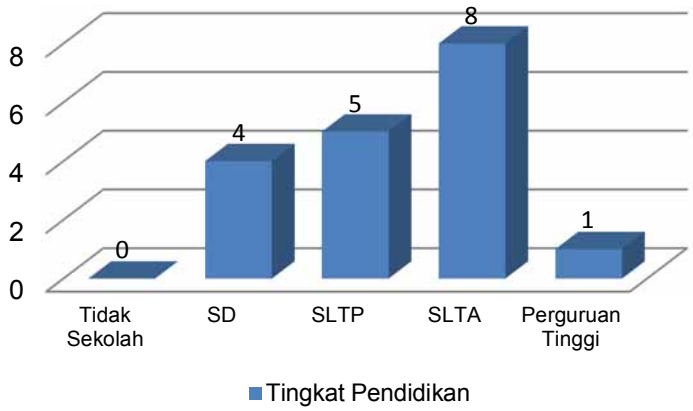


Figure 85. *Educational Level of Respondents in Desa Talibura*
Captions: Educational Level (Tingkat Pendidikan), Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi)

Most of the respondents worked as farmers, cultivating wet paddyfields, dry fields and plantation (Figure 86). Some farmed paddyfields during the rainy season and then depended on plantation crops during the dry season. Others farmed dry fields but not paddyfields. Although their main crop was the same, rice, it was treated differently. Farmers who planted rice in paddyfields depended heavily upon the availability of water, so these fields tended to be close to the river and have begun to use a system of irrigation from the river. Nevertheless, Desa Talibura's water supply system still depends on rain, so in effect the paddyfields can only be farmed in the rainy season. Similarly, those who farm dry fields also depend on the rain but these fields are not always inundated. The strain of rice planted in wet and dry fields also differs. Dry field farmers begin to till the land when the rainy season arrives and clear it of weeds from time to time. At harvest-time, they return to harvest the crop. Other commodities cultivated in dry fields are maize and vegetables.

Respondents' other occupations were: village official, civil servant, housewife, entrepreneur and the armed forces.The village officials interviewed were paid an honorarium (i.e. did not have civil servant status), whereas the respondent with civil servant status was the village secretary. The entrepreneur was a trader. Of the 18 respondents, only 5 did not have a side job (Figure 87). The thirteen who did have a side job mostly opened a small kiosk or were involved in trade.

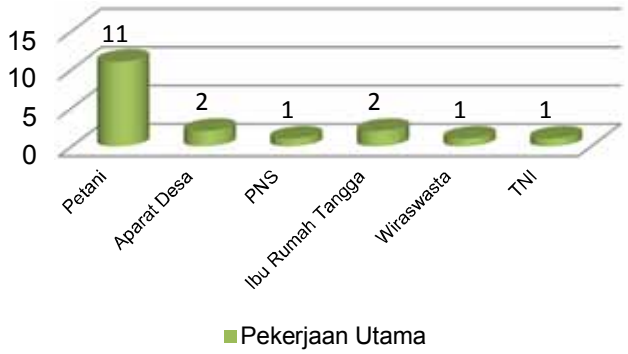


Figure 86. *Main Occupation of Respondents in Desa Talibura*
Captions: Main Occupation (Pekerjaan Utama), Farmer (Petani), Village Official (Aparat Desa), Civil Servant (PNS), Housewife (Ibu Rumah Tangga), Entrepreneur (Wiraswasta), Armed Forces (TNI)

.

Figure 87. *Secondary Sources of Income of Respondents in Desa Talibura*
Captions: Side Jobs (Pekerjaan Sampingan), Pension (Pensiunan), No Side Job (Tidak Bekerja Sampingan), Farmer (Petani), Village Official/ Honorarium (Aparat Desa/ Honorer), Entrepeneur/ Trader (Wiraswasta/ Pedagang), Skilled Labour (Tukang), Weaver (Penenun), Livestock Farmer (Peternak)

Having diverse sources of income, the respondents also had different incomes and expenses. Some respondents also had secondary jobs in order to increase the family income sufficiently to meet their monthly expenses. Information on respondents' incomes and expenditures can be seen in Figure 88. This shows that while many (a third) of the respondents had a monthly income and expenditures in the Rp.1.5--2 million range, almost as many (just under a third) had incomes and expenditures of less than Rp.500,000 a month. These figures suggest that there was a balance between the number ofrespondents who were aboveand below the poverty line.Analysis found no indication of consumerism, as expenditures were roughly equal to incomes. Details of the

respondents' financial circulation according to occupation can be seen in Table 59. Interesting to note is the wide gap between the minimum and maximum incomes of farmers, which is also reflected in their expenditures. Further examination reveals that the high income farmers are those who own their land, so they get more profit from the harvest than farm labourers do. Farm labourers tend to earn less and therefore spend less than owner-farmers.

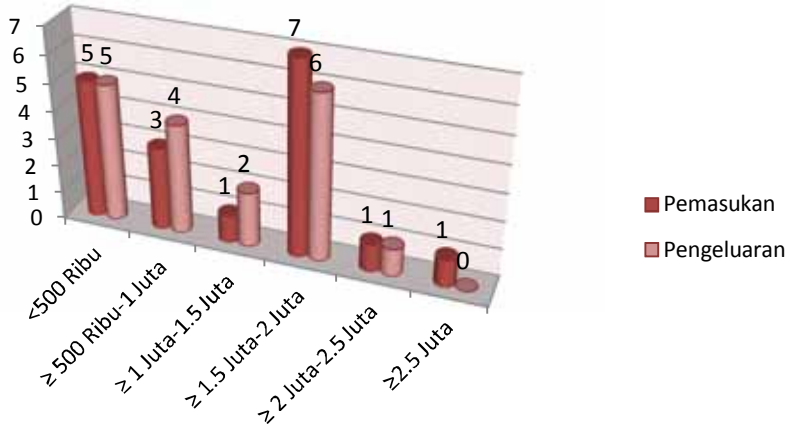


Figure 88. *Monthly Income and Expenditure of Respondentsin Desa Talibura*
Captions: Income (Pemasukan), Expenditure (Pengeluaran), Thousand Rupiah (Ribu), Million Rupiah (Juta)

Table 56. Details of Financial Circulation of Respondents in Desa Talibura

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Occupation			
Farmer	Rp.200,000-Rp.1,500,000	Rp. 200,000-Rp.750,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed
Housewife	Rp.1,500,000	Rp.1,500,000	Clothing, food, health, education, entertainment
Pensioner	Rp. 1,900,000-Rp. 2,650,000	Rp. 1,000,000-Rp. 1,500,000	Clothing, food, health, education, entertainment, livestock farming expenses
Village Official	Rp 250,000-Rp. 650,000	Rp. 200,000-Rp. 300,000	Clothing, food, health, education, entertainment
Entrepreneur	Rp 1,500,000	Rp. 1,500,000	Clothing, food, health, education, entertainment, business capital
Armed Forces	Rp. 2,500,000	Rp. 1,000,000	Clothing, food, health, education, entertainment
Secondary Occupation			
Skilled labour	Variable		Supplementary income. Usually done by farmers
Textile weaver	Rp.250,000	-	Supplementary income

Source: Questionnaire and interviews with respondents

The majority of respondents had homes constructed from semi-permanent materials: timber or bamboo, or half timber half brick, with a galvanised roof. Fewer respondents lived in non-permanent constructions than in permanent or semi-permanent. Non-permanent constructions were made from timber or bamboo, with thatched leaf roof and earth floor. Permanent houses had solid wall, galvanised roof and concrete or ceramic tiled floors. Information on the types of homes of respondents is presented in Figure 89. Almost all respondents owned their own home (freehold), whether permanent, semi- or non-permanent. Only one, the respondent in the Armed Forces, lived in a house belonging to the military. The number of rooms in each respondent's house also varied. Information on this can be seen in Figure 90. All had their own bathroom and toilet, though some were still rather make shift. They had begun to be aware of the importance of health, so no longer defecated just anywhere. All respondents had mains PLN electricity. They all used firewood for fuel, with a few also using kerosene as a substitute. Their water supply was generally from wells. Those respondents from Dusun Kampong Baru and Talibura had access to *pamsimas* piped water from springs in Dusun Tanah Merah. Details on the number of respondents who used well water and *pamsimas* piped water are presented in Figure 91.

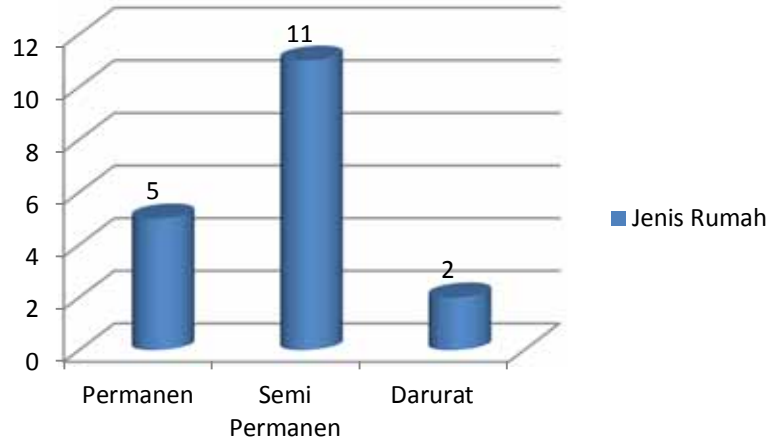


Figure 89. *Types of Housing of Respondents in Desa Talibura.*
Captions: Type of House (Jenis Rumah), Permanent Building (Permanen), Semi-Permanent Building (Semi Permanen), Non-Permanent Building (Darurat)

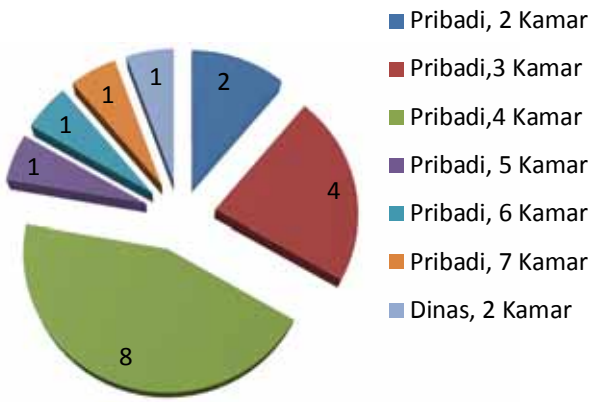


Figure 90. *Ownership and Size (number of rooms) of Homes of Respondents in Desa Talibura*
Captions: Own House (Pribadi), Bedrooms (Kamar), Military Owned (Dinas)

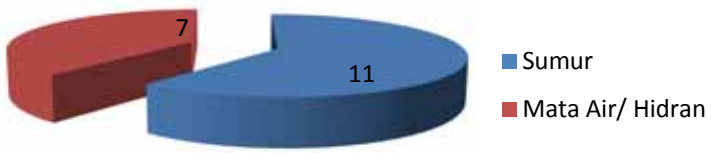


Figure 91. *Water Sources used by Respondents in Desa Talibura*
Captions: Wells (Sumur), Spring/ Hydrant (Mata Air/ Hidran)

Besides their house, other assets owned by respondents included land, agricultural tools, vehicles, valuables, and the ability to send their children to school (Table 60). According to information from respondent interviews and direct identification, on average respondents owned 1-4 ha of land. They used this for agriculture and livestock farming, both individually and in groups. The average rice harvest was 500 kg per harvest. Their agricultural tools were still very simple, such as mattock, hoe and machete. No-one in Desa Talibura yet had a tractor, so the soil was worked by buffalo. Unlike the custom in Java, however, buffaloes in Flores are simply let into the paddyfield and left to tramplethe ground; in Java, the buffaloes till the land with the farmer, using a plough. Livestock farming in Desa Talibura uses a shifting system of tethered grazing, so requires a large area of land. The animals are tethered to a tree and moved from time to time, without being put into a pen or shed. Of the 18 respondents, only 2 possessed a two-wheeled vehicle. Four were able to educate their children as far as tertiary level, and four just as far as senior highschool. Analysis indicated that most of the respondents fell into the 'average' category. These criteria were obtained from interviews and direct observation in the field.

Table 57. Prosperity Parameters for Respondents in DesaTalibura, Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock per household	30-50 animals	10-20 animals	Fewer than 10 animals
Agricultural yield/harvest (Rice)	More than 50 sacks	20-50 sacks	1-10 sacks
Highest educational level of children	University	Junior-Senior Highschool (SLTP-SLTA)	Primary – Junior Highschool (SD-SLTP) or did not attend school
Type of house	Permanent building (Solid walls, ceramic tiled floor, zinc roof)	Semi Permanent (Timber walls, zinc roof, concrete or earth floor)	Non-permanent (Bamboo walls, thatched leaf roof (Rumbia), earth floor)
Area of land owned	>10 ha	1-9 ha	< 1 ha, or none

Ownership Status	Rich	Average	Poor
Fishing equipment	Motor boat, Fish trap (*Kelong*), Net	Sampan and Net	Rod and line, Net
Income/month	More than Rp.4,000,000	Rp.1,000,000-1,500,000	< Rp. 1,000,000
Vehicles owned	Car, motor cycle, motor boat,	Sampan and motor-cycle	None
Communication devices	Television, handphone, satellite dish, radio	Television, handphone, radio	Handphone, TV

Source: Compiled from various sources (questionnaire and interviews with respondents), 2012

Besides information on respondents' assets, their level of prosperity was also measured in terms of their debts (Table 61). Of the 18 respondents, 11 had no debts because they did not feel the need to borrow money, because they did not want to be burdened by monthly repayment instalments, and also because of the collateral required to obtain a loan. Savings-loans banking facilities in Desa Talibura are more advanced than those in the other villages of Kecamatan Talibura, such as Desa Nangahale and Desa Darat Pantai. This is because Desa Talibura is the district capital and is on the main road linking Maumere and Kabupaten Flores Timur (Larantuka). These banking facilities include Bank BRI, Bank NTT, Kopdit Obormas, PNPM, and the post office.

Table 58. Information on Debts Incurred by Respondents in Desa Talibura

Source of Loan	Reasons for Borrowing from this Source				Annual Interest	Repayment System	Number of Respondents
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service			
Kopdit Pintu Air	10 million	Maumere (30 km)	• Specific conditions set by provider	Good	2 %	• Depends on size of loan	1
Kelompok Tani Bina Usaha	2.5 million	Talibura	• Must become a member of the farmers group	Good	1.5%	• Depends on size of loan • Monthly repayments for a fixed period of time	3
Obormas	50 million	Maumere (30 km)	• Specific conditions set by provider	Good	1.5%	• Depends on size of loan	3

Source: Compiled from various sources (questionnaire and interviews with respondents), 2012

3.5.3 Ecosystem Profile for Desa Talibura

3.5.3.1 Ecosystems and Natural Resources in Desa Talibura

A field survey and spatial analysis showed that Desa Talibura has a steep topography. Only 16.2% has a gradient of 0-8%. This type of topography is highly vulnerable to disaster, particularly landslide. Details of the area and topography of Desa Talibura are presented in Table 62 and Figure 92.

Table 62. Land Area of Desa Talibura Based on Topography

Gradient	Area (ha)	%
0-8%	282.53	16.2
8-15%	271.54	15.6
15-25%	386.02	22.1
25-40%	436.9	25.0
>40%	368.27	21.1
Total Area	1745.26	100.0

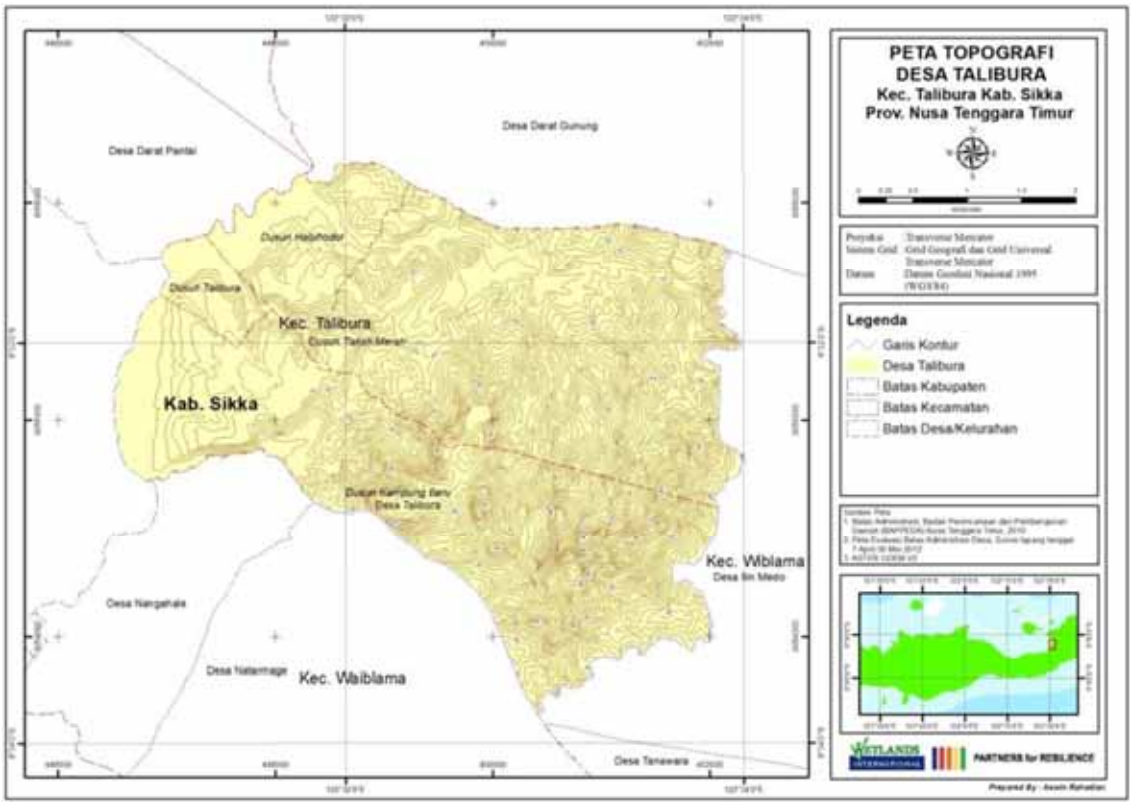


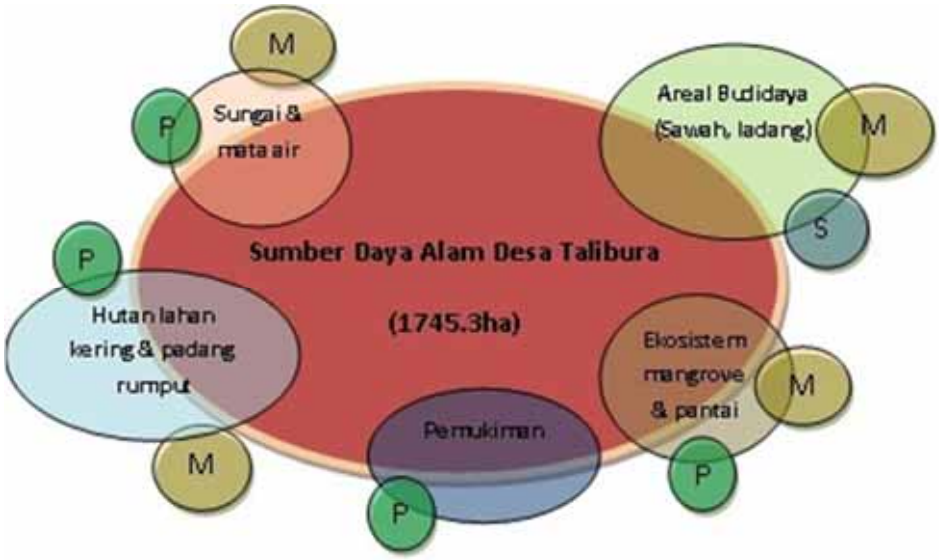
***Figure 92**. Topographical Map of Desa Talibura.*

The assessment of ecosystems and land cover focussed on the whole of the Desa Talibura area. A constraint experienced during this assessment was the inaccuracy of the administrative boundaries and definitive maps produced by village and central government. Existing maps were simply sketched plans with no scale or coordinates.Information on the types and area of ecosystems mapped in the field in Desa Talibura is presented in Table 63.

Table 59. Ecosystems in Desa Talibura

Type of Ecosystem	Area (Ha)	%
Dry land forest	1,155.1	66.2
Cultivation	509.9	29.2
Human settlement	47.6	2.7
Mangrove	27.3	1.6
Coastal	2.3	0.1
Marine	3.2	0.2
Total Area	1,745.3	100.0

Much of the land in Desa Talibura is used for agriculture because most of the inhabitants work as farmers. A large part of the natural resources are utilised directly by the local community. The relationships between the natural resources and their users in Desa Talibura can be seen in Figure 93.



(Key: M = Community, P = Government, S = Private Sector).

Figure 93. *Relationship between Natural Resources and their Users in Desa Talibura*
Captions: Natural Resources in Kelurahan Sawah Luhur (Natural Resources in Desa Talibura (Sumber Daya Alam Desa Talibura), Rivers and Springs (Sungai dan Mata Air), Cultivation (Ricefields/ Farmland), Dryland Forest and Grassland (Hutan Lahan Kering dan Padang Rumput), Human Settlement (Pemukiman), Mangrove and Coastal Ecosystem (Ekosisitem Mangrove dan Pantai)
M = Community, P = Government, S = Private Sector, CA = Nature Reserve

3.5.3.2 Spot Mapping

Mapping of the village was done with the participation of the community. This was done as a way of providing clarification and raising the community's understanding of the condition, potentials and boundaries of the village (desa) and dusuns. The result of this activity is the spot map of Talibura presented in Figure 94. The red symbols indicate sites at risk of disaster. Several types of threat exist in Talibura. These include fire, drought, water shortage, illegal logging, storm, flood, abrasion, and fish bombing. Fire often occurs in dryland forest and grasslands, especially in the dry season, when temperatures are very high and there is no rain. Another threat to dryland forest is illegal logging. Several reasons are given for this, including: to obtain timber, to open up paths for hunting, and to clear land for agriculture. Land clearance for agriculture is done mainly at the beginning of the rainy season, during August-October.Drought and water shortages occur during the dry season. The fact that the dry season lasts longer than the rainy season makes this area especially vulnerable to such arid conditions. Water shortages most frequently affect the inhabitants Dusun Tanah Merah and Dusun Habihodot because these two dusuns are not supplied by springs. In contrast, the people in Dusun Talibura rarely experience a water crisis or drought because their paddy fields and personal water requirements are supplied by mountain springs.

Figure 94. *Spot Map of Desa Talibura.*

3.5.3.3 Transect Mapping and Landscape Change

Transect mapping was done together with the community on the basis of the ecosystem cover in Desa Talibura. The main items of information analysed were land status, current land use, ecosystem users, productivity, constraints faced in ecosystem management, and solutions to them. Details of the transect map of Desa Talibura can be seen in Table 64. Other information obtained in the field concerned the status of the land in the settlement. All the land in the settlement has now been issued with certificates as official proof of ownership. However, land outside the settlement, considered to be *hak ulayat* communal land, is in the forest and therefore no certificates have been issued for it. The document used as proof of rights to this land isthe annual tax invoice (SPPT).

Table 60. Transect Map of Desa Talibura

	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
Land Status	Land is farmed by the villagers but owned by the church (Misi Gereja) ±68 ha Of this, 50% is used by the villagers for paddyfields (20 ha), dry fields, coconut Maximum area farmed by each person is 1 ha	Privately owned by individuals: (area 0.5-1 ha) Group plantation: owned by the church (HGU)	Privately owned land Logging prohibited	State and *Adat* owned	State and *Adat* owned	State owned
Current use	Rain fed rice fields Dry fields: maize, cassava, legumes Most common crops are rice and maize	Land planted with coconut, cacao, banana, and cashew	For drinking and daily needs	Clams for consumption	Extraction of firewood, timber for house construction, traditional ceremonies	Fish, , seafood (Shrimp, Squid, octopus) sea slugs (captured using traditional methods), and seaweed (for sale and consumption)
User group	There are 5 farmer groups, comprising 3 inDusun Tanah Merah, 1 in Dusun Talibura, and 1 in Dusun	Worked by owner if land privately owned Worked by group (42 members) if land owned	Wairlaki spring: inhabitants of Dusun Tanah Merah, Habihodot, Talibura	Coastal community	Traditional *adat* community and general public	Coastal community and seafaring fishers

	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
	Kampong Baru Farmer group activates are: savings&loans, agriculture and cattle farming	by church Area of land worked by group = 0.25-1 ha/ person	Wairlaka spring: inhabitants of Dusun Kampong Baru			
Productivity	4-5 ago until present: • October :start to clear land • November :start planting • December: planting completed 1990s: • August-September : start to clear land • September : start planting • Planting took 3 months • Long dry season (*fuso*): paddyfields yield 33 kg/ha • normal season (good) , paddyfields yield 25-30 sacks/0.5 ha (50 kg/sack) • Previously (3-4 years ago) yield could reach 3-4 ton unhusked rice per 0.5 ha • Maize (unhusked): 10 sacks/0.75 ha • Maize (unhusked) 8 sacks/0.75 ha (50kg/sack) • 1 ha approx 13-14 sacks	Cashew: once a year, Aug-Sept, but small harvest also possible in January Cashew price (January): expensive and poor quality (Rp5000/kg) Cashew price(Aug-Sept): cheap and good quality (Rp 2000-15000/kg) Improves each year Plant spacing for rice is 20-25 cm, cashew 6x6 m, coconut 10x10 m Cashew: about 1-5kg/tree (the older the tree the greater the yield) 1 ha of cashew plantation contains 80-100 trees planted 5-6 metres apart	Water discharge increasing	Seafood: about 4 sacks per picking, annual productivity about 80 kg/year	1 year about 20 m^3	*Rumpon (*fish aggregating device): 1-2 ton/year *pukat* net: less than 120 kg/year lift net: 2.5 ton/year

	Agricultural Land	Mixed Plantation	Springs	Mangrove Forest	Hilly Area	Sea
Constraints	Uncertainty of rainfall High rainfall often causes flooding of farmland (Dusun Habiihodot and Tanah Merah) Attack by green paddy bug(*walang sangit*) pest	No significant constraints so far. The only constraint to occur every year is the effect of rainfall	Illegal logging around springs in the past	Illegal logging Abrasion Use for project (yield has decreased since the 1990s) No village regulations yet exist on mangrove and environment	Illegal logging, forest fire	Fish bombing *"tuba"* root poison
Solutions/ efforts to overcome the constraints	Irrigation Construct water storage tanks Update rainfall forecasts	Extension services	Government ban on logging near springs Reforestation around springs: *ara* trees, pandanus, *ketapang*, bamboo Village regulation	Reforestation Unknown use of mangrove fruit to dye cloth	Reforestation Binding regulations	Extension services Binding regulations

Prior to 1991 the Desa Talibura area still had plenty of forest (mangrove &highland plateau forest). In 1992 there was an earthquake and tsunami which destroyed much of the mangrove forest in Desa Talibura. Further information on changes to Desa Talibura's landscape can be seen in Figure95. A positive trend has been the increase in mangrove forest between 1992 and the present. The community are aware of the importance of mangrove forest as a defence against tsunami and abrasion, but while some of them know about the regulations banning the felling of trees in protection forest and mangrove forest, as well as the regulations on the management of river banks, some ignore the ban. Moreover, mangrove forest management needs the support of regional (*Perda*) and village (*Perdes*) government legislation, to maintain and expand the small area of remaining mangrove forest.

Although the volume is not great, illegal logging still occurs in Desa Talibura. During field observation, logging was detected in forest stands along the river, bush, and other areas in the hills. In general, such logging was limited to fulfilling the villagers' need for building materials and firewood. Species frequently extracted for building were *Kayu merah*, Tamarind (*Asam*), andMahogany (*Mahoni*). From observation in the field it was ascertained that Desa Talibura's centre of government and population concentration (including public facilities and infrastructure) are sited on the coastal plain near the beach. The distance from the shoreline to the settlement is very close, between 10 and 100 metres. Some villagers have even lost their houses as a result of abrasion

during the last few years. Field observation identified Desa Talibura's beach as generally sandy, alternating with pebble and mud beaches. The illustration below shows the land-cover class/use from the shore to the land along a cross-section of Desa Talibura. The cross transect and changes illustrated are the result of field observation analysis and spatial analysis.

Figure 95. *Landscape Changes in Desa Talibura.*

3.5.3.4 Water Quality

The Desa Talibura community obtain water for consumption and other daily needs from several sources. These include Wairlaki spring, Wairlaka spring, and wells dug in the settlement area (Figure 96). Results of the water quality analysis for Desa Talibura are presented in Table 65. These results show that the condition of the water at station 1 was fit for consumption. Its DO, temperature, salinity and pH were suitable for other uses such as agriculture, freshwater aquaculture, washing, bathing, etc. Nevertheless, for human consumption, this water needs to be filtered first as its TDS was close to the upper limit for drinking water recommended by the Health Ministry. Moreover, its ppt concentration exceeded 1, which raises the concern that prolonged consumption in the long term could be harmful to health. The community did not consume water from station2 as it tasted brackish. This was borne out by the analysis, which showed that its TDS, salinity and pH levels made it unfit for human consumption as it would damage health in the long term.

The water at stations 3 and 4 was found to be almost identical. Both were used for daily needs and consumption.According to the villagers, both had no taste (fresh). However, analysis detected TDSlevels above the limit recommended by the Health Ministry. These were only slightly above the maximum, however. It is strongly recommended, therefore, that the water be filtered before consumption in order to reduce the TDS level. This should be done using thick fabric that is also capable of trapping fine particles. Unlike stations 1-4, the water at station 5 inundated mangrove forest in Desa Talibura. The mangrove trees there were flourishing. Analysis showed that the water temperature, salinity, pH and DO levels made it suitable for mangrove growth.In addition, the TDS concentration was high, as a result of its high salinity due to the mineral salts dissolved in it.

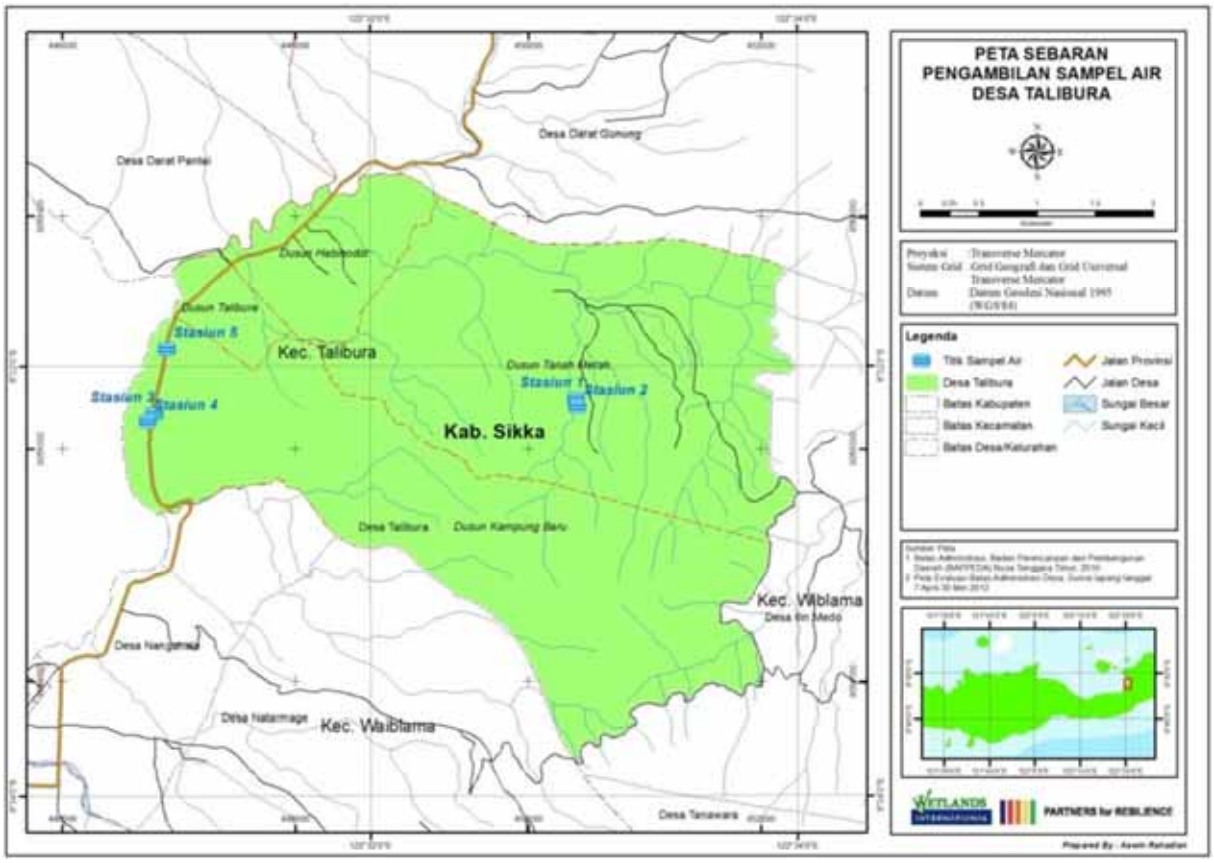


Figure 96. *Map Showing Distribution of Water Sampling Stations in Desa Talibura.*

Table 61. Results of Water Quality Analysis for Desa Talibura

Parameter	Unit	Station					*		**	
		1	2	3	4	5	Min	Max	Min	Max
DO (mg/L)	mg/L	6	5.3	5.2	6	5.4	2	-	-	-
Temperature (°C)	°C	30.7	24.8	24.7	24.6	24.8	-	-	-	Air temperature ±3
Salinity (ppt)	ppt	1.2	1.6	0.3	0.3	29.6	-	-	-	-
TDS (mg/L)	mg/L	499	3082	538	517.9	45819	-	1000	-	500
pH	-	7	8.99	7.54	8	8.02	6	9	6.5	8.5

Notes:

Station1 : Wairlaki spring
Station 2 : Community well in Dusun Talibura (for washing only)
Station 3 : Villager's well (Dusun Kampong Baru)
Station 4 : *Pamsimas*in the parish (Church)
Station 5 : Water in Mangrove Forest

* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Quality Control

** : Potable Water Quality Standard according to Indonesian Health Minister regulation RI NO.492/MENKES/PER/IV/2010

3.5.4 Disaster, Vulnerability and Capacity of the Desa Talibura Community

3.5.4.1 Information on Disaster in Desa Talibura

3.5.4.1.1 History of Disasters and Seasonal Events in Desa Talibura

The history of disasters in Desa Talibura was obtained from interviews and questionnaires completed by the respondents, and also from the WIIP team working there. This was then checked and supplemented with the most recent information.The results of this analysis and the history of disasters in Desa Talibura can be seen in Table 66.

Table 62. History of Disasters in Desa Talibura

Time of Occurrence	Type of Disaster	Remarks	Impact
1965	Flood	• Flood caused by 3 consecutive days of rain • Volume of water in rivers rose and overflowed onto the land	• Many plants destroyed • Harvest failed • Flood inundated 3 dusuns in Talibura
January 1986	Flood	• Flood caused by a week of rain • Flood occurred at 15.00 local time (WITA)	• Plants inundated • Harvest failed • Flood inundated 2 dusuns
February 1990	Abrasion	• Abrasion occurred during West wind season	• Shore-line receded • Human settlements of Dusun Talibura and Dusun Kampung Baru became closer to the beach
December 1992	Earthquake and Tsunami	• Started with high air temperatures • Earthquake occurred suddenly, accompanied and followed by water gushing from underground and from the sea • Tsunami swept across the area • Settlements protected by mangrove did not suffer a major impact	• Homes destroyed in the two dusuns near the beach
January 1994	Flood	• Flood caused by days of continuous rain • Flood lasted only 4 hours	• Many plants destroyed, resulting in failed harvest • Areas impacted by the disaster were Dusun Talibura, Habihodot, and Kampung Baru

Time of Occurrence	Type of Disaster	Remarks	Impact
February 1995	Flood	• Big waves during west wind season • Floodwater was 50 cm deep, and lasted for 20 minutes	• Water flooded villagers' homes (Dusun Kampung Baru and Talibura)
1997-2009	Flood	• Flood occurs every year in this village	• Victims are the inhabitants near the river and on the lowland plain
August 2010	Forest fire	• Happened at night • Site of forest fire far from human settlement	• Some of the villagers' livestock died
April 2011	Kantor Koramil office caught fire	• Occurred in the middle of the day	• Building destroyed • 1 human victim
20 December 2011	Flood	• Flood caused by 3 days of rain • Flood usually occurs during January-March	• Many plants destroyed • Some of the villagers' livestock died • Ricefields flooded, resulting in failed harvest
15 January 2012	Landslide	• Caused by heavy rain • Area of landslide: 10 ha • Happened at night • Site was up in the hills, and there were no homes or plantations beneath it • Occurred on Bukit Wairlaki hill	• Water supply channel damaged • 2 hectares of villagers' crops damaged • Area of landslide was 10 Ha
15 February 2012	Flood	• Kantor Koramil office was flooded • Village was flooded by high ocean tides1 metre deep for 3 days	• Relocation recommended for 59 households fromDusun Talibura, 76 from Dusun Kampong Baru to Darat Pantai • Land for relocation site provided by the community
14 March 2012	Rain, wind, and high tides	• Rain accompanied by wind and high tides for 4 consecutive days	• Seawater flooded marketand road, thus disrupting transportation
17 March 2012	Tornado	• Occurred at 19.30 local time (WITA)	• Destruction of 2 homes,a cashew plantation, a cacao plantation, plus damage to electricity poles • Disaster impacted on Dusun Tanah Merah

Source: Laporan PFR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

Analysis indicated that the dominant disasters in Desa Talibura were floods and abrasion, both of which occur almost every year when the rainy season arrives. Floods originate in the hills near Dusun Tanah Merah and Habihodot. Abrasion occurs near Dusun Kampung Baru and Talibura because both these dusuns are near the beach. Earthquake accompanied by tsunami has only occurred once, in 1992, but caused great damage, both material and non-material.The north coast of Flores Island is quite prone to earthquakes as it is on the boundary between two tectonic plates. Landslides have occurred in Desa Talibura but not on a routine basis. Landslides will occur if there is a high intensity of rainfall and it rains almost every day. Due to the labile soil and degraded forest conditions, landslide could happen at any time. The newest is typhoon or tornado. These winds usually come during the west wind seasonbetween January and March. In March 2012 a tornado occurred in the village. It only blew down a few trees in the plantations and did not claim any lives. Many villagers do not know how to save themselves from this type of disaster. If flood or abrasion occurs, most of them know what steps to take, because these types of disaster do not attack human life, impacting only on the plants and livestock in the vicinity.

Besides disaster history, information was also obtained about the seasonal calendar used by the Desa Talibura community. This can be seen in Table 67. The rainy season starts around October but with relatively low rainfall intensity. This is when the farmers start to clear the land, because in November they will till the land and then plant. The land is cleared of weeds by burning them or by removing them with a mattock. To economise on time, energy and money, however, most of the villagers prefer to burn their land rather than remove the weeds one by one. The types of agriculture pursued in Desa Talibura are dry-field and paddy-field. The paddy-fields are usually in an area watered by the river, or near to the river, so that they get water easily. During the following month, i.e. November, the farmers begin to work the land. They break up the soil and sow seeds. The types of plant cultivated in Desa Talibura include rice, maize, and vegetables. Rice is planted in paddy-fields and dry-fields. Several years ago, in the 1990s, field clearing was under way in August-September, because the rains started in August.

Today the seasons have shifted, so the planting time has also shifted accordingly. Rice can be harvested in April to May (Table 67). However, 20 years ago it was harvested in February-Marchbecause it had been planted earlier. The main rice harvest is from both paddy-fields and dry-fields. Vegetables and maize are the second major commodities after rice. Maize is planted in dry-fields and is useful when the rice stores are running low. Then the villagers usually consume maize as a substitute for rice. The gales/west-wind season also usually occurs during the rainy season. These winds blow in from the sea thus causing high waves. As a result, less fish are caught as many fishers do not go out to sea at this time for safety reasons. Moreover, few fish are caught in traps when the seas are rough. The fishers from Desa Talibura catch fish at sea almost the whole year round and every day. Most of them stop during the west-wind season and when the moon is bright. Some fishers still go to sea when the moon is bright because they need the money.

The dry season is April-October. Several estate crops can be harvested during the dry season. One of these is coconut, which can be harvested three times a year (Table 67). Others are cashew, cacao and tamarind. The religious activities of the Catholic members of the community are performed according to the Christian calendar in certain months of the year; for example Christmas is celebrated in December and Easter usually in April. The Muslims, on the other hand, observe their festivals according to the Islamic calendar (qomariyah), so the dates of these change in relation to the Christian calendar.

Table 63. Calendar of Events/Seasons in Desa Talibura

Season/Event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Rainy season													November - March.
Dry season													April – October.
Field preparation season													Octobe r - November
Planting season													Usually November - December
Coconut harvest													3 times a year: January May, and August
Maize harvest													Maize is harvested in March
Cashew harvest													Cashew is harvested in August and size of harvest increases in September
Rice harvest													Rice harvest time can vary, depending on time of planting
West-wind /storm season													Usually occurs in January, February and March
Catholic religious observances													They community celebrate Easter in April, the Month of Mary/Rosaryin May and October, Christmas in December, and new year at the beginning of January
Islamic religious observances													Muslim observances, such as circumcision, haj pilgrimage, idul fitri depend on the Islamic calendar
Traditional *adat* festivals/activities													The community usually celebrate *adat* festivals (*loe' unur*, and*lewon*) in October and the following year in the same month, or in November

Season/Event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Sea-fishing													Fishers go to sea every month of the year, but there is an increase in seafaring activity during September to November
Sport and other activities													Usually inearly August in the run up to Indonesian Independence Day celebrations

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

3.5.4.1.2 Disaster Impact

The various disasters that have occurred in Desa Talibura have had a significant impact. Flood and abrasion cannot be ignored, because they both happen every year. The results of an investigation into disaster impact in Desa Talibura, using information from a number of sources, can be seen in Table 68.

Table 64. Impact of Disasters that have Occurred in Desa Talibura

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on tree felling in forest areas (Upstream) • Replanting of trees in degraded forest areas and around springs • Land immediately adjacent to the river will not be used for agriculture but become green belt (still under discussion)
Abrasion										• Planting of mangroves and beach plants along the coast • Rehabilitation of degraded mangrove forest

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Earthquake & Tsunami										• Move people in earthquake-prone areas to a safer site
Land and forest fire										• Create regulations to ban the burning of forest and land • Teach the community about land burning and its effects
Landslide										• Ban on tree felling in forest areas (Upstream) • Replanting of trees in degraded forest areas and around springs • Prohibition of agricultural activities in landslide prone areas
Typhoon										• Aid has been given to typhoon victims
Epidemic										• Extension services promoting a healthy lifestyle • Villagers advised to have their own washing/toilet facilities (MCK), even if very simple • Construction of water sources such as a well at every home • *Pamsimas*Program
Drought										• Development of *Pamsimas* program • Construction of water supply, such as piping water from spring • Provision of capital and seeds from local government

Key: High Medium Low

Analysis showed that abrasion, earthquake & tsunami, typhoon and epidemics posed the highest risk to the community. Other disasters such as flood, landslide and forest fire frequently attacked land and agricultural output. The earthquake accompanied by tsunami in 1992 destroyed the village. The frequent abrasion, primarily in Dusun Kampung Baru and Talibura,is beginning to impact on the community. The sea has been gradually eating away the coast, with the result that people's homes have become increasingly closer to the sea shore. Nevertheless, the people are reluctant to move away. They give various reasons for this, such as the claim that they cannot live far from the sea, that they need to be close to their source of livelihood, and that it would be difficult to find an equally strategic place elsewhere. The recent typhoon only hitplantations and caused some damage to a few houses, but did not claim any lives. The recent extreme weather has increased the probability of typhoons returning to Desa Talibura. This disaster did cause considerable losses, however, as the destruction of plantation trees resulted in a failed harvest for farmers of estate crops. Epidemics occur almost every year, particularly malaria, which poses a serious threat to the community, attacking during both the wet and dry seasons. The number of victims and losses due to malaria are decreasing each year, however.The village government and community have started to make various efforts to eradicate malaria, which is endemic to Nusa Tenggara Timur.

Flood always damages agricultural land, especially the paddy-fields which are near the river. Nevertheless, the farmers are still reluctant to move or convert their riverside fields to green belt.The losses from these floods are also considerable. Every year the villagers are threatened with starvation as a result of the failed harvests. Another disaster that occurs in the rainy season is landslide. High rainfall together with labile soil conditions and degraded forest make certain parts of Desa Talibura prone to landslide. These sites are in the forest near Dusun Tanah Merah. Although far from the settlement, these areas are farmed by the villagers.The impact of landslide that is most seriously felt by the people is the damage to agricultural land. Economic loss is therefore the main problem resulting from this type of disaster.

Forest fires in this area are usually the result of the villagers' own actions. They burn forest to clear land for agriculture. This has serious impacts, including damage to land and a continuous decline in water sources. Forest fire can also reduce work opportunities as land which is repeatedly burnt will become infertile and unable to support crops. Drought in Desa Talibura usually occurs at the height of the dry season, in July-August. Around 4-5 years ago, Desa Talibura suffered drought resulting in harvest failure. The rains did not come, so the fields received no water at all. As a result, the harvest failed, food supplies plummeted and the community were threatened with famine.Starvation was prevented by government assistance, through the distribution of foodstuffs to every inhabitant.

As well as identifying disaster impacts, the team also analysed the villagers' perceptions of disaster impact (Figure 97). This was done through interviews and focus group discussions (FGD). The results suggested that an insufficient proportion of the community would probably agree to relocate their fields or homes away from a disaster prone area. They considered that the land and assets they owned now had been inherited from their ancestors and therefore could not be abandoned. Moreover, they had not yet found an equally strategic site to live on or farm. This issue needs to be addressed. Local government must attempt to find an acceptable alternative solution that is not detrimental to the community, so that the disaster impact reduction program can proceed.

The respondents were much more enthusiastic about receiving information and training on what to do in the event of disaster, and after the disaster, rather than being forced to move to another location. They felt the need for such information in order to reduce the severity of the impact.

Further analysis indicated that all respondents (28% strongly agreed; 72% agreed) felt that their way of life had changed since their area had been frequently hit by disasters. Now, the people know better the warning signs of disaster, they know alternative methods of coping with arid land and failed harvests, and they have begun to undertake actions to conserve the environment. These actions comprise cooperation among local government, community, and various organisations that have come to the village. Coastal rehabilitation, reforestation of upstream areas, etc. are examples of activities that the community did not do in the past but are doing enthusiastically now.

When a disaster of great force strikes a village, the community will migrate to a safer area without any pressure from anyone else.They move together as a mass to higher ground to save themselves. In the case of lesser disasters that they do not consider dangerous, however, many of the respondents disagreed that it was necessary to move to a safer area. They felt that it was still possible to overcome and withstand the on slaught of future disasters. The positive side of this is that the respondents become more vigilant for disaster warning signs, especially those in nature. For example, if the village gets heavy rain every day, they will move away from the river, because they know that it will overflow. Details of the respondents' perceptions can be seen in Figure 97.

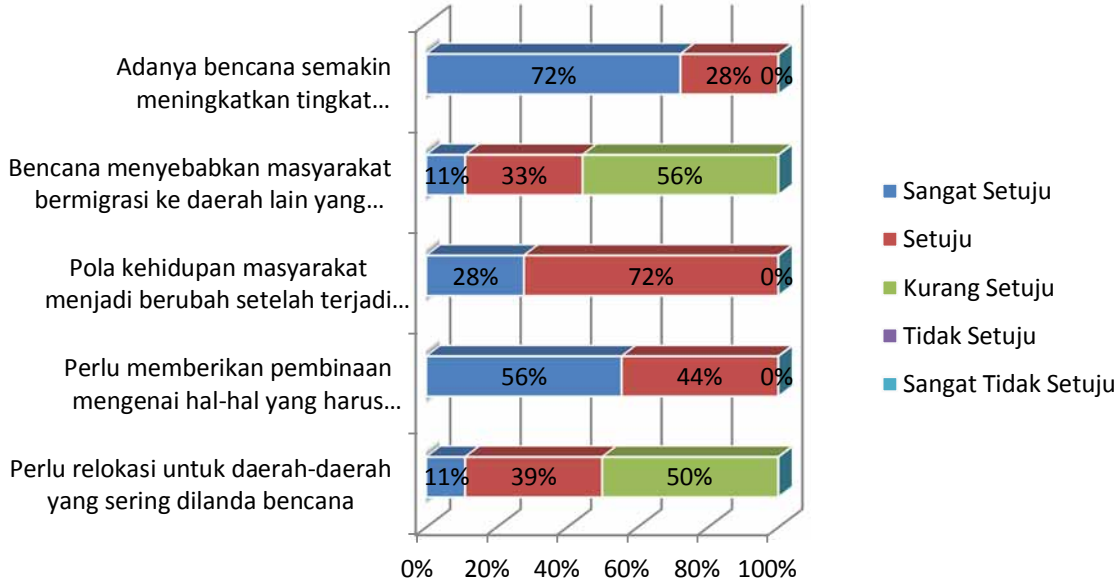
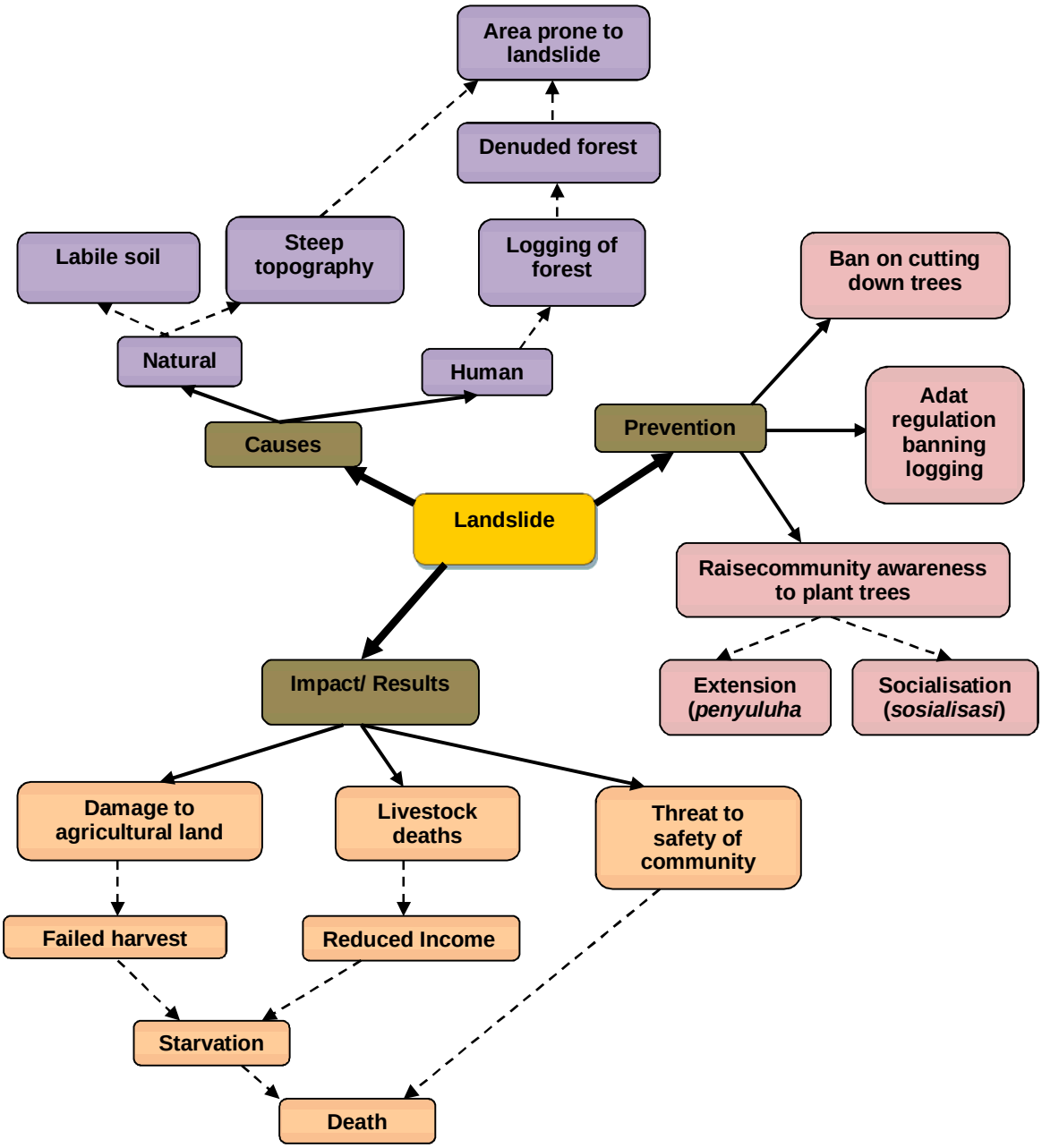


Figure 97. *Respondents' Perception of Disaster Impact in Desa Talibura.*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

3.5.4.1.3 Sample Issue Tree forDesa Talibura



3.5.4.2 Vulnerability in Desa Talibura

Information on vulnerability in Desa Talibura was obtained through PRA activities as described above. The sources of the vulnerability information in this section were only the questionnaires and in-depth interviews conducted with the respondents. The vulnerability information obtained from direct physical observation in the field is presented in the discussion that follows. The vulnerabilities were divided into five categories as shown in Table 69.

Table 65. Vulnerabilities and Capacities ofthe Desa Talibura Community

Variable	Vulnerability	Capacity
Health, Physical condition,and Environment	1. Inadequate road construction in Dusun Tanah Merah area 2. Logging of forest 3. Logging and degradation of mangrove forest 4. Long dry season 5. Epidemics of malaria, acute respiratory tract infections and skin diseases 6. Still many homes built on beach	1. Roads used at present are simply hardened dirt tracks 2. Create *Adat* and village regulations banning the felling of trees in hill area 3. Create *Adat* and village regulations banning the felling of trees in coastal area 4. Community construct water storage tanks, and have been assisted by *pamsimas* program 5. Extension services on hygiene, people are beginning to pay more attention to hygiene & do not defecatejust anywhere 6. Awareness raising (*sosialisasi*) on the dangers of building homes in areas prone to abrasion, especially near the beach
Socio-cultural	1. School drop-outs 2. Low quality human resources 3. Population density 4. Traditional *adat* customs are starting to be ignored	1. Awareness raising (*sosialisasi*), extension services, and school grant (*BOS*) aid from schools concerned 2. Skill improvement (softskills), improved education 3. Several customs are still observed, such as *belis*, harvest, rice-planting, etc.
Attitudes and Motivation	1. Disaster response 2. Indifference 3. Laziness 4. Insufficient awareness of need for environmental conservation 5. Insufficient awareness by community of the need to plant and conserve mangroves	1. Exists from SIBAT-PMI 2. Religious guidance 3. Guidance from traditional *adat*, community and religious leaders 4. Guidance from traditional *adat*, community and religious, extension services and 'socialisation' (*sosialisasi*) 5. 'Socialisation' and extension services from various agencies
Institutional/ Organisational	1. Presence of institutions not fully accepted throughout the village 2. Egocentricity prevalent	1. 'Socialisation' 2. Extension services

Variable	Vulnerability	Capacity
Economic	a. Lack of employment opportunities b. Many villagers still live below the poverty line c. High unemployment	1. Extension services and provision of working capital; several business savings/loan programs now available 2. – 3. State health insurance scheme (*Jamkesmas*), school grants (*BOS*), working capital loans, government assistance, etc. 4. Provision of capital loans, livelihood diversification, transmigration, migrant worker scheme (*TKI*), etc.

Source: Compiled from various sources (questionnaire and direct interviews with respondents), 2012

Analysis indicates that almost all the vulnerabilities that could occur in this village have been addressed.Nevertheless, the capacities that have begun to take shape need to be further enhanced so that past and possible future vulnerabilities can be overcome and disaster impact minimised.So far, vulnerabilities related to disaster, such as the environmental degradation of forest, mangrove and springs have been reduced through activities facilitated by several organisations. These organisations work together with local government so that the programs can easily be accepted by the community. In addition to the information on vulnerabilities and capacities of the Desa Talibura community given in the vulnerability matrix in Table 69, information on the types of disaster risks they could face is presented in Figure 98.

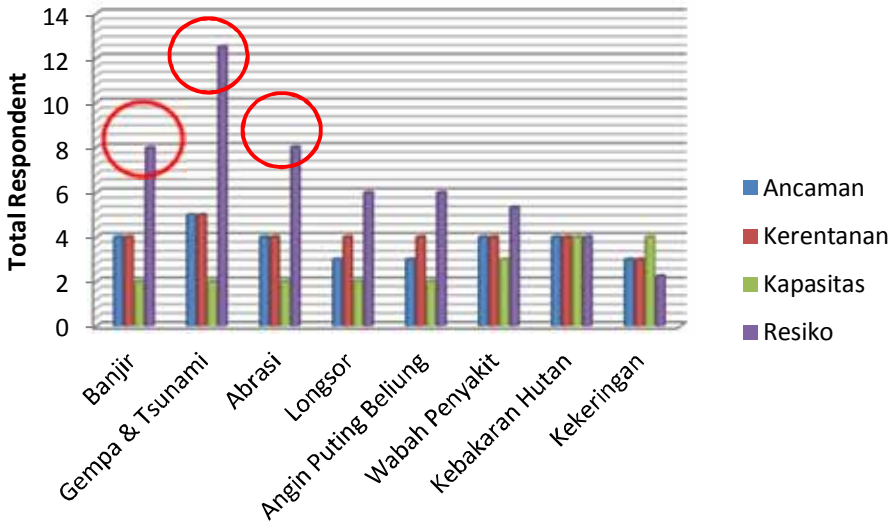


Figure 98. *Information on Threats, Vulnerabilities, Capacities and Risks of Disaster, according to Disaster Type, in Desa Talibura.*
Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko) Flood (Banjir), Earthquake & Tsunami (Gempa Bumi dan tsunami), Abrasion (Abrasi), Landslide (Longsor), Tornado (Angin Putting Beliung), Epidemic (Wabah penyakit), Forest Fire (Kebakaran Hutan), Drought (Kekeringan).

From Figure 98 above, it can be seen that the greatest disaster risk to Desa Talibura is earthquake with tsunami. One reason for the high risk is the community's low capability to cope with disaster. This type of disaster is very difficult to predict as the existing technology is still limited.The second highest disaster risk in Desa Talibura was found to be flood and abrasion. From information provided by members of the community and government agencies, it was ascertained that both these disasters occur almost every year in Desa Talibura. The risk of these disasters is high partly due to the people's poor response to them. For example, many people still live in homes near the beach despite the high level of abrasion there. Moreover, mangrove destruction is still rife, and it is difficult for mangrove seeds to grow. Nevertheless, several programs have been initiated to reduce various disaster risks there. As with abrasion, so too with flood; one reason for the high risk is the community's low level of awareness and responseregarding disaster. Floods are considered a normal event, even though they cause considerable loss. Moreover, agreement to move agriculture away from flood-prone riverside areas has still to be reached.

3.5.4.3 Community Capacity in Desa Talibura

3.5.4.3.1 Early Warning System

An early warning system (EWS) is one part of a community's capacity to cope with disaster. EWS can make use of signs in nature or signals purposely given by people to inform the public of an imminent disaster. These disaster warnings may be given through traditional means or using modern technology. In Desa Talibura, an EWS has been set up through cooperation among the local government, the village community, and the Indonesian Red Cross (PMI) through SIBAT activities. Several signs in nature often also provide warning in Desa Talibura.

Information about the EWS in the village was obtained from respondents' answers to the questionnaireand in-depth interviews. An analysis of the results can be seen in Figure 99. This indicates that most respondents knew nothing of EWS when disaster struck the village. However, 25% of the respondents did know of disaster signs through weather forecasts, either from weather forecasts in the media or by reading signs that they recognised in nature. A much smaller number of respondents received warnings from public announcements in places of worship (5%) or in the mass media (newspapers, radio, television) (5%). Respondents' ignorance of EWS was due to lack of information, for several reasons. One of the main reasons was that measures to familiarise the villagers with EWS (such as early escape procedures) had not yet reached the whole village. Others were public attitudes (especially respondents who considered EWS warnings unimportant), inadequate information from the government (in the case of large-scale disasters), inadequate communication facilities and technology, and ineffective unstructured communication among the various agencies concerned with EWS.

Figure 99. *Respondents' Perceptions of EWS in Desa Talibura.*
Captions: Early Disaster Warning (Peringatan Dini Terhadap Bencana), Didn't Know (Tidak Tahu), Weather Forecast (Perkiraan Cuaca), Kentongan Alarm (Kentongan), Announcement in Public Place (Pengumuman di Tempat Umum), Mass Media (Media Massa),

If they had known about the early warning before the disaster happened, the main thing they would have done would have been to escape. They would also have prepared important items such as food, cash, clean water and important documents (e.g. land ownership certificate, education certificates). When disaster struck, most respondents chose to evacuate to the nearest homes of family or neighbours considered safer. However, 33% of respondents chose to stay outside their home so that they could escape more easily to a safer place. Only a few chose to evacuate to an emergency shelter or to stay at home. Details of the respondents' efforts to save themselves in the event of disaster can be seen in Figure 100.

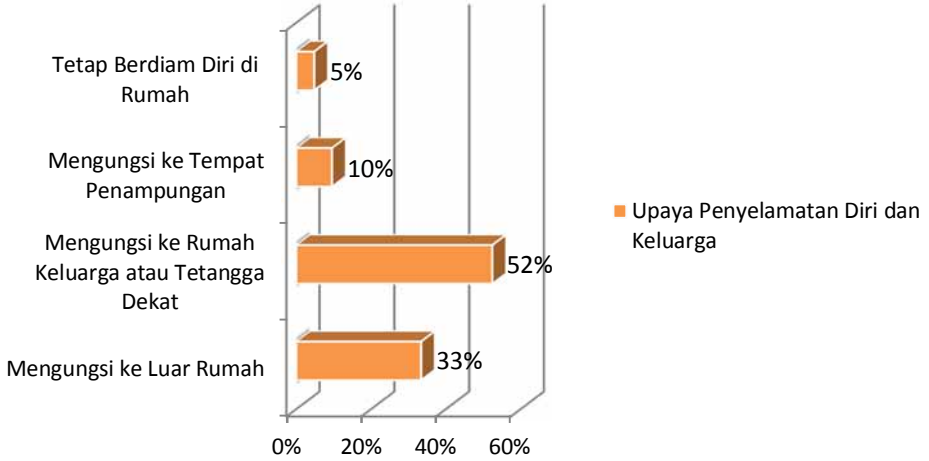


Figure 100. *Efforts that Respondents in Desa Talibura would Make to Save Self and Family*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Stay Inside Home (Tetap di dalam Rumah), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family Neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman

The Desa Talibura government has taken action at times of disaster. This information was obtained directly from respondents via questionnaire and interviews.Analysis indicated that government actions were more often taken after the disaster had occurred. They distributed aid and provided emergency shelters for the community. Government also provided evacuation equipment. Only 11% of respondents stated that government had given early warning prior to a disaster, while 4% said that local government had never given any help whatsoever. For this reason, cooperation needs to be strengthened among the various agencies so that EWS in the village can function synergistically. Information on respondents' perceptions of government role in dealing with disaster is presented in Figure 101.

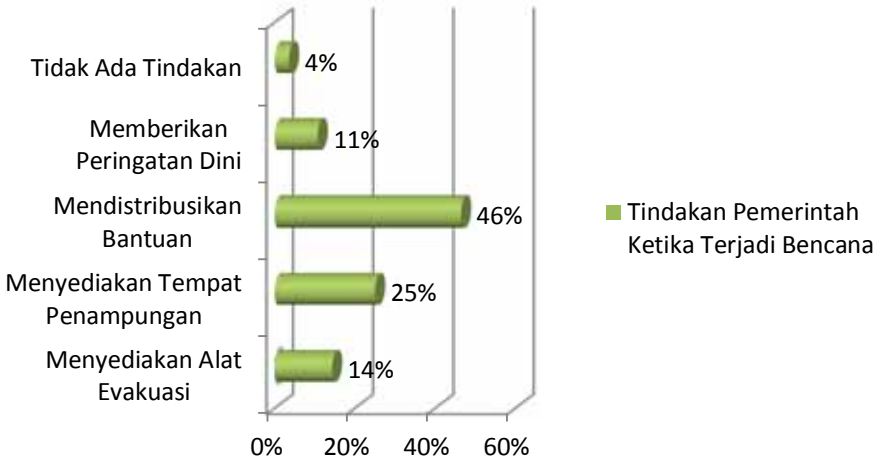


Figure 101. *Information on Action Taken by Desa Talibura Government in Response to Disaster Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), No Action Taken (Tidak Ada Tindakan), Gave Early Warning (Memberikan Peringatan), Distributed Aid (Mendistribusikan Bantuan), Provided Shelter (Menyediakan Tempat Penampungan), Provided Evacuation Equipment (Menyediakan Alat Evakuasi)*

3.5.4.3.2 Accessto and Control of Community Assets

Besides EWS, as discussed above, access and control are an important part of community capacity. Access includes facilities, infrastructure, and the ease with which they can be accessed at times of disaster. Information on who controls or is responsible for thesefacilities and infrastructure is also equally important, because it is connected with permission to use them. The assets meant here are of two types: privately owned and public. Private assets can be used by each individual and his/her family at a time of disaster. Community/public assets, however, are used more for the general public interest, on a wider scale. Information on access to and control of assets in Desa Talibura is presented in Table 70.

Table 66. Information on Access to and Control of Assets that can be Used in the Event of Disaster in Desa Talibura

Private Source of Ownership	Accessibility at Time of Disaster								Ownership Control
	Flood	Earthquake & Tsunami	Abrasionon	Forest Fire	Landslide	Tornado	Drought	Epidemic	
Agricultural Land	**		Yes	**	**	**		Yes	Father
Homes	Yes			Yes	Yes	Yes	Yes	Yes	Father, Mother
Furniture	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Mother
Valuables	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Vehicles	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father
Clothes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Food	**		Yes	Yes	Yes	Yes		Yes	Father, Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Fuel	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Valuable Documents	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Public Source of Ownership	**Accessibility at Time of Disaster**								**Ownership Control**
	Flood	Earthquake & Tsunami	Abrasionon	Forest Fire	Landslide	Tornado	Drought	Epidemic	
Places of worship	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Roads	**		Yes	Yes	**	Yes	Yes	Yes	Community
Market	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Football field	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Village Hall/ Office	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Village government
Boats	Yes			Yes	Yes	Yes	Yes	Yes	Communitywith prior permission from owner
Water sources	Yes		Yes	Yes	Yes	Yes	**	**	Community
Public bathing, washing, toilet facilities	Yes		Yes	Yes	Yes	Yes	**	Yes	Community
School buildings	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Communitywith prior permission
Banks/financial institutions	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Owner concerned

Source: Questionnaire findings and direct observation in the field

Note : (**) Part accessible

Almost all the private assets in Table 70 can be accessed in the event of disaster, except during earthquake or tsunami. In this case, only savings could be accessed, provided that they had been saved in another place. An individual's cash would probably not be accessible unless it had been possible to retrieve valuables while escaping. When floods hit the village, farmland and food were only partially accessible. Flood inundated agricultural land along the river, making just these areas inaccessible. Similarly, food stored at home could be accessed but not the rice crops as these were threatened by harvest failure.

When abrasion occurs, it is only the houses on those parts of the coast being eroded that become inaccessible, while homes in safer areas away from the coast can still be accessed as places of refuge. Agricultural land becomes inaccessible during forest fires, landslide, or tornado because these three disasters affect the land, both forested and farmed. In times of drought, the assets that cannot be accessed are the same as during flood. The difference is the condition of the land: during flood it cannot be accessed because of excess water, whereas during drought it becomes unusable because of the lack of water. During epidemics, all private assets can be used.

As regards public facilities and infrastructure, there are still some that are not fully accessible and some that cannot be accessed at all. Roads leading towardsa disaster area cannot be accessed easily during flood or landslide.In the case of earthquake and tsunami, no public assets are accessible. Boats cannot be used during the abrasion season, because most fishers do not go to sea as the waves are big. They fear that their boat could be damaged and their lives threatened if they insist on putting to sea under such conditions. Water sources cannot be accessed during drought and epidemics, unless the source is a spring that has not been contaminated by the disease bacteria. Similarly, public washing/toilet facilities cannot be accessed during drought as there is no water available for bathing and washing.

3.6 Desa Nangahale – Kabupaten Sikka

3.6.1 Profile of Desa Nangahale – Kecamatan Talibura

3.6.1.1 General Description of Desa Nangahale

Desa Nangahale is part of Kecamatan Talibura, Kabupaten Sikka, Nusa Tenggara Timur (NTT) Province. Desa Nangahale was formed in 1999, as a result of the expansion of Desa Talibura. Village expansion began in 1997 and was realised in 1999. Initially, Desa Nangahale was a place of evacuation for the people from Pulau Babi island, who were victims of the 1992 earthquake and tsunami. Desa Nangahale covers an area of13.76 km^2(1376 ha) or about 5.29% of the total area of Kecamatan Talibura (*Kecamatan Talibura Dalam Angka Tahun 2012*). According to spatial analysis, however, based on field data, Desa Nangahale covers about 5.904 km^2 (590.4 ha). This village is at an elevation of 400 metres above sea level (*Kecamatan Talibura dalam Angka Tahun 2011*). Desa Nangahale consists of 4 dusuns, 8 RWs, and 29 RTs. The dusuns are: Dusun Nangahale, Namandoi, Utan Wair, and Likong Gete. The administrative map of Desa Nangahale is presented in Figure 102. Desa Nanghale borders directly onto the Flores Sea and several neighbouring villages.The boundaries of Desa Nangahale are as follow:

- North : Flores Sea
- South : Desa Tuabao and Desa Runut (Kec. Waiblama and Kec. Waigete)
- East : Desa Talibura (Kec. Talibura)
- West : Desa Runut (Kec. Talibura)

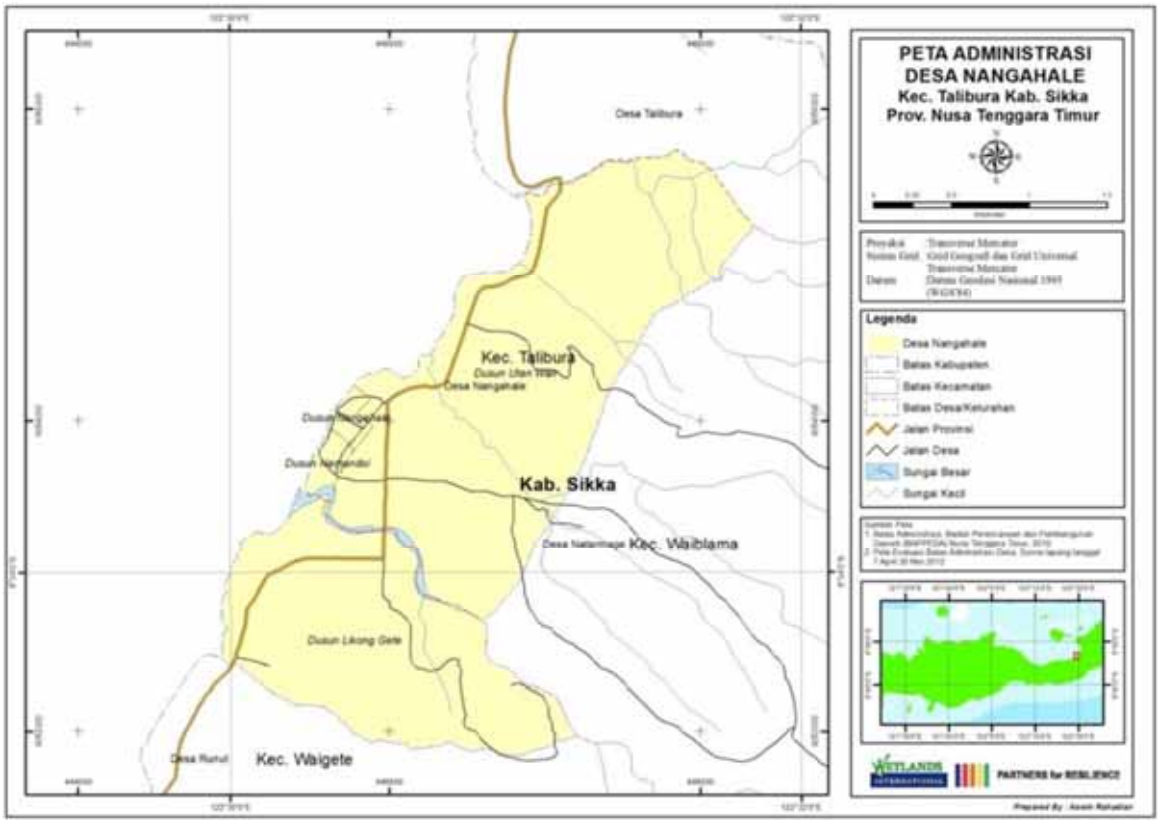


Figure 102. *Administrative Map of Desa Nangahale.*

Access to Desa Nangahale is quite easy as the infrastructure is very good.The road to the village has been tarmacked and is traversed by public transport, which includes minibuses running between Maumere-Larantuka and motor-cycle taxis.The distance from Desa Nangahale to Kota Maumere is about 36.5 km, and the journey takes 1-1.5 hours. The distance to the main town of the *kecamatan*is about 5.7 km, which can be covered in10-15 minutes. Desa Nangahale has comprehensive educational facilities, from kindergarten (TK) all the way up to senior highschool (SLTA). Health facilities comprise 1 *posyandu*. If people are ill or require more advanced medical assistance, they can use the services of the *Puskesmas* public health centre in Desa Talibura. Mains water supply from PDAM has not yet reached Desa Nangahale. Only the inhabitants of Dusun Lekong Gete obtain their clean water from Wairlaki spring. Those living in Dusun Namandoi, Nangahale, and Utan Wair get their water from wells dug in front of their homesor in other particular places.Some wells, specifically those in Dusun Namandoi and Nangahale,taste slightly salty, especially those wells near the seashore. Desa Nangahale's sports facilities consist only of a football field near the beach. Not far from the football field is the public cemetery, which is intended for use by the entire village community, both Muslim and Catholic. Economic activity in the market occurs just twice a week, on Fridays and Saturday afternoons. This market is in Desa Talibura.

The inhabitants of Desa Nangahale comprise two large groups: the indigenous people and migrants from Pulau Babi. The indigenous people live in Dusun Utan Wair and Lekong Gete, while the migrants live in Dusun Nangahale and Namandoi. Most of Nangahale's indigenous inhabitants are Catholic and belong to the Tanah Ai ethnic group. The migrants from Pulau Babi are Moslem and of Badjo and (just a small minority) Tidung ethnicity. The population of Dusun Nangahale and Namandoi increases every year. This can be seen from the increasing size and density of these settlements. The atmosphere in both these dusuns is always busy, whether in the morning, afternoon or at night. Although the populations of Dusun Lekong Gete and Utan Wair are also increasing, however, this increase is smaller than in the other two dusuns.

The main livelihoods in Desa Nangahale are from estate crops and sea-fishing. However, it was observed in the field that a large proportion of the community farm land in the plantation belonging to PT. Diosis Agung Ende (abbreviated to PT. DIAG), a private coconut plantation company. PT. DIAG permits the villagers to use this land to grow maize, rice and vegetables, free of charge. In return, the villagers have to work at shelling copra once a week, every Wednesday. In addition, they also have to keep the land around the coconut trees free of weeds. The other major source of income is from sea-fishing.They usually put to sea in the early morning and return after sunset, or leave in the late afternoon and return just after dawn. They usually sell their catch directly at the fish market or sell them to middle-men. In addition, the fish also provide them and their families with a daily source of food. Besides farming and sea-fishing, other livelihoods include working aspeddlers, salt farmers, coconut oil producers, cake vendors, livestock farmers, middlemen/ brokers, motor-cycle-taxi drivers, carpenters, mechanics and unskilled labourers. Several villagers keep livestock as a source of extra income.These include goats, chickens, ducks, pigs and cattle. These animals are not kept in pens. They are allowed to roam free and find food themselves during the day, then at night they are tethered by rope to a tree or fence near the owner's house.

3.6.1.2 Institutions in Desa Nangahale

There are more stakeholders in Desa Nangahale than in the other villages. As can be seen in Table 71, these stakeholders are very varied. Because of the large population, especially that concentrated in the two dusuns of Nangahaleand Namandoi, plus the frequent disasters that occur in this village,many agencies work in this area. The village government and parliament (BPD) play a very important role in Desa Nangahale. Almost all the activities and programs implemented there, whether from government or non-government (LSM/NGO) agencies, must be known to these two bodies. Moreover, both bodies hold considerable authority in managing the village's ecosystems.They always work together with the traditional *adat* institutions in the village. These come from the indigenous ethnic groups (Tanah Ai) living in Dusun Lekong Gete and Utan Wair.

Disaster risk reduction in this village involves several agencies. Those playing a major role in this include LSM/NGOs. They work in environmental rehabilitation and restoration, and in the improvement of community welfare. WIIP and COREMAP are LSM/NGOs working on environmental rehabilitation, while the other LSM/NGOswork more in human resource development and community capacity improvement through social and economic activities. Financial institutions also play an important role in supporting the villagers' economic activities. Religious institutions, extension agencies and educational institutions play a greater role in improving the quality of human resources. Directly or indirectly, they shape the people's character, making them more resilient to changing conditions. Besides these, anEWS has also been established in this village through PMIand SIBAT. However, it needs to be reinforced so that all members of the community can experience and actively participate in it. Eventually, it is hoped that they will always be prepared and know the EWS procedures, so that the impact of disasters can gradually be diminished.

Table 67. Institutions in Desa Nangahale

Type of Institution	Name of Institution	Activities	Ranking
NGO/LSM	Binadaya	• Community empowerment • Scholarships for foster children • Toilet construction • *Posyandu* construction	4
	PLAN	• Development of fishers' and farmers' businesses	1
	AUSAID	• Clean water management	1
	Coremap 1	• Coral reef management and conservation	1
	BPSTM	• Capital assistance for sea-faring fishers	1
	PMI	• Building and institutional assistance • Disaster response training	2
	WIIP	• Mangrove conservation and rehabilitation • Community economic empowerment • Ecosystem management training	4
Banks/ Financial Institutions	BRI	• Loan capital, finance	1
	Bank NTT	• Loan capital, finance	1

Type of Institution	Name of Institution	Activities	Ranking
	PNPM	• Savings and loans • Community empowerment through economic enterprises	2
	Kopdit Obor Mas	• Loan capital, finance	1
	Kopdit Pintu Air	• Loan capital, finance • Insurance services	2
	Bank Keliling	• Loan capital, finance	3
Religious Institutions	Remaja Masjid	• Islamic religious activities	1
	MUDIKA	• Catholic religious activities	1
Extension Agencies	PertanHut	• Provision of seedlings and fertilisers • Agricultural and forestry extension services	1
	Animal husbandry	• Provision of young livestock • Provision of vaccine for livestock	1
Government Agencies	DISHUT	• Forest conservation	1
	DISTAN	• Agricultural extension	1
	PKK	• Socio-economic condition of women in the village	2
	Village Government	• Implements village government • Plans AnnualRegional Budget (APBD) • Issues village bylaws and policy	4
	BPD / Village Parliament	• Implements government together with village officials • Plans Annual Regional Budget(APBD) together with village officials • Issues policy and village bylaws • Monitors performance of village officials	4
	Posyandu	• Infant health	2
Climatology station	-	-	-
Educational Institutions	PAUD	• Early (pre-school) learning • Food processing and feeding	2
	Primary school (SD)	• Education	1
	Junior highschool (SMP)	• Education	1
	Senior highschool (SMA)	• Education	1
Companies/Private Enterprise	PT. DIAG Keuskupan Ende	• Coconut plantation • Copra processing employs housewives	1
	Seaweed	• Seaweed cultivation in the sea in Desa Nangahale • Employs men	1

Type of Institution	Name of Institution	Activities	Ranking
	PT. Mutiara	• Pearl cultivation in the waters of Desa Nangahale • Employs men	1
Early Warning System	SIBAT from PMI and village community	• Evacuation of disaster victims • Announcements over loud speakers/megaphone at time of disaster • Construction of evacuation route	2
Traditional*Adat* Institutions	*Lembaga adat Suku Tanah Ai* (Tanah Ai *Adat* institution)	• Performs traditional rituals • Makes *adat* regulations related to community life • Mediator between *adat* regulations and government regulations	4

3.6.2 Community Profile for Desa Nangahale

The community profile for Desa Nangahaleresulted from the analysis of responses from 24 respondents considered to be generally representative of the community there. The activity began with Focus Group Discussion (FGD) and completion of a pre-prepared questionnaire.Respondents were selected on the basis of several criteria which included a range of gender, ages, livelihoods and educational levels, so as to obtain the desired range of information. Details of respondents' ages, religion, ethnic groupand marital status can be seen in Figure 103 to 106.

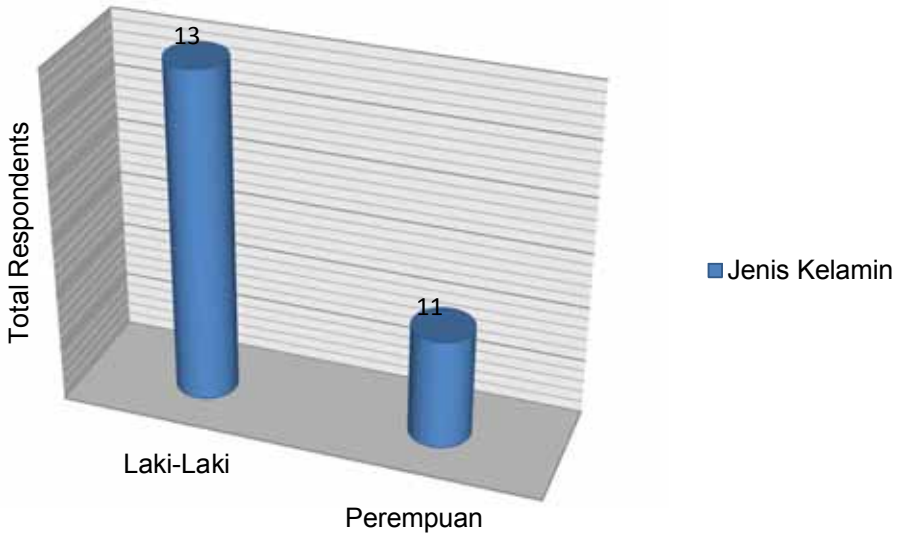


Figure 103. *Gender of Respondents in Desa Nancaptions*
Captions: Gender (Jenis Kelamin), Males (Laki-Laki), Females (Perempuan)

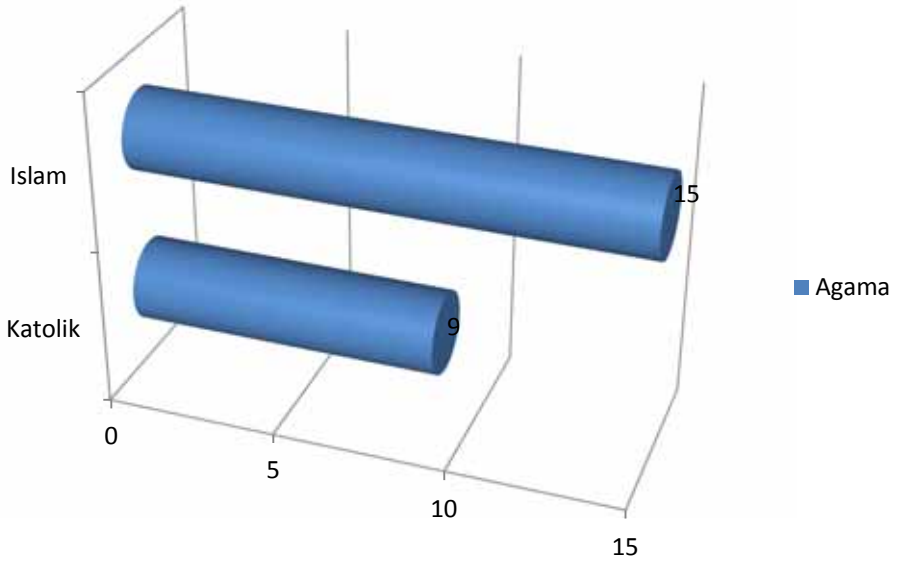


Figure 104. *Religions of Respondents in Desa Nangahale*
Captions: Religion (Agama), Islam (Islam), Catholic (Katolik)

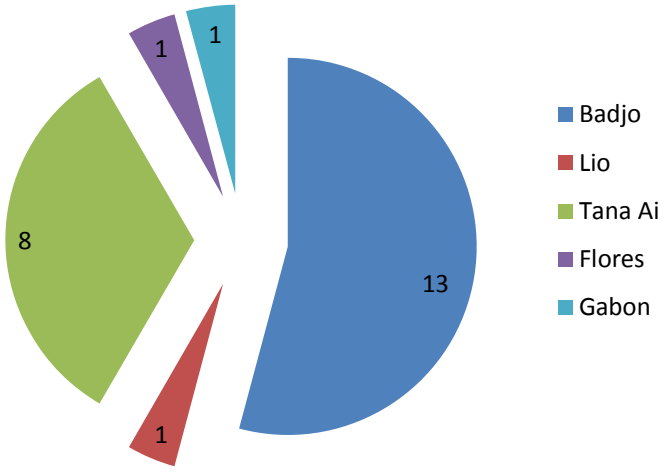


Figure 105. *Ethnicities of Respondents in Desa Nangahale.*

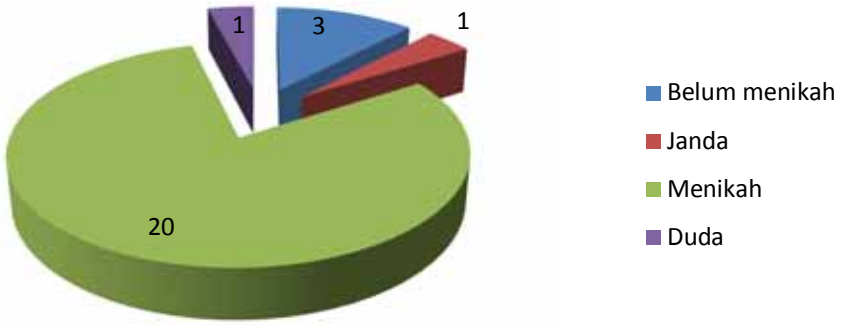


Figure 106. *Marital Status of Respondents in Desa Nangahale.*
Captions: Unmarried (belum Menikah), Divorced/ Widowed for Female (Janda), Married (menikah), Divorced/Widowed for Male (Duda)

Based on the information in Figure 103, it can be seen that male respondents outnumbered female by 13 to 11. Their average age was around 38 years. Most of them came from Dusun Namandoi and Nangahale. This is borne out by the information on ethnicity (Figure 105) which shows that just over half of the respondents were from the Bajo ethnic group. The Bajo people came from Pulau Babi and have lived in Dusun Nangahale and Namandoi since the earthquake and tsunami of 1992. The others were from Dusun Utan Wair and Dusun Lekong Gete. The respondents had lived in the village around 18-20 years. Most were married (20 persons), the others being unmarried or divorced/widowed (Figure 106). On average, each of them financially supported 3 dependents.

The educational level of the respondents in Desa Nangahale was relatively low. Many (11) hadonly completed primary school (SD) and 2 had either never been to school or had not completed primary school. (Figure 107). According to the information obtained, most of these 13 respondents worked as farmers, and some raised livestock. Respondents who had continued their education to complete senior highschool or a course of higher education usually worked as civil servants and village officials. Most respondents had a side job to supplement their income. Examples include a farmer who also worked as unskilled labour on a building site, and a member of the village parliament (BPD) who had a side-job selling cakes. Further information on the respondents' livelihoods can be seen in Figure 108 and 109.

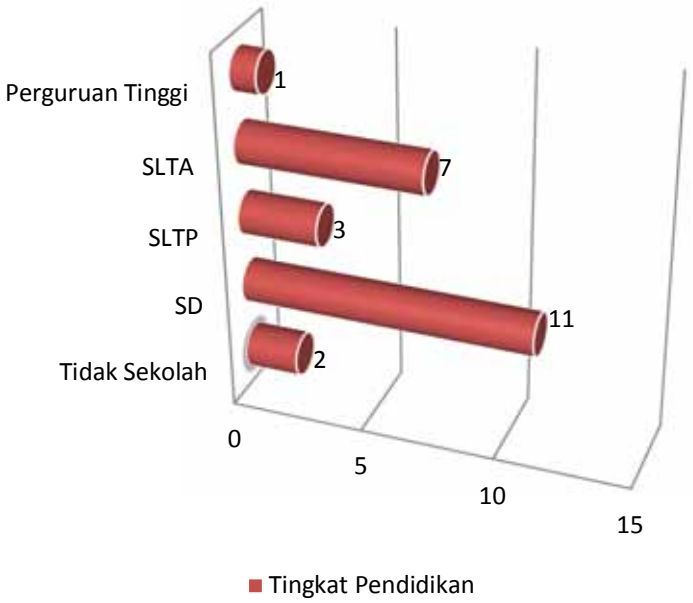


Figure 107. *Educational Level of Respondentsin Desa Nangahale.*
Captions: Educational Level (Tingkat Pendidikan), Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi)

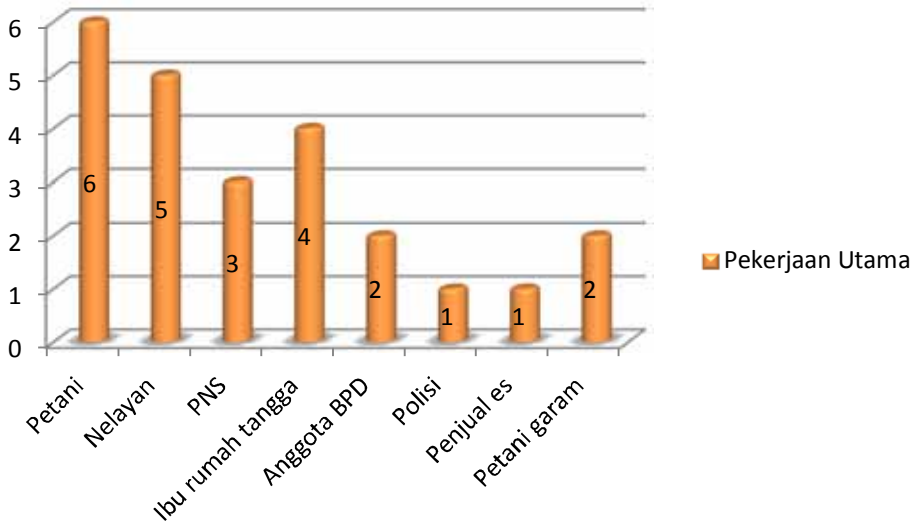


Figure 108*. Main Occupation of Respondents in Desa Nangahale.*
Captions: Farmer (Petani), Sea-faring Fisher (Nelayan), Civil Servant (PNS), Housewife (Ibu Rumah Tangga), Village Parliament Member (Anggota BPD), Police (Polisi), Ice Vendor (Penjual Es), Sat Producer (Petani Garam)

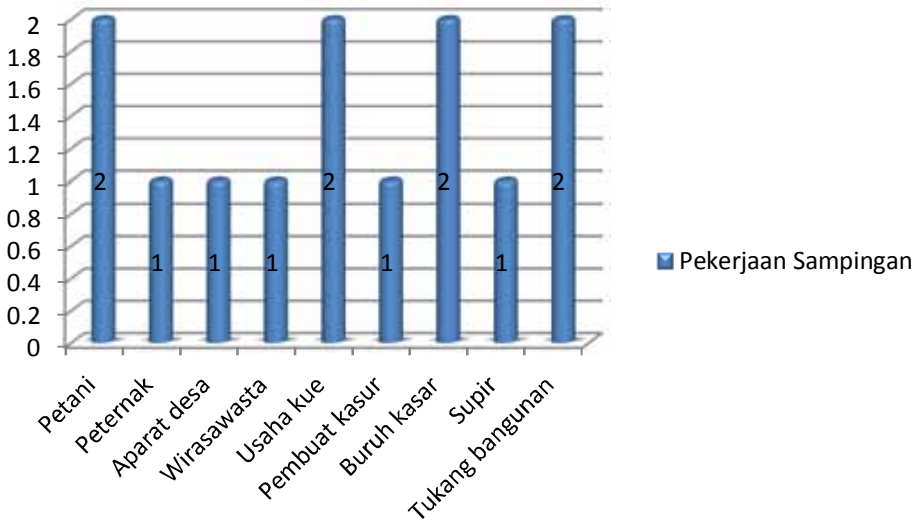


Figure 109. *Secondary Occupations of Respondents inDesa Nangahale.*
Captions: Side Job (Pekerjaan Sampingan), Farmer (Petani), Animal Husbandary (Peternak), Village Official (Aparat Desa), Entrepeneur (Wiraswasta), Cake Business (Usaha Kue), Bed Producer (Pembuat Kasur), Unskilled Labour (Buruh kasar), Driver (Supir), Construction Worker (Tukang Bangunan)

Respondents' incomes varied in size. Many (11) made less than Rp1 million/month, ranging around Rp.500,000-Rp.750,000. More than half (14) also had average monthly expenditures of less than Rp.1million. However, they said that their income was often smaller than the amount they had to pay out. This complaint came mainly from farmers and unskilled labourers. Those respondents who worked as civil servantsor village officials enjoyed more economic stability than the farmers and labourers. Information on respondents' average monthly incomes and expenditures can be seen in Figure 110.

Respondents' expenditures included food, clothing, health, education and entertainment. There were two reasons for expenditures that exceeded income.The first was that prices continually rise whereas their incomes stay the same. The second was that some respondents were not good at managing their money. The tendency to live extravagantlywhen they had money, then suffer problems when they ran out, was a problem often mentioned in the interviews. Moreover, when they had money problems, some respondents would borrow from the mobile bank known as "Koperasi Selamat Pagi" (Good morning cooperative). Reasons given for this were that the loans were paid out quickly and the terms were relatively easy. Information on the respondents' financial circulation can be seen in Table 72.

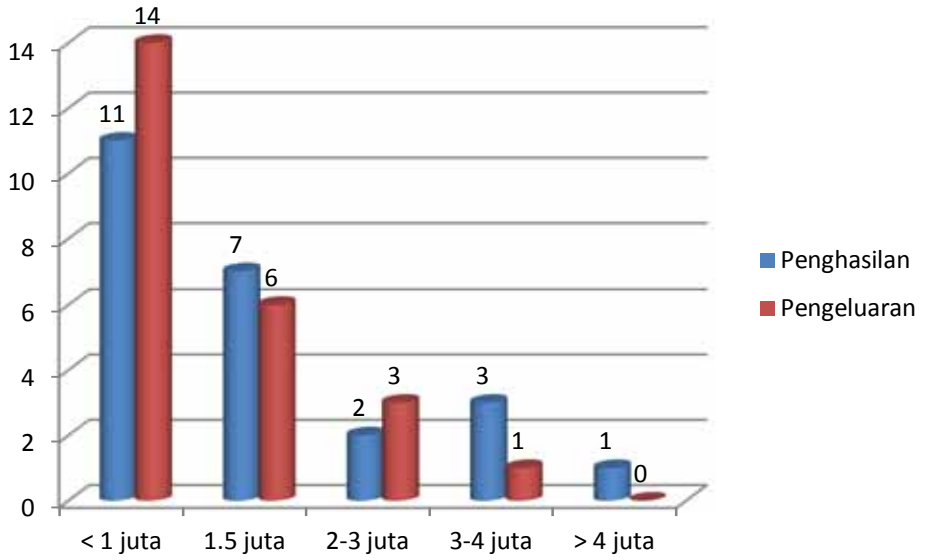


Figure 110. *Average Monthly Incomes and Expenditures of Respondents in Desa Nangahale. Captions: Income (Penghasilan), Expenditure (Pengeluaran), Million Rupiah (Juta)*

Table 68. Details of Financial Circulation of Respondents in Desa Nangahale

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Occupation			
Farmer	Rp.550,000-Rp.750,000	Rp.750,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed
Sea-faring fisher (fish)	Rp.600,000-Rp.800,000	Rp.750,000	Clothing, food, health, education, entertainment, capital to repair fishing tackle and boat
Sea-faring fisher (octopus)	Rp.1,500,000-Rp.2,000,000	Rp.1,500,000	Clothing, food, health, education, entertainment, capital to repair fishing tackle and boat, and bait
Civil servant	Rp.2,000,000 – Rp.3,000,000	Rp.2,000,000-Rp.3,500,000	Clothing, food, health, education, entertainment
Housewife	Rp.750,000-Rp.1,500,000	Rp.750,000-Rp.1,500,000	Clothing, food, health, education, entertainment
BPD Member	Rp.600,000	Rp.600,000	Clothing, food, health, education, entertainment
Police	Rp.3,000,000	Rp.2,200,000	Clothing, food, health, education, entertainment

Source of Income	Size of Income	Size of Expenditure	Remarks
Vendor (Ice)	Rp.400,000	Rp.300,000	Clothing, food, health, education, entertainment, capital to buy stock for trade
Salt farmer	Rp.1,000,000-Rp.1,500,000	Rp.900,000-Rp.1,200,000	Clothing, food, health, education, entertainment, capital to buy raw materials for making salt
Secondary Occupation			
Livestock farmer	Rp.400,000-Rp,600,000	-	Supplementary income.Usually done by farmers.
Village official	Rp.550,000	-	Several housewives also work as village officials
Entrepreneur	Rp. 2,000,000 - Rp.2,500,000	-	Supplementary income.
Cake business	Rp.1,800,000	-	Supplementary income and to improve family economic condition
Mattress maker	Rp.1,000,000	-	Supplementary income and to improve family's economic condition.
Unskilled labour	Rp.1,500,000	-	Supplementary income.
Driver	Rp.750,000-Rp.900,000	-	Supplementary income, or done at times when fishing or farming are not possible
Construction worker	Rp.1,500,000-Rp.2,000,000	-	Supplementary income.

Source: Questionnaire and interviews with respondents

Most respondents (20) owned their own home. Of the others, one lived in a house provided by the employer, and three still lived with parents and siblings. The houses comprised permanent, semi-permanent and non-permanent constructions. Permanent houses had solid walls, zinc roof, and tiled floors. Semi-permanent houses were characterised by half solid half timber walls, zinc or thatched(straw or black palm fibre)roof, and earth or cementfloors. Non-permanent houses had bamboo or plywood walls, thatched roof (straw or black palm fibre), and earth floors. Around a third of the respondents did not have a toilet and bathroom. Details of respondents' houses' sanitation facilities are presented in Figure 111.

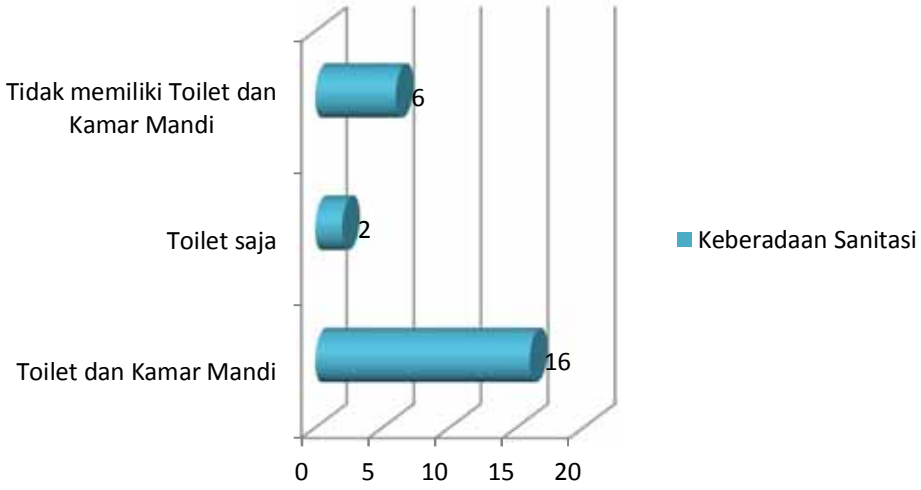


Figure 111. *Sanitation Facilities in Homes of Respondentsin Desa Nangahale.*
Captions: Sanitation Facilities (Keberadaan Sanitasi), No Toilet or Bathroom (Tidak Memiliki Toilet dan Kamar Mandi), Toilet Only (Toilet Saja), Toilet and Bathroom (Toilet dan Kamar Mandi)

The respondents' main source of water was from wells. All the respondents in all four dusuns used well water. Desa Nangahale does have a spring but only part of the community in Dusun Utan Wair and Lekong Gete use it. Energy for cooking comes from firewood and kerosene.More of the respondents use wood than use kerosene.All the respondents enjoy PLN mains electricity; 18 get their electricity directly from PLN, while 6 obtain it via a family relative or neighbour.

Most of the respondents who work as farmers do not farm their own land (Figure 112). They only farm land belonging to PT.DIAG. They plant a range of crops, such as maize, sweet potato, cassava, etc. They farm it using simple tools like machete, mattock, hoe and sickle. Respondents who work as fishers normally use a sampan or simple sailing boat to catch fish.Their fishing tackle is also quite simple, such as nets and lines. Ownership of assets such as land, agricultural equipment, valuables, etc., which form parameters for assessing the respondents'level of prosperity, can be seen in Table 73.

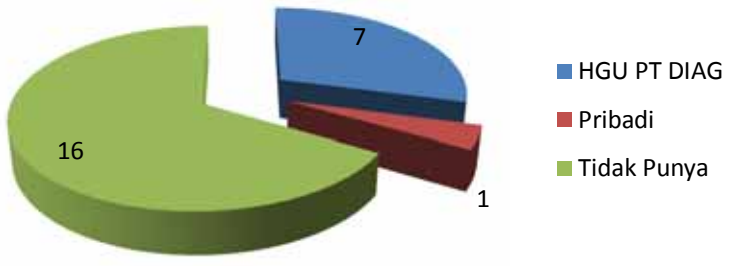


Figure 112. *Land Ownership Status of Respondents in Desa Nangahale.*
Captions: HGU PT DIAG, Private (Pribadi), Do Not Own Land (Tidak Punya)

Table 69. Prosperity Parameters for Respondents invDesa Nangahale Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock per household	30-50 animals	10-20 animals	Fewer than 10 animals
Agricultural yield/harvest (Rice)	More than 50 sacks	20-50 sacks	1-10 sacks
Highest educational level of children	University	Junior-Senior Highschool (SMP-SMA)	Primary – Junior Highschool (SD-SMP)
Type of house	Permanent building (Solid walls, ceramic tiled floor, zinc roof)	Semi Permanent (Timber walls, zinc roof, concrete or earth floor)	Non-permanent (Bamboo walls, thatched leaf roof (sago palm/ rumbia), earth floor)
Area of land owned	>10 ha	1-9 ha	< 1 ha, or none
Fishing equipment	Motor boat, traps, nets	Sampan and net	Rod and line, net
Income/month	More than Rp.4,000,000	Rp.1,000,000-1,500,000	< Rp. 1,000,000
Vehicles owned	Car, motor cycle, motor boat,	Sampan and motor-cycle	None
Communication devices	Television, handphone, satellite dish, radio	Television, handphone, radio	Handphone, TV

Based on the information in the table above, it can be ascertained that many of the respondents are in the poor to average prosperity groups. On average, they have only a few livestock and their agricultural produce is a maximum of just one ton. They own only 0.5 to 1 hectare of the land they manage (Respondents has land). Also, their average monthly income ranges from Rp.1 million-1.5million (average) down to less than Rp.1 million (poor). They mostly do not own a motor vehicle or the equivalent, and their communication devices are limited to items such as handphone, television, and radio.

Respondents' debts was another piece of information obtained to describe their characteristics, and was another parameter used to assess their level of prosperity. Information on respondents' debts is presented in Table 74. This table shows that most of the respondents (14) did not have any debts. They felt that the repayment instalments would be a burden if they had to borrow money for urgent expenses.

Table 70. Information on Debts Incurred by Respondents in Desa Nangahale

Source of Loan	Reasons for Borrowing from this Source				Annual Interest	Repayment System	Number of Respondents
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service			
BRI	>10 million	Talibura (5 km)	• Collateral required • Quite difficult	Good	1.4%	• Depends on size of loan • Usually maximum 5 years	2
PNPM	10 million	Talibura (5 km)	• Must be a member of PNPM • Submit loan proposal in advance • Quite easy	Good	1.1%-1.3%	• Depends on size of loan • Maximum 18 months	8
Money-lender/ Mobile bank (*Bank keliling*)	Under 1 million	Money-lender comes to borrower	• Photocopy of ID card (KTP)	Quite good	50%	• Depends on agreement • Daily instalments	
From friends or family	-	Direct contact	• As agreed	Good	-	• Depends on agreement reached	
Kopdit Obor Mas	10 million	Maumere (30 km)	• Specific conditions	Good	1.5 %	• Depends on size of loan	
Kopdit Pintu Air	10 million	Maumere (30 km)	• Specific conditions	Good	2 %	• Depends on size of loan	
Bank NTT	>10 million	Talibura (5 km)	• Collateral required • Quite difficult	Good	0.7 %	• Depends on size of loan	

Almost all the respondents said that they participated in an organisation. A respondent could take part in more than one organisation. The organisations' activities have had a positive effect on them, particularly by providing them with new information and knowledge.The organisations in which they participate are shown in Figure 113. Most of the respondents take part in the reforestation group with Wetlands International Indonesian Programme (WIIP). They are also involved in other organisations such as PNPM, farmers group, Coremap–Ministry of Marine Affairs and Fishery, etc. However, there were 5 who do not take part in any organisation at all. Apart from not being interested, they also said they did not have time to contribute to the activities of these organisations.

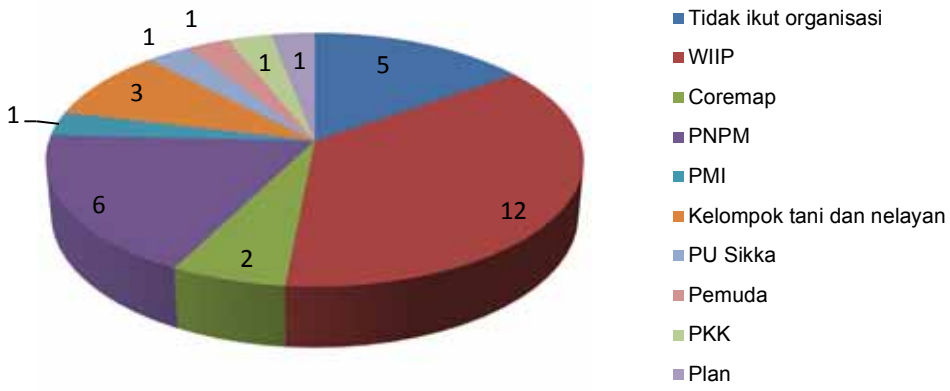


Figure 113. *Organisations in which Respondents in Desa Nangahale Participated*
Captions: Did Not Participate in An Organisation, WIIP, Coremap, PNPM, Redcross (PMI), Farmers and Fisheries Groups (Kelompok Tani dan Nelayan), PU Sikka, Youth Organisations (Kelompok Pemuda), PKK, Plan

3.6.3 Ecosystem Profile for Desa Nangahale

3.6.3.1 Ecosystems and Natural Resources in Desa Nangahale

The Desa Nangahale area has a topography of hills and a relatively wide plain mainly along the coast. Desa Nangahale's shoreline is about 4km long and parallel to the main road. A topographic map of Desa Nangahale is presented in Figure 114. According to the field survey and spatial analysis, a large part of Desa Nangahale is flat, with 49.6 % of the total area having a gradient of only 0-8%. This level topography is not prone to disaster such as landslide but is vulnerable to flooding. More detailed information on the various gradients of land in Desa Nangahale is presented in Table 75.

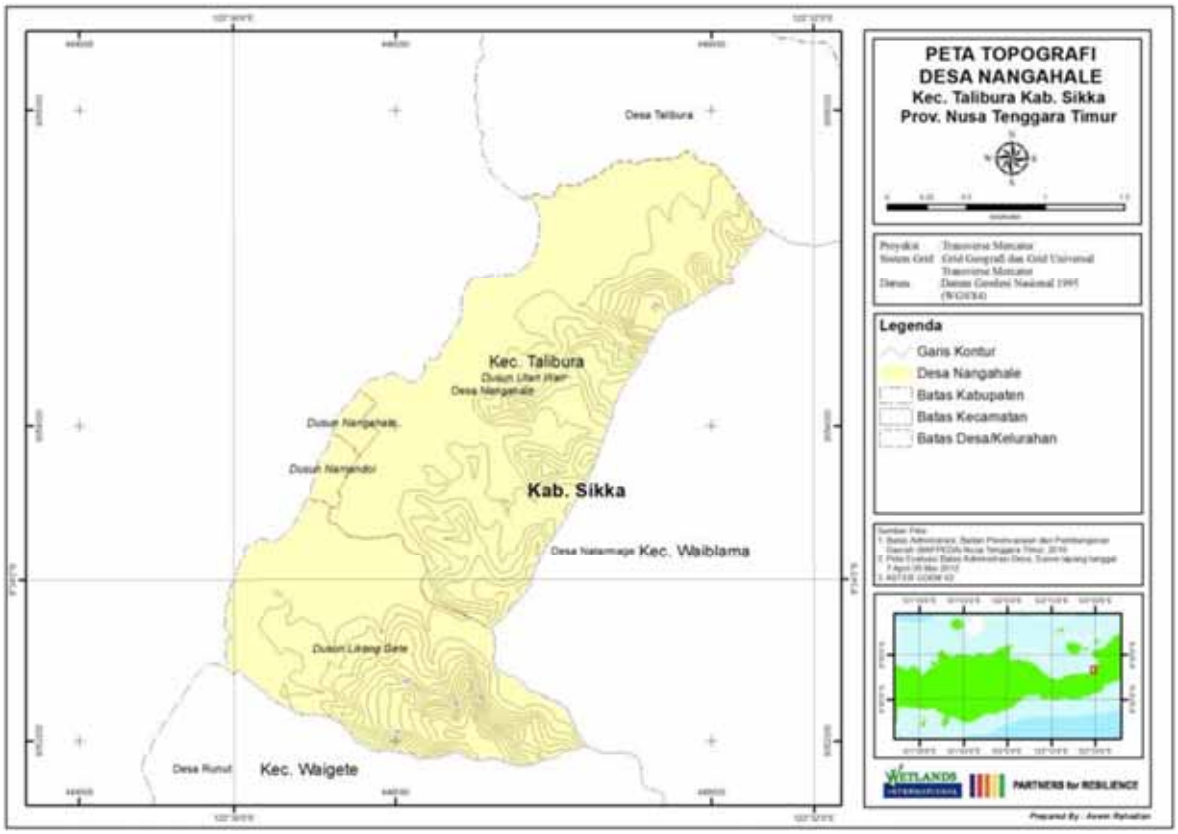


Figure 114. *Topographical Map of Desa Nangahale.*

Table 71. Land Area of Desa Nangahale Based on Gradient

Gradient	Area (ha)	%
0-8%	292.65	49.6
8-15%	103.64	17.6
15-25%	86.54	14.7
25-40%	73.79	12.5
>40%	33.8	5.7
Total Area	590.41	100.0

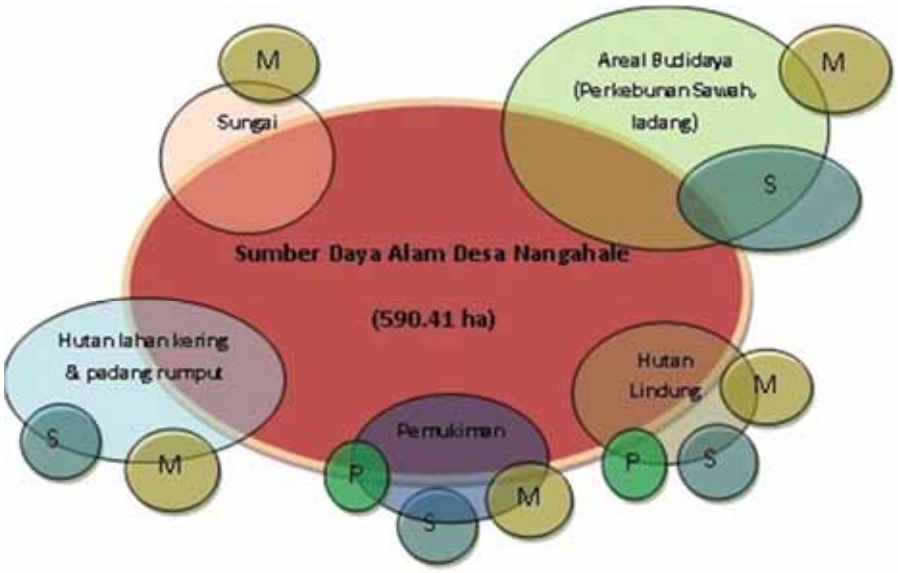
Most of Desa Nangahale (76.9%) is under cultivation. It is dominated by the plantations of PT. Diosis Agung Ende (PT. DIAG), which holds a concession to use the land for coconut plantations. The coconut plantations were first opened in 1932, during the colonial period, with a concession of around 2000 ha. Along with the development of the community and national policy, part of this concession was converted to other uses, one of which was housing. Information on the types and extent of each ecosystem mapped in Desa Nangahale is presented in Table 76.

Table 72. Types and Area of Ecosystems in Desa Nangahale

Ecosystem	Area	%
Marine	3.8	0.6
Cultivation	453.9	76.9
Human settlement	37.7	6.4
Coastal	10.0	1.7
Mangrove	9.0	1.5
Dry land forest	76.0	12.9
Total Area	590.4	100.0

Source: Compiled from field data

Before the tsunami in 1992, a large part of Dusun Nangahale was part of the concession held by PT DIAG. Much of the land in Desa Nangahale is used for the interests of PT DIAG's plantation. However, a large proportion of the population are centred in Dusun Nangahale and earn a living from fishing.Access to natural resources (SDA)is used directly by the local people and private sector.The relationships between the natural resources and their users in Desa Nangahale can be seen in Figure 115.



(Key: M = Community, P = Government, S = Private Sector).

Figure 115. *Relationship between Natural Resources and their Users in Desa Nangahale.*
Captions: Natural Resources in Desa Nangahale (Natural Resources in Desa Nangahale), Rivers (Sungai), RiceFields/Farmland (Sawah ladang), Dryland Forest and Grassland (Hutan Lahan Kering dan Padang Rumput), Human Settlement (Pemukiman), Protection Forest (Hutan Lindung)
M = Community, P = Government, S = Private Sector

3.6.3.2 Spot Mapping

Spot mapping in Desa Nangahale was done with the participation of the local community. The purpose of this was to supplement information from the participative mapping of the village done previous with WIIP, PMI, COREMAP, and PNPM. The mapping by WIIP produced a plan of each dusun while that by PMI produced a plan of the village. The village plan made previously had not been drawn to an accurate scale nor adhered to proper mapping principles. The spot map drawn by the community and facilitated by PMI is presented in Figure 116.

Figure 116. *Spot Map Produced through Desa Nangahale Community Participation and PMI*

The spot map produced by WIIP together with the community was based on the results of the participative mapping integrated with the results of spatial analysis. The spot map and ecosystem map drawn by the Assessment Team together with the communityis presented in Figure 117. The information obtained indicated that the area of Desa Nangahale differs from that of its administrative area.The mapping also sought information on land cover and land use in Desa Nangahale. The area of the village was found to be 590.41 ha. Areas of disaster risk are marked with a red line. The various threats in Desa Nangahale include fish bombing, storm, illegal logging, and abrasion. Fish bombing is still commonly used by the local people as a way of catching more fish. They already know that fish bombing is harmful but they still continue to do it. Abrasion often occurs in Dusun Namandoi and can reach the people's homes if the waves are very high. The abrasion is due to the destruction of mangrove forest and beach plants along the coast of Desa Nangahale. From field visits it was ascertained that Desa Nangahale's centre of government and population concentration (including public facilities and infrastructure) are situated on the lowland plain near the coast. The distance from the shoreline to the settlement is very close, just 10-50 metres. In fact, some villagers have lost their homes to the abrasion during the last few years. Field observation identified Desa Nangahale's coast as being characterised generally by sandy beach alternating with pebbles and mud.Illegal logging is common in the area of Dusun Lekong Gete. The trees felled are normally used for constructing houses. Forest is also cut down to clear the land for planting rice when the rainy season arrives.

Figure 117. *Spot Map of Desa Nangahale.*

3.6.3.3 Transect Mappingand Landscape Change

Before 1991 the Desa Nangahale area still had plenty of forest (mangrove & highland plateau forest). A large area was also PT DIAG plantation. In 1992 there was an earthquake and tsunami, as a result of which Desa Nangahale became a relocation site for victims from Pulau Babi, Pulau Permana, Pulau Koja Doi, Pulau Koja Gete, Pulau Pangabatan, Pulau Pemana, and people from Utan Wair and Wair Het. After 1998 ("reformation era"), abrasion advanced increasingly closer to the main road and people's houses. The remaining mangrove forest consists only of small colonies. Conditions are worse in places where the mangrove has been completely destroyed.Some of the people know about the regulations banning the felling of trees in protection forest and mangrove forest, as well as the regulations on the management of river banks, but ignore the ban. Moreover, mangrove forest management needs the support of regional (*Perda*) and village (*Perdes*) government legislation, to maintain and expand the diminishing area of mangrove forest that still remains.More detailed information on the dynamics of landscape change and the transect map can be seen in Figure 118 and Table 77.

Figure 118 . *Map of Landscape Changes in Desa Nangahale.*

Table 73. Transect Map of Desa Nangahale

Topic	Land Cover / Use						
	Cultivated Land	**Mixed Plantation**	**Human Settlement**	**Rivers&Springs**	**Hill Forest**	**Mangrove Forest**	**Sea**
Land Ownership Status	Much of the agricultural land (coconut & cacao plantation) is HGU PT DIAG concession. A small part is *adat* land belonging to the indigenous Tanah Ai community	A small part of the mixed plantation is agricultural land (coconut & cacao plantation) in the HGU PT DIAG concession. A small part is *adat* land belonging to the indigenous Tanah Ai community	Some is owned freehold, some is in the process of obtaining freehold status.	State owned land, HGU use rights, and *adat* owned. Most of the community have wells, which are rather brackish	*Hak ulayat* communal land, State owned forest	Freehold, State owned, and *adat*owned. Area of mangrove forest is around 4 ha.	State owned
Current use	PT DIAG plantation: coconut&cacao ,	Land in PT DIAG is planted with seasonal	Homes, government offices, places of	For irrigation and daily needs ,	Extraction of firewood, timber for	Shellfish, crabs for personal consumptio	Pearls, fish, sea slugs (captured using

	managed together with the community; Rain-fed rice, maize, secondary crops. Freehold/*adat*: rain-fed ricefields, maize, secondary crops.	crops. Freehold land planted with coconut, cacao, banana, jatrophaand cashew.	worship, schools, etc.		house constructio n, traditional *adat* ceremonies .	n and some for sale	traditional methods), and seaweed (for sale and consumption)
User group	Private sector (HGU PT DIAG) The local community shell the copra	Private sector (HGU PT DIAG) Community (Tanah Aiethnic group)	Community (Tanah Ai &Bajo ethnic groups) Private sector(HGU PT DIAG), Government	Community	Community	Coastal community	Bajo coastal community
Productivity	PT DIAG Plantation ?? Community land: 4-5 ago until present: • October :start to clear land • November :start planting • December: planting completed 1990s: • August-September : start to clear land • September : start planting • Planting took 3 months • Long dry season (*fuso*): paddyfields yield 33 kg/ha	Cashew: once a year, Aug-Sept, but small harvest also possible in January Cashew price (January): expensive and poor quality (Rp5000/kg) Cashew price (Aug-Sept): cheap and good quality (price Rp 2000-15000 /kg) Plant spacing for cashew is 6x6 m, coconut 10x10 m Cashew: about 1-5kg/tree	-	-	-	-	*Rumpon (*fish aggregating device): 1-2 ton/year *pukat* net: less than 120 kg/year lift net: 2.5 ton/year

	• normal season (good) , paddyfields yield 25-30 sacks/0.5 ha (50 kg/sack) • Previously (3-4 years ago) yield could reach 3-4 ton unhusked rice per 0.5 ha • Maize (unhusked): 10 sacks/0.75 ha • Maize (unhusked) 8 sacks/0.75 ha (50kg/sack) • 1 ha approx 13-14 sacks	(the older the tree the greater the yield) 1 ha of cashew plantation contains 80-100 trees planted 5-6 metres apart.					
Reason for fall in productivity (threat)	Logging, fire, collapse due to age of tree, drought, seasons and weather.	Logging, fire, collapse due to age of tree, seasonal drought, and weather.	Tornado, flood, drought	Logging, seasonal drought, and weather.	Logging, fire, collapse due to age of tree, seasonal drought, and weather.	Logging, abrasion	Fish poisoning and bombing
Opportunity for increasing production	Private sector: Increase involvement of community	Diversification, Extension on appropriate cultivation of mixed plantation.	Education&training on disaster evacuation	Optimisation of village regulations (*perdes*)	Optimisation of village regulations (*perdes*)	Optimisation of village regulations (*perdes*)	Optimisation of village regulations (*perdes*) &law enforcement

One of the main causes of ecosystem destruction in Desa Nangahaleis fire. Field observation came across several fire hot spots, particularly in grassland and bush. The cause of fire in Nangahaleis that usually the fires are started intentionally by the community for certain purposes. They burn grasslands in order to stimulate the growth of new shoots that they can feed to their livestock. Actually, the people of Desa Nangahalehave their own controlled burning techniques and know how to prevent these fires from spreading to neighbouring areas. However, some of them use fire indiscriminately and, as a result, it spreads to other areas,out of control. Bush, in many cases, is

burned to clear land for agriculture. Illegal logging, though not in large quantities, is still frequent in Desa Nangahale. During field observations, logging was found in mangrove stands, bush and other areas all along the coast. Generally, this logging is limited to the needs of the local community for building materials and firewood. The species mostly logged for construction timber are rosewood, tamarind, and mahogany.

Besides fire and logging, another trigger that contributes to ecosystem destruction in Desa Nangahale is abrasion. According to existing records and local witnesses, abrasion occurs every year. During the last 3 years, it has even destroyed the homes and buildings of people living along the coast. In interviews, several villagers expressed the wish that government or another agency would help in the construction of breakwaters, so as to release Desa Nangahale from the threat of abrasion.In the context of disaster risk reduction, the evidence described above should receive the attention of various agencies, especially stakeholders who have interests in the village, as well as the village community themselves.

Additional information obtained while performing the transect and study of landscape changes in Desa Nangahale included the status of village land. Much of the plantation and other land in the village is leased to Misi Leda Lero Biara (SDV) and PT DIAG (Diosis Agung Ende), who holdLand Use Rights (*Hak Guna Usaha*) and use the land for the cultivation of coconuts and cacao. According to information from members of the community, this HGU status lasts for 25 years and the contract expires in 2013. The village is currently negotiating to acquire the management rights to this land so that it can be managed by the village community. Other information obtained was area status as related to current and future rehabilitation activities in Desa Nangahale.

3.6.3.4 Water Quality

Analysis of water quality in Desa Talibura was performed only at two sources in Dusun Nangahale. The differences lie in their uses (Figure 119 and Table 78). The water at station 1 is used only for washing, bathing, etc. while that at station 2 is used for daily purposes and consumption. Results indicated that the values for DO concentration and temperature at both stations were normal. Both can be used for other purposes, such as washing, bathing and freshwater fish farming. Both had pH values below the upper limit recommended by government and the Health Ministry.However, both had levels of salinity and TDS above the recommended limit.This water did not taste brackish but still needs to be processed first if it is to be consumed. Water at station 2 to be used for drinking should be filtered prior to consumption.

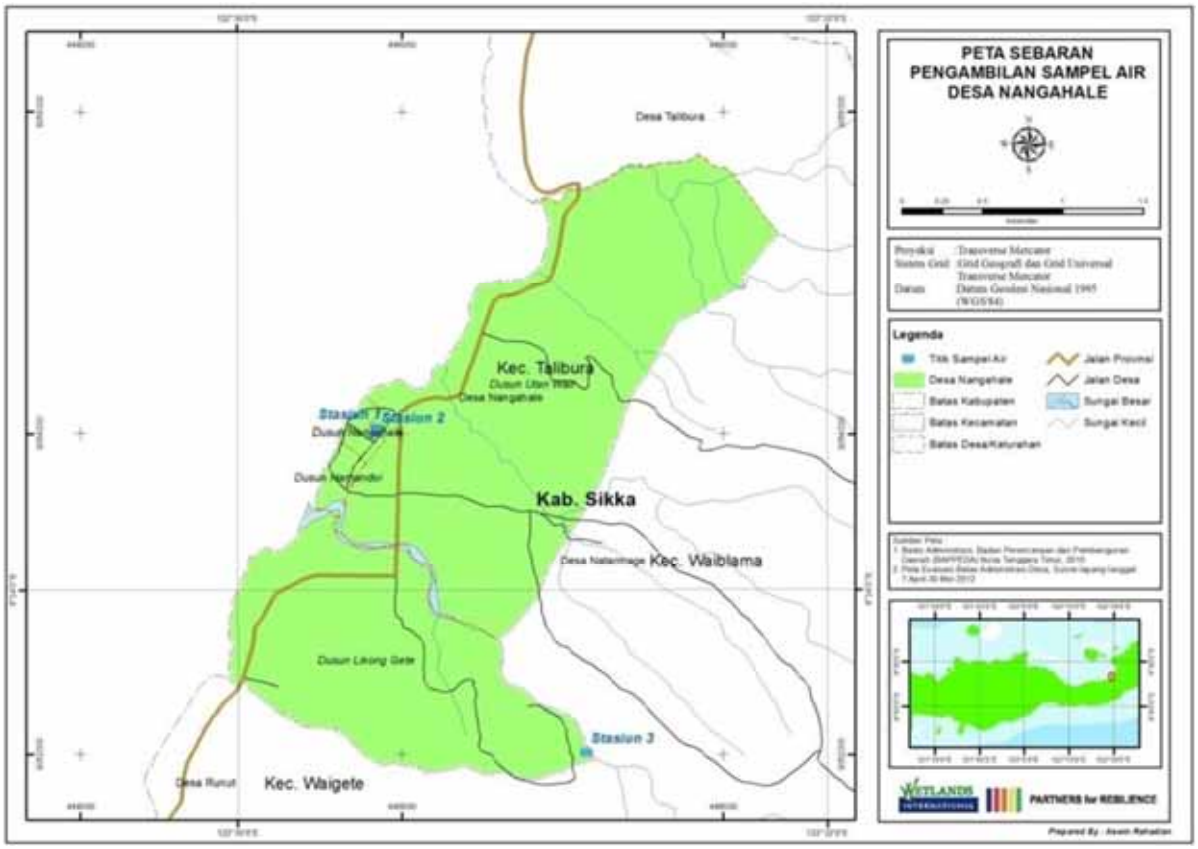


Figure 119. *Map Showing Distribution of Water Sampling Stations in Desa Nangahale.*

Table 74. Results of Water Quality Analysis for Desa Nangahale

Parameter	Unit	Station		*		**	
		1	2	Min	Max	Min	Max
DO (mg/L)	mg/L	5.1	4.3	2	-	-	-
Temperature (°C)	°C	29.8	29.4	-	-	-	Air temperature ±3
Salinity (ppt)	ppt	0.4	0.5	-	-	-	-
TDS (mg/L)	mg/L	795	952	-	1000	-	500
pH	-	8.19	7.77	6	9	6.5	8.5

Notes:

Station 1 : WIIP Representative Office in Desa Nangahale (Dusun Nangahale)

Station 2 : Villager's well (Dusun Nangahale)

* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Pollution Control

** : Potable Water Quality Standard according to Indonesian Health Minister regulation NO.492/MENKES/PER/IV/2010

3.6.4 Disaster, Vulnerability and Capacity of the Desa Nangahale Community

3.6.4.1 Information on Disaster in Desa Nangahale

3.6.4.1.1 History of Disasters and Seasonal Events in Desa Nangahale

Desa Nangahaleis a village fairly prone to a variety of disasters.A disaster occurs almost every year. Details of the disasters that have struck Desa Nangahale during the period 1973-2012 (39 years) can be seen in Table 79.

Table 75. Disasters that have Occurred in Desa Nangahale

Time of Occurrence	Type of Disaster	Remarks	Impact
1973	Extended dry season	• Extended dry season caused harvest to fail	• Failed harvest • Food shortage • Community at risk of starvation
1977	Extended dry season and starvation	• Extended dry season caused harvest to fail	• Failed harvest • Food shortage • Starvation • Distended abdomen, malnutrition • Death
1988	Flood	• Heavy rain for 3 days causing rivers to overflow	• Plants inundated by river water • Failed harvest • Starvation • Distended abdomen • Malnutrition
	Extended dry season	• Extended dry season caused water shortage • Plants died due to lack of water	• Difficulty obtaining clean water • Failed harvest • Community at risk of starvation
2 December 1992	Earthquake and Tsunami	• Started with earthquake. • Sea receded a long way. • Then the tsunami wave came, height about 6 metres	• Infrastructure damaged • 2 persons died • Inhabitants evacuated • Public facilities and infrastructure severely damaged
1993	Flood	• Continuous rain caused rivers to overflow	• Community hit by epidemic of diarrhoea &vomiting • Dengue fever epidemic killed 2 children

Time of Occurrence	Type of Disaster	Remarks	Impact
1994	Flood	• Continuous rain caused rivers to overflow	• Community suffered from epidemics: diarrhoea &vomiting
1997	Flood	• Continuous rain caused rivers to overflow and inundate villagers' homes	• Mains water pipes damaged • Community suffered from epidemics: diarrhoea &vomiting, dengue fever
2000	Flood	• Continuous rain, villagers' homes flooded • Water sources polluted by floodwater	• Community suffered from epidemics: diarrhoea &vomiting
2002	Flood	• Continuous rain for one week. • Rain caused seawater to rise and flow into villagers' homes • Water sources polluted by floodwaters	• Community suffered from epidemic of skin diseases
2003 and 2007	Abrasion	• Big sea waves swept across coastal area	• 33 salt huts badly damaged as a result of abrasion by waves • Fishing boats damaged
2007	Fire	• Fire occurred in Dusun Utan Wair	• 3 homes destroyed by fire
2008	Abrasion		• Salt huts damaged again by action of waves • Shoreline receded 1 metre
	Strong winds	• Occurred during west wind season	• Damage to agricultural crops
2009	Forest fire	• Fire lasted for 2 days. • Caused by clearing of forest for land. • Fire occurred in Dusun Lekong Gete	• Livestock deaths • Plant death
21 September 2009	Earthquake and Tsunami	• Earthquake of force 7.5 on Richter scalerocked Desa Nangahale. • Earthquake was followed by tsunami	• 12 villagers injured

Time of Occurrence	Type of Disaster	Remarks	Impact
11 January 2011 (16.00 local time)	Abrasion	• Heavy rain accompanied by strong winds caused high seawaves.	• 18 homes on the shore's edge swept away by waves • 24 homes in danger of being swept away by waves • 241 villagers evacuated to safer area
28 February 2012	Typhoon	• Rain and hurricane caused damage to several villagers' houses. • Occurred at 12.30 local time	• 12 homes badly damaged • 8 homes slightly damaged • Posyandu and PAUD damaged
14 March 2012	Abrasion	• Heavy rain for 2 dayscaused high waves and caused rivers to overflow	• Sea wall damaged • Damage to large trees, electricity poles, and agricultural crops near the rivers

Source: Laporan PFR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification

From the information in the table above, it can be ascertained that the most frequent disasters in the last 39 years have been flood and abrasion. Floods occurred in 1988, 1993, 1994, 1997, 2000, and 2002, and abrasion in 2003, 2007, 2008, 2011, and 2012. Floods are usually the result of heavy rains that pour down on the village for several days. These increase the volume of river water, causing the rivers to overflow onto the surrounding area, which is agricultural land. As a consequence, the crops die and harvest fails. The increase in river water volume is also caused by the fact that the groundwater recharge zone upstream has been shrinking as a result of illegal logging. However, the cutting down of trees in the forest is now prohibited both by village government and local *adat* institutions.

After the floods recede, another disaster emerges and has recurred almost every year. This is abrasion. During the last 39 years, abrasion occurred in 2003, 2007, 2008, 2011, and 2012. Abrasion usually happens between the months of December and April. The problem has become increasingly difficult because the edge of the beach is lined with salt huts and people's homes, and their owners refuse to move. The reason they give is that the beach is near to their source of livelihood, which is fishing.

The biggest disaster suffered by the people of Desa Nangahale was the earthquake and tsunami in 1992. As a result of this earthquake, the entire population of Pulau Babi evacuated to Desa Nangahale and are now permanent residents of Dusun Nangahale and Namandoi. Another disaster to hit Desa Nangahale was the droughts in 1973, 1977 and 1988. Drought causes plants to die, leading tofood shortages and the threat of famine. This occurred in 1977, with starvation causing bloated stomachs, severe malnutrition and deaths. The latest disaster to strike Desa Nangahale was the hurricane/tornado in February 2012, which caused damage to public facilities and infrastructure, including the early learning centre/PAUD and Posyandu, and to people's homes.

Besides information on disasters during the last 39 years, information on the seasonal events that occur during a year was also obtained from field study. Seasonal disasters in Desa Nangahale are presented in Table 80.

Table 80. Seasonal Disasters in Desa Nangahale

Type of Event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Fire													• Fires frequent in dry season • Hot weather causes air temperatures to rise
Flood													• Floods caused by high rainfall • River water discharge levels rise, so rivers overflow onto neighbouring land
Abrasion													• Occurs during rainy season (west wind) • High sea waves and strong winds
Malaria													• Malaria occurs throughout the year. • Malaria is endemic to NTT
Diarrhoea													• Diarrhoea frequent during transition to dry season • Poor sanitation is one of the causes
Coughs and colds													• Frequent during dry season/ or transition between seasons • Poor air conditions and changeable weather
Chicken Pox													• Occurs during dry season
Conjunctivitis													• Occurs during rainy season • Poor environmental sanitation
Hurricane													• Occurs during the first part of the year, during west-wind season. • Very strong winds
Vomiting& diarrhoea													• Occurs during dry season
Dengue fever													• Occurs in rainy season • Poor environmental sanitation

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification

With reference to the table above, the types of disaster event in Desa Nangahale can be divided into two categories: firstly those that occur in the dry season, and secondly those that occur in the rainy season. Dry season events are forest fire, and epidemics of malaria, diarrhoea, coughs and colds, chicken pox and vomiting& diarrhoea. Fires occur during July-November. They are most frequent in the run up to the start of the rainy season i.e. October to November. During July to September, air temperatures are very high and thereforemany grasslands suddenly catch fire. From October to November, people intentionally burn the land and forest toopen up new land for agriculture, on which they will plant crops in the rainy season. Epidemics that often strike when the dry season arrives are diarrhoea in June to November, chicken pox in August to October, and vomiting & diarrhoea (*muntaber*) in July to October. These three diseases spread through the population as a result of the poor sanitation in their home environment. Coughs and colds usually occur during the transitions between seasons, i.e. April to June when the rainy season gives way to the dry season, then in October to December when the dry season changes to the wet. Coughs and colds result from the changeable weather which reduces the body's resistance to disease.

Rainy season events are floods, abrasion, hurricane, eye infections and dengue fever. Floods, abrasion and hurricane usually occur together as a result of torrential rain lasting several days. In addition, strong winds whip up high waves at sea which then sweep across the shore. Not infrequently, these winds become storms. During the storm and abrasion season, fishers rarely put to sea because they do not want to endanger their lives.Dengue fever is easily transmitted among the villagers as a result of the poor sanitation. Pools of water in ditches together with a generally unhealthy life style make the people easily susceptible to infection by dengue fever. In addition, the disease that attacks the community all year round is malaria, which is endemic to Nusa Tenggara Timur.

3.6.4.1.2 Disaster Impact

The various disasters that have occurred in Desa Nangahale have had a significant impact, both material and non-material. The material losses suffered include deaths, and damage to public facilities and infrastructure, agricultural land, etc. Non-material losses include trauma resulting from disaster, loss of livelihood, changes to the way of life, etc. Information on the impacts suffered as a result of the disasters that have hit Desa Nangahale are summarised in Table 81.

Table 81. Impact of Disasters that have Occurred in Desa Nangahale

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Extended dry season										• Construction of food storage facilities (such as rice barns) at almost every home • Construction started on rainwater storage tanks in agricultural areas when dry season approaches • Coordination with local Office if having difficulty coping with dry season
Famine										• Crop diversification • Community have begun to store part of their harvest for food until the next harvest
Flood										• Ban on tree felling in upstream forest areas, imposed by village government &local *adat* institutions
Abrasion										• Construction of breakwaters along shore • Planting of mangrove and beach plants • Assistance for current victims of abrasion
Earthquake& Tsunami										• Move people in earthquake-prone areas to a safer site
Land and forest fire										• Create regulations to ban the burning of forest and land • Teach the community about land burning and its effects
Typhoon										• EWS now exists to give warnings when there are signs of a typhoon approaching the village • Aid exists for typhoon victims
Epidemic										• Extension services promoting a healthy lifestyle • Public washing/toilet facilities have been constructed • Construction of water sources such as a well at every home

Key: High Medium Low

Besides identifying the impacts of disaster, interviews were also held with respondents toinvestigatetheir perceptions regarding these impacts. This was done by asking them to state their agreement or disagreement with a series of statements. Their responses can be seen in Figure 120.

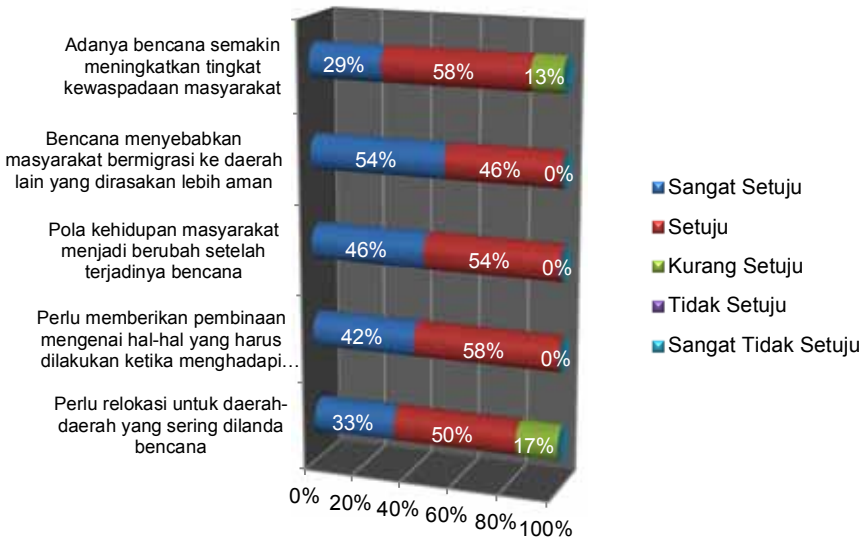


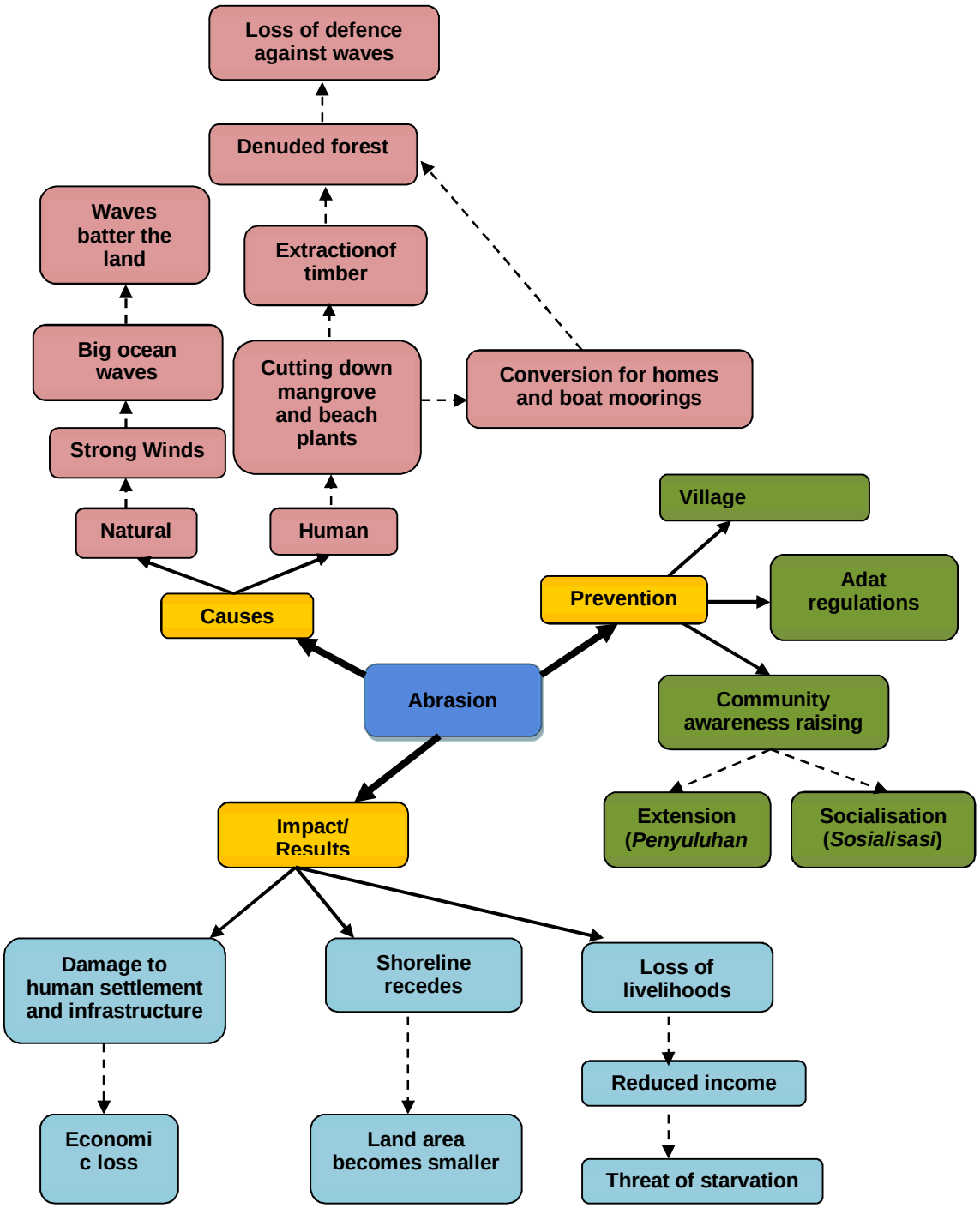
Figure 120. *Respondents' Perception of Disaster Impact in Desa Nangahale*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

Of the respondents, 33% agreed strongly and 50% agreedthat people living in disaster prone areas should be relocated without delay. Homes and salt-huts along the shore's edge should be moved quickly to safer sites, provided that this would not disturb their livelihoods. However, a significant minority (17%) did not fully agree with this.They were more concerned about the ease of access to fishing and salt-making sites. Besides, they were not accustomed to living away from the sea. Those who lived in areas at risk of disaster, especially, were keen to get guidance and training on what to do in the event of a disaster. All the respondents agreed with this recommendation, 42% of them strongly. In addition, they all agreed (54% of them strongly) that they felt safer after migrating to a safer area. One example was the inhabitants of Pulau Babi,who had moved to Dusun Nangahale and Namandoi after the earthquake and tsunami in 1992 and did not wish to return to Pulau Babi, feeling safer in the new place. Another example was the former sea-shore dwellers who had moved and felt that their new home was safer than the old one.

The people's way of life had also changed following various disasters. The biggest change was after the earthquake and tsunami of 1992. All the respondents agreed, 46% of them strongly. For instance, prior to the disaster, the inhabitants often did not care about environmental conservation. Now, however, they are more proactive in protecting and conserving their environment. In the past, fishers had gone to sea much more frequently than now, as the weather is now sometimes unpredictable. The final item was the respondents' perceptions regarding their level of vigilance following the disasters in Desa Nangahale. Most of them agreed (29% strongly agreed, 58% agreed)

that the frequent recent disasters had made them more vigilant, in order to save themselves and their family, and whatever possessions they could, if a disaster occurred. However, 13% did not fully agree with this, saying that they felt just the same as usual and there was no need to worry about disaster occurring.

3.6.4.1.3 Sample Issue Tree for Desa Nangahale



3.6.4.2 Vulnerability in Desa Nangahale

Vulnerability and community capacity are two inter-related components. The greater the community's capacity to cope with a disaster, the lower the disaster risk will be. This capacity can be in the form of physical facilities and infrastructure, and also the community's own attitudes and motivation. Information on vulnerability in Desa Nangahale can be seen in Table 82.

Table 76. Vulnerability and Community Capacity in Desa Nangahale

Variable	Vulnerability	Capacity
Health, Physical ,and Environmental	1. Infertile soil 2. Construction of tarmacked roads without drainage 3. Illegal logging of upstream forest 4. Long dry season 5. Epidemics of diarrhoea, dengue fever, malaria, acute respiratory tract infections, skin diseases 6. Inadequate environmental sanitation and toilet\washing facilities 7. People defecate just anywhere 8. Inadequate use of water sources 9. There are still many homes and salt huts on the beach 10. Houses are huddled together (dirty, crowded environment)	1. Soil preparation equipment, extension services from relevant agencies, dryfield agriculture 2. Some members of the community have started constructing drainage ditches themselves 3. Create *adat* and village regulations banning the felling of trees in forest and near upstream water springs 4. Community construct water storage tanks 5. Extension services on hygiene, people are beginning to live more hygienically and do not defecate just anywhere. 6. Villagers are beginning to have their own toilet and washing facilities. 2 public bathing/toilet facilities have been constructed, 7. There are public washing/toilet facilities 8. – 9. Some have started to move 10. -
Socio-cultural	1. School drop-outs 2. Juvenile delinquency 3. Low quality human resources 4. Gambling 5. Theft 6. Population density	1. - 2. *Adat* institutions, neighbourhood institutions (RT, RW, and dusun), religious approach 3. Improve expertise (soft skill), improve education 4. Police 5. Police **6.** Family planning program
Attitudes and Motivation	1. Disaster response 2. Social jealousy 3. Indifference 4. Laziness 5. Lack of awareness 6. Non-use of sanitation(*MCK*) facilities	1. SIBAT, provision of information about disaster, personal awareness 2. Religious guidance 3. Guidance from *adat*, community and religious leaders 4. Guidance from *adat*, community and religious leaders

Variable	Vulnerability	Capacity
		5. Guidance from *adat*, community and religious leaders 6. Extension services from health agencies and community leaders 7. Guidance from religious leaders
Institutional/ Organisational	1. Improvement needed to inter-institutional relationships 2. Improvement needed to the activities of various institutions 3. Institutions not yet fully accepted 4. Egocentricity prevalent	1. Coordination and negotiation 2. 'Socialisation' 3. 'Socialisation' 4. Extension services
Economic	1. Lack of employment opportunities 2. Inhabitants' incomes still low 3. Insufficient innovation and technology for agricultural, fishery and livestock products 4. Many inhabitants still live in poverty 5. High unemployment	1. Extension services and provision of business capital 2. Livelihood diversification 3. Extension services, 'socialisation'(*sosialisasi*)and dissemination of information and technology. 4. Cash hand-outs (*BLT*) and Family of Hope program(*PKH*), rice for the poor (*beras raskin*), State health insurance scheme (*Jamkesmas*) 5. 9 years free compulsory education, Companies: PT. Mutiara and PT. Diag

Source: Results from identification in the field

The information in the table above was then compiled in the form of a chart, to examine the threats, vulnerabilities, capacities and risks in Desa Nangahale (see Figure 121). From this figure it is apparent that thehighest risk of disaster in this village is fromflood and abrasion. Both these disasters occur almost every year and usually happen when the rainy season arrives.Another relatively high risk disaster in Desa Nangahale is forest fire. Low levels of awareness and ineffective legislation on the banning of logging in the forest are two of the reasons for poor community capacity.

Disasters that the community is now able to cope with quite well are extended dry seasons, hunger, and earthquake with tsunami. To overcome the problems of extended dry seasons, the community have constructed simple reservoirs in the vicinity of their fieldsand have started constructing wells and water storage tanks. To prevent starvation, they have started building barns to store their crops after harvest. As regards earthquake and tsunami, they have begun to understand the natural warning signs of tsunami. From their experience of the 1992 earthquake and tsunami, they have also learnta lot about how to save themselves from such a massive disaster.

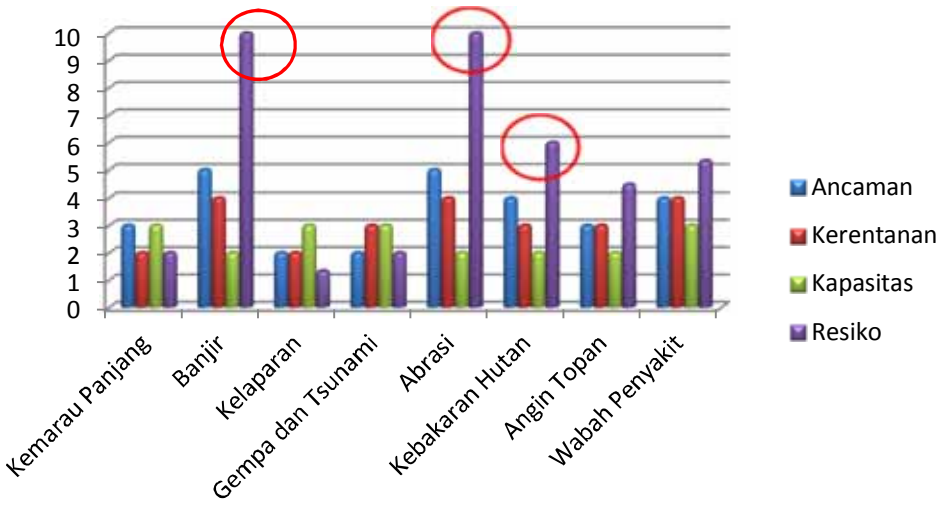


Figure 121. *Disaster Risk in Desa Nangahale.*
Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Extended Dry Season (Kemarau panjang), Flood (banjir), Starvation (Kelaparan), Earthquake and Tsunami (Gempa dan Tsunami), Abrasion (Abrasi), Forest Fire (Kebakaran Hutan), Typhoon (Angin Topan), Epidemic (Wabah Penyakit)

3.6.4.3 Community Capacity in Desa Nangahale

3.6.4.3.1 Early Warning System

Community capacity can be improved by paying attention to early disaster warnings which, it is hoped, can reduce the death toll and losses caused by the disaster. Information obtained from interviews with respondents revealed that 61% of themdid not have any warning information when disasters occurred in Desa Nangahale. Only 7% said they often knew about imminent disasters from weather forecasts on television. When the disaster actually occurred, for example typhoon or abrasion, some said that they got information about it via the beating of a *kentongan* alarm or electricity pole, or announcements from places of worship. Information on respondents' knowledge of early disaster warnings is presented in Figure 122.

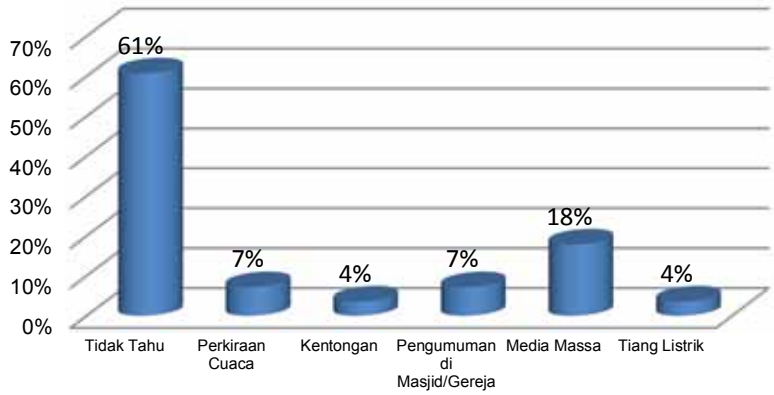


Figure 122. *Desa Nangahale Respondents' Knowledge of Early Disaster Warning*
Caption: Knowledge of Disaster warning (Pengetahuan mengenai Peringatan Adanya Bencana), Did Not Know (Tidak Tahu), Weather Forecast (Prakiraan Cuaca), Kentongan Alam, Announcement in Mosque/ Church (Pengumuman di Mesjid/ Gereja), Mass Media (Media Masa), Electricity Pole (Tiang Listrik)

All the respondents said they would respond well if they received an early warning before a disaster struck.Even those who said they had never known of any early warning stated that they would have responded well had they known. On receiving such a warning, they would take steps to save themselves and their family. Some would also secure important documents such as certificates, land ownership deeds, etc. (39%). Information on actions they would take on receiving an early disaster warning can be seen in Figure 123.

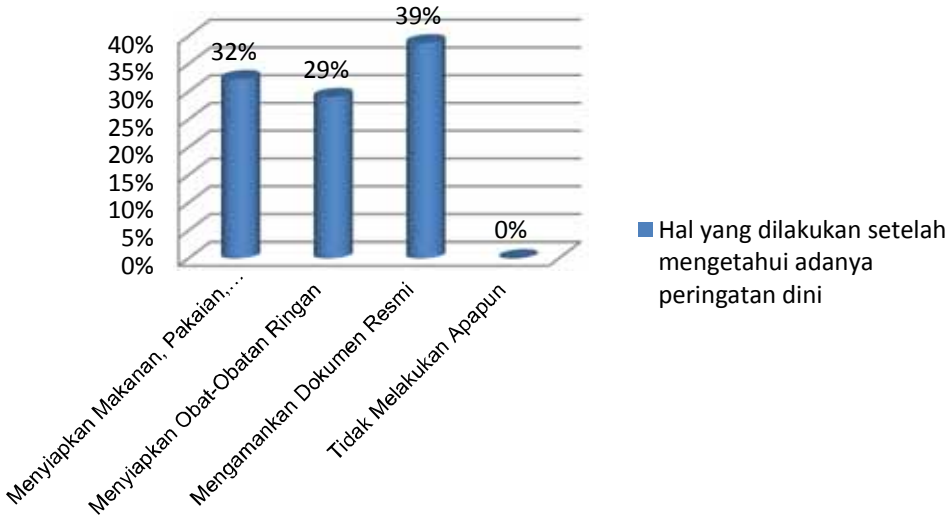


Figure 123. *Actions Desa Nangahale Respondents would Take on Receiving Early Disaster Warning*
Captions: Action taken on receiving early warning (Hal yang dilakukan setelah mengetahui adanya peringatan dini), Prepare food, clothing, clean water (Menyiapkan makanan, pakaian, air bersih), Prepare first aid medicines (Menyiapkan obat-obatan ringan), Secure official documents (mengamankan dokumen resmi), Do nothing (Tidak melakukan apapun)

To save themselves and their family, a large proportion of the respondents (42%) would usually evacuate to a safer place outdoors, such as an open field. Many (33%) would evacuate to the house of a friend or neighbour in a safer area. Just 6% would go to an emergency shelter. This would normally be the village hall (*Balai Desa*). However, 18% would be reluctant to leave their home in the event of disaster. They reasoned that they would be safer in their house than outside. Details of how they would save themselves and their family are presented in Figure 124.

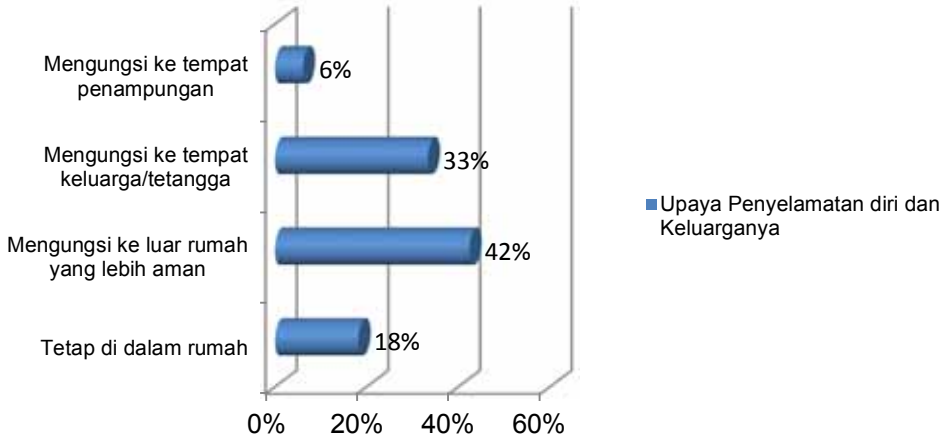


Figure 124. *Efforts that Desa Nangahale Respondents would Make to Save Themselves*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family, neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Stay Inside Home (Tetap di dalam Rumah)

Endeavours to improve community capacity will not progress well unless local government plays a role. Government and community work together to reduce disaster risk and impact in the village. Government has already taken certain measures aimed at reducing disaster impact. These include 'socialisation', simulations, and extension services. However, these have not reached all of the villagers. Information obtained from the questionnaire and interviews shows that when a disaster occurs, the government's action is to provide shelter (38%). Government and villagers together erect emergency shelters at the village office and village hall. They usually also set up an emergency public kitchen to feed the disaster victims. For example, when typhoon struck in February 2012, the Desa Nangahale office was turned into a shelter for those whose homes had been damaged.Besides this, according to respondents, local government also provided evacuation equipment like stretchers, medicines, etc. in cooperation with SIBAT-PMI (30%). 28% of respondents stated that the village government also distributed aid such as food and clothes to disaster victims, and building materials if their homes had been damaged. All assistance from outside must, of course, go through the local government. Nevertheless, there was also a respondent (2%) who said that the government's response was inadequate in that it did not provide any early warning of the disaster. Detailsof respondents' perceptions concerning local government action in dealing with disaster can be seen in Figure 125.

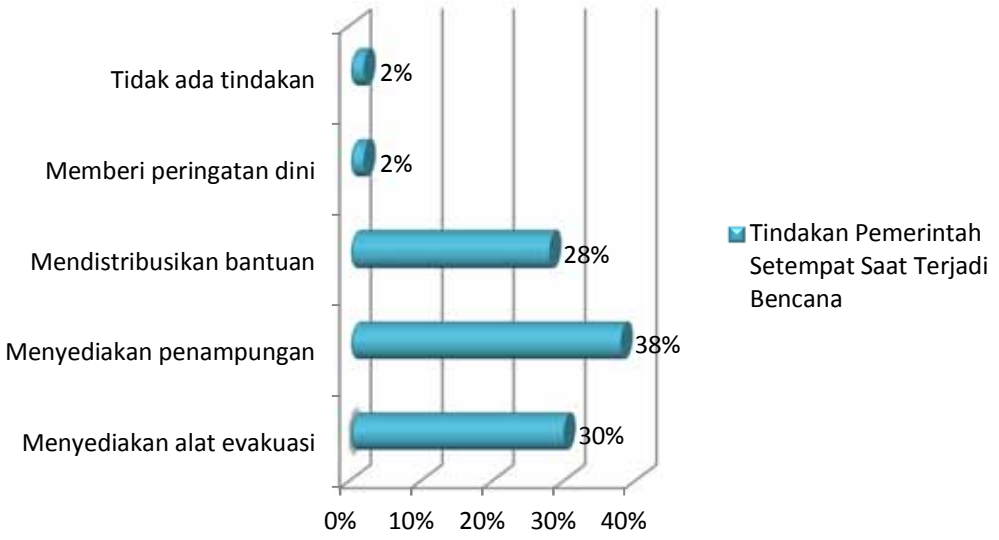


Figure 125. *Information on Action Taken by Desa Nangahale in Response to Disaster. Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), Provided Evacuation Equipment (Menyediakan Alat Evakuasi, Provided Shelter (Menyediakan Tempat Penampungan), Distributed Aid (Mendistribusikan Bantuan), Gave Early Warning (Memberikan Peringatan), No Action Taken (Tidak Ada Tindakan)*

3.6.4.3.2 Access to and Control of Community Assets

In addition to a disaster early warning system, community capacity can be improved if the facilities and infrastructure to be used in a disaster can be accessed easily. This information is vital as these facilities can be used for escape or to support life after the disaster. Information on access to and control of assets that can be used in the event of disaster in Desa Nangahale can be seen in Table 83.

Table 77. Information on Access to and Control of Assets that can be Used in the Event of Disaster in Desa Nangahale

Private Source of Ownership	Accessibility at Time of Disaster								Ownership Control
	Extended Dry Season	Flood	Famine	Earthquake &Tsunami	Abrasion	Forest Fire	Typhoon	Epidemic	
Agricultural Land	No								HGU PT. DIAG
Homes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Father
Furniture	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Mother

Valuables	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Mother
Vehicles	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Father
Clothes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Mother
Food		Yes			Yes	Yes	Yes	Yes	Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father
Fuel	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Father
Valuable Documents									

Public Source of Ownership	Accessibility at Time of Disaster								Ownership Control
	Extended Dry Season	Flood	Famine	ke &Tsuna	Abrasion	Forest Fire	Typhoon	Epidemic	
Places of worship	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Community
Roads	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Community
Market	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Community
Football field	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Community
Village Hall/Office	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Village Government
Boats	Yes	Yes	Yes			Yes		Yes	Community
Water sources		Yes			Yes	Yes	Yes	Yes	Community
Public bathing, washing, toilet facilities	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Community
School buildings	Yes	Yes	Yes		Yes	Yes	Yes	Yes	School Manager

Source: Findings from questionnaire and direct observation in the field

Agricultural land in Desa Nangahale is difficult for the community to access as it is held by PT. DIAG until 2013. Family assets under the father's controlare primary goods like the house, vehicle, monetary savings, and fuel. Secondary goods, like household appliances and furniture, food, clothing, and several items of value, usually come under the mother's control.Most public facilities and infrastructures are usually easier to access as these are in places which belong to the community.Only a few, such as school buildings and the village hall, are under the control of certain agencies, and require a procedure to be gone through before they can be used in response to disaster.

3.7 Desa Kotabaru – Kabupaten Ende

3.7.1 Profile of Desa Kotabaru – Kecamatan Kotabaru

3.7.1.1 General Description of Desa Kotabaru

Desa Kotabaru is in the eastern part of Kabupaten Ende and is also the capital of Kecamatan Kotabaru. Desa Kotabaru is situated at an elevation of 100m asl. The village covers an area of about 19.68 km^2(1968 ha) or 10.9% of the total area of Kecamatan Kotabaru (*Kecamatan Kotabaru dalam Angka Tahun 2012*). According to spatial analysis based on direct observation in the field, however, Desa Kotabaru covers 42.403 km^2 (4240.3 ha). Desa Kotabaru is divided into 4 dusuns: dusun 1, 2, 3, and 4. Dusun 1 and 2 are closer to the main road, dusun 3 to the sea, and dusun 4 to the hills. The administrative map of Desa Kotabaru is presented in Figure 126. Desa Kotabaru borders directly on:

- South : Desa Tou (Kec. Kotabaru-Kab. Ende)
- North : Flores Sea
- West : Desa Ndodo (Kec. Maurole-Kab. Ende)
- East : Desa Tou Timur (Kec. Kotabaru-Kab. Ende)

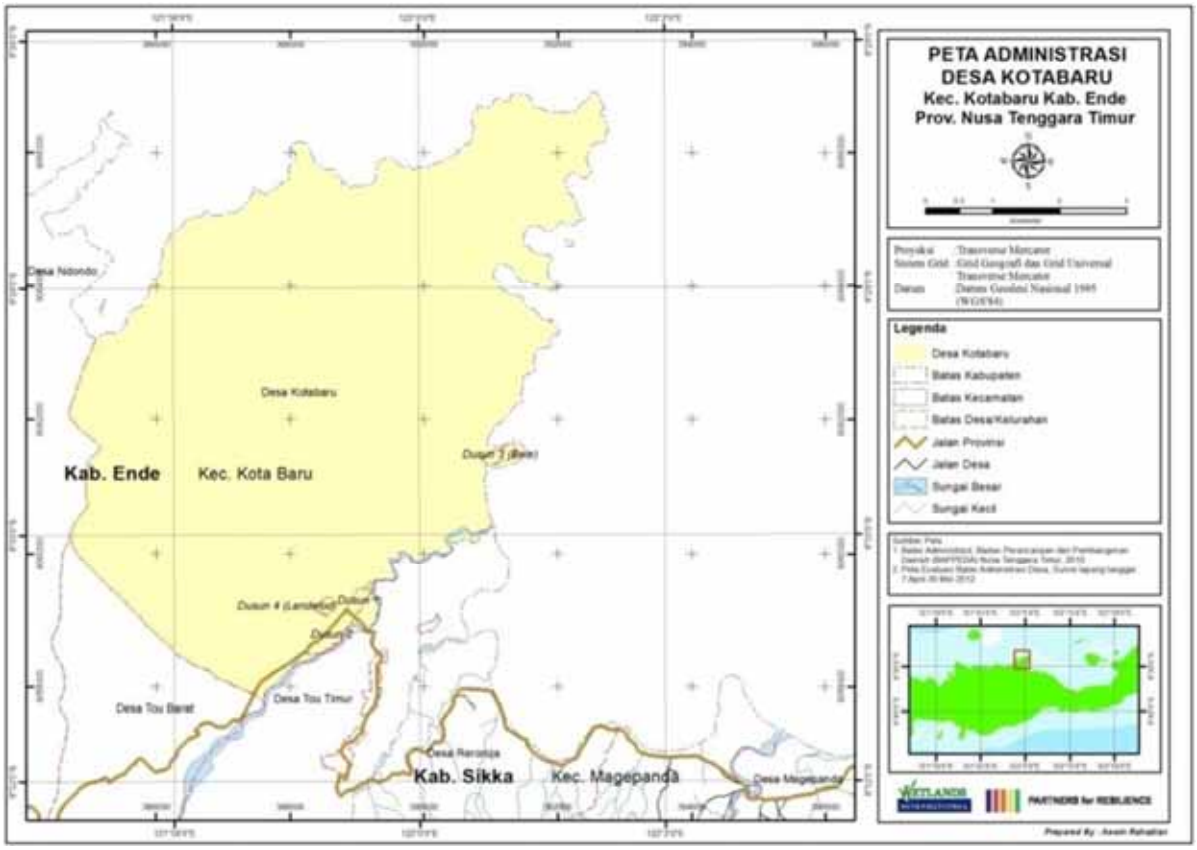


Figure 126. *Administrative Map of Desa Kotabaru.*

Access to the village is quite good. The main, provincial level, road is tarmacked, although its condition has now begun to deteriorate. If nothing is done about this, the road's condition will worsen and become very bad. Desa Kotabaru is closer to Maumere than to Ende. The distance from

Desa Kotabaru to Maumere is around 42 km and can be covered in about 1.5 hours. That from Desa Kotabaru to Kota Ende is 122 km and the journey takes 2-2.5 hours (*Kecamatan Kotabaru dalam Angka Tahun 2009*). Public transport passing the village comprises minibuses and trucks, but these are still infrequent. Most of the villagers tend to travel by motor-cycle, either their own or hired (*ojek*), because it is quicker and easier to find. The village roads between the dusuns are in poor condition, especially the one going to dusun 3. As well as being rocky, this road also needs to be improved as it still consists mostly of soil and sand. When the rainy season arrives, the road becomes muddy and extremely difficult to travel on.

The educational facilities in this village range from primary school (*SD*) to senior highschool (*SLTA* or equivalent). Desa Kotabaru has 2 primary schools (*SD*), 1 junior highschool (*SLTP*), and 1 vocational highschool (*SMK*) for animal husbandry/fishery. Health facilities comprise one maternity clinic (*polindes*) and public health centre (*puskesmas*). The maternity clinic is in Desa Kotabaru and the public health centre in Desa Tou Timur, in Dusun Mulawatu. To get clean water, the inhabitants of Dusuns 1 and 2 use spring water, while those living in Dusuns 3 and 4 use wells. These wells often dry up during the long dry season, as a result of which the inhabitants of Dusun 3 and 4 often lack water and have to journey quite a long way towards Dusuns 1 or 2 in order to fetch water. Not all the people in Desa Kotabaru yet enjoy electric lighting as this has, so far, reached only those living in Dusun s1 and 2 . The main problem is that the infrastructure of electricity poles and cables is not yet able to reach Dusun 3 and 4.

A large proportion of Desa Kotabaru's people are of Lio descent, with a small percentage being migrants from other ethnic groups such as Badjo, Sikka, Maumere, etc. As in Tou Timur, in Kotabaru also the people still hold firmly to their traditions.They still perform the traditional *adat* rituals in their lives, as in Tou Timur. The highest *adat* leader is the Mosalaki or 'land lord'. It is the duty of the Mosalaki to protect and supervise all the traditional *adat* laws and procedures in the village. In addition, local government policies must also be discussed with the Mosalaki before they can be implemented in Desa Kotabaru. The population of Desa Kotabaru was 1583 at the end of 2011, with a population density of 80 individuals/km^2.

3.7.1.2 Institutions in Desa Kotabaru

Institutions in Desa Kotabaru play an important role in the managementof the village's ecosystems. By this is meant primarily management of both the natural and social environments (Table 84). Government institutions (village government, village parliament/*BPD*, andsub-district/*kecamatan*) play an important role in village activities. Programs from central government and other agencies must all involve the local village government. Besides government institutions, the traditional *adat* institutions also have a vital role to play in ecosystem management policy in Desa Kotabaru. The *adat* system is still very strong in this area, so much so that no activity approved by the village government can proceedif the local *adat* institution does not agree to it. The *adat* institution in Desa Kotabaru is headed by the Mosalaki, whose task it is, as the village elder, to lead the community. WIIP is active in the conservation and rehabilitation of wetlands and coastal areas, through the planting of mangroves and beach plants.Another NGO, SwissContact , is working to develop the village's tourism potential. Both these LSM/NGOs in principle aim to develop the village to make it stronger in the face of change and to develop and improve its human resources.

Banks/financial institutions, religious institutions, extension agencies, public health centres (*puskesmas*), socio-political organisations (*sospol*), BPPT and educational institutionsbasically aim at community capacity building to better enable the community to cope with the changes happening in their area. This strengthening of community capacity is done in several fields, including economic, social, capability, etc. No Early Warning System (EWS) has yet been set up in Desa Kotabaru but the community are beginning to realise the importance of having one.

Table 1. Institutions in Desa Kotabaru

Type of Institution	Name of Institution	Type of Service	Ranking
LSM/NGO	WIIP	• Rehabilitation of coastal environments • Reforestation • Community capacity raising through economic activities • Improvement of the village's human resources	4
	Swiss Contact	• Development of tourism potential in the village	2
Banks/ Financial Institutions	Bank NTT	• Savings and loans	2
	Kopdit CU	• Savings and loans	2
	UPK	• Savings and loans	2
	PNPM	• Savings and loans	2
Religious Institutions	Church OMK, KUB	• Religious activities for Catholics • Religious teaching for Catholics	2
Extension Agencies	BPPT	• Agricultural extension services • Provision of seedlings and fertilisers	3
	Gapoktan	• Village farmers' association	3
Government Agencies	Puskesmas	• Health services	
	Sospol	• Social and political education	
	BPPT	• Technological development • Dissemination of information related to agriculture	3
	Kecamatan Office	• Implements government at sub-district level • Issues policies and legislation at sub-district level • Monitors government in each village	3
	Village Government	• Implements village government • Plans Annual Regional Budget(APBD) • Issues village bylaws and policy	4

Type of Institution	Name of Institution	Type of Service	Ranking
	BPD / Village Parliament	• Implements government together with village officials • Plans Annual Regional Budget(APBD) together with village officials • Issues policy and village bylaws • Monitors performance of village officials	3
Educational Institutions	Pre-school :TK/ PAUD (2)	• Education	2
	Primary schools /SD (3)	• Education	2
	Junior highschool /SLTP (1)	• Education	2
	Vocational highschool /SMK (1)	• Education	2
Early Warning System	-	• -	-
Traditional *Adat* Institutions	*Adat Suku Pribumi Desa Kotabaru* (Desa Kotabaru indigenous*Adat* institution)	• Regulations related to socio-cultural life • Regulations on environmental management, etc.	5

3.7.2 Community Profile for Desa Kotabaru

The community profile for Desa Kotabaru was compiled from information obtained from 14 respondents, the majority of whom were male (Figure 127). All adhered to the Catholic faith. Most of them were of Lio ethnicity, while the rest were Adonara (from Adonara Island). Their average age was 34 years, the youngest being 23 and the oldest 47. They had lived in Desa Kotabaru for an average of 34 years and most had lived there all their life.

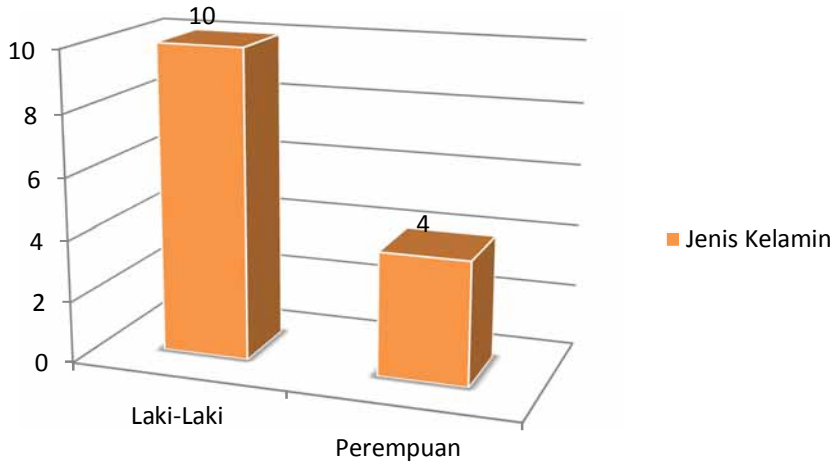


Figure 127. *Gender of Respondents in Desa Kotabaru.*
Captions: Gender (Jenis kelamin), Males (Laki-laki), Females (Perempuan)

Most of the respondents had completed a primary school education, but only a few had gone on to secondary school (Figure 128). Most were married andone was either widowed or divorced (*janda*) (Figure 129). Their average number of dependents was 3. Most worked as farmers so were highly vulnerable to disasters as their livelihoods depended heavily on weather conditions. The other respondents' primary occupations were fisher and housewife (Figure 130). Housewives in Desa Kotabaru also work as farmers. They usually help their husbands in the fields or work as hired farm labourers to add to the family income.

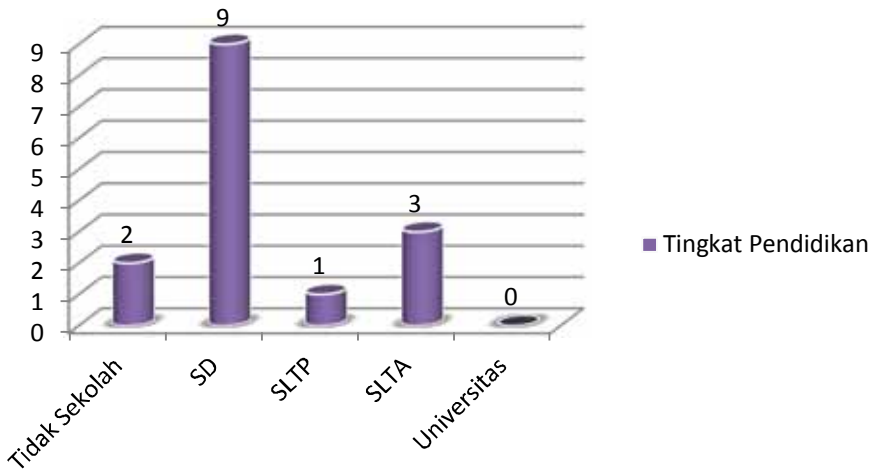


Figure 128. *Educational Level of Respondents in Desa Kotabaru.*
Captions: Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), University (Universitas)

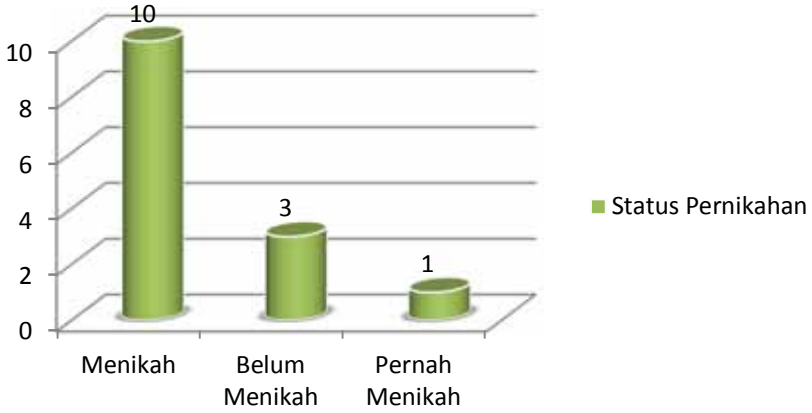


Figure 129. *Marital Status of Respondents in Desa Kotabaru.*
Captions: Marital status (Status pernikahan), Married (Menikah), Not yet married (Belum menikah), No longer married (pernah menikah)

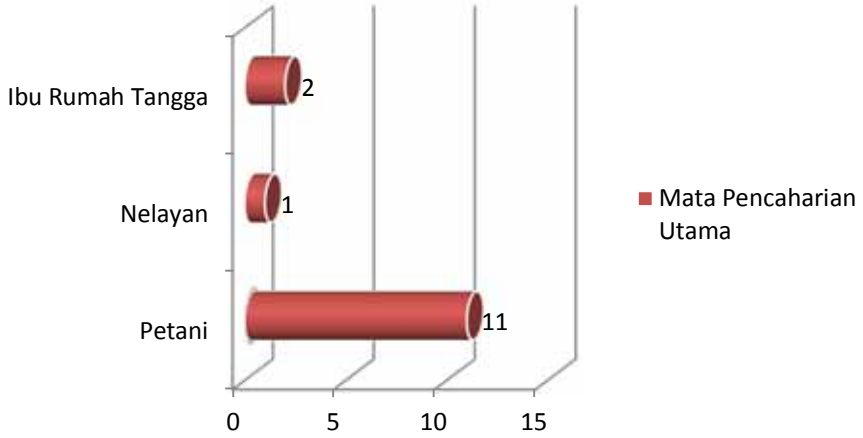


Figure 130. *Main Occupation of Respondents in Desa Kotabaru.*
Captions: Primary occupation (Pekerjaan utama), Ibu rumah tangga (House wife), Seafaring fisher (Nelayan), Faermer (Petani)

Besides working as farmers, fishers or housewives, many of the respondents also had secondary occupations which they did to supplement the family's income. Fishing is the most common secondary occupation for the villagers. They fish at sea mainly in the dry season, when their fields cannot be farmed due to lack of water. However, half of all the respondents interviewed said that they did not have a secondary occupation but just relied on farming (Figure 131). As a result, their monthly incomes were very small and sometimes less than their expenditures. Information on respondents' incomes and expenditures according to occupation can be seen in Table 85.

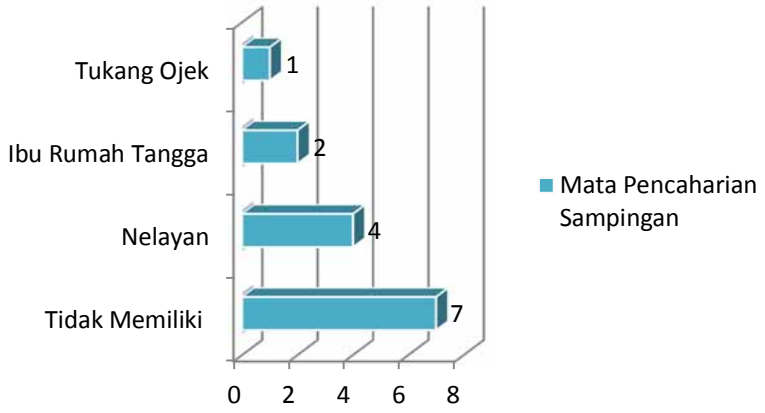


Figure 131. *Secondary Occupations of Respondents in Desa Kotabaru.*
Captions: Secondary occupation (Pekerjaan sampingan), Motor cycle taxi driver (Tukang ojek), Housewife (Ibu rumah tangga), Fisher (Nelayan), None (Tidak memiliki)

Respondents' monthly incomes were mostly less than five hundred thousand rupiah. Very few earned more than this, and none got more than two million rupiah (Figure 132). Similarly, their monthly expenditure was also usually below Rp.500,000. Interestingly, however, the number of respondents who earnt less than Rp.500,000 was greater than the number who spent less than Rp.500,000. Conversely, the number spending Rp.500,000-Rp.1,000,000 exceeded the number who earnt this amount. This indicates that some of them were in financial difficulty as their expenditures

exceeded their incomes. This can be seen in more detail in the data on respondents' financial circulation presented in Table 85. An analysis of Table 85 shows that farmers tended to spend more than they earned. The difference between their monthly income and expenditure varied from Rp.100,000 to Rp.1.5 million. Small-scale farmers and farm labourers earned much less than land owners. Sea fishing (both as a primary and secondary occupation) yielded a reasonable income. Fishers could earn money every day by selling their catch. On average, the price of fish ranged from Rp.10,000 to Rp.20,000 / ikat.

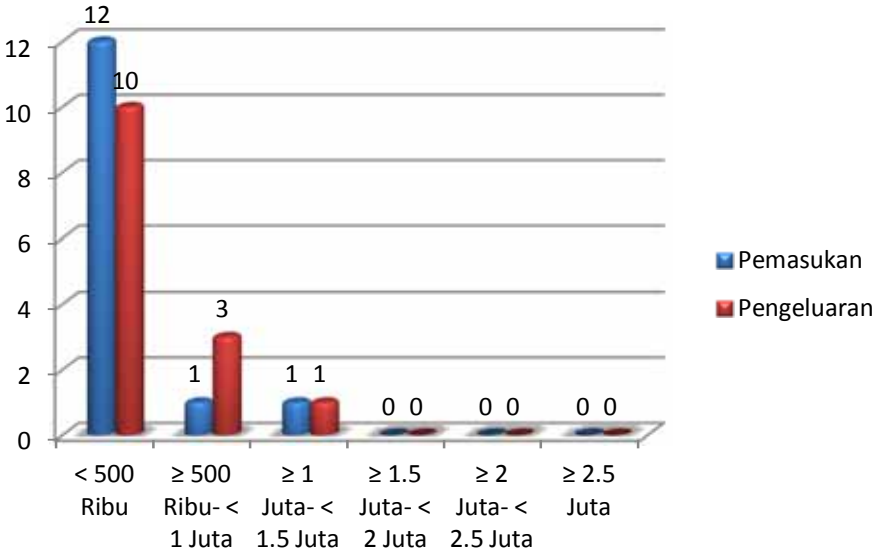


Figure 132. *Incomes and Expenditures of Respondents in Desa Kotabaru.*
Captions: Income (Pemasukan), Expenditure (Pengeluaran), Million rupiah (Juta)

Table 2. Details of Financial Circulation of Respondents in Desa Kotabaru

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Occupation			
Farmer	Rp.100,000-Rp.1,500,000	Rp. 150,000-Rp.1,500,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed
Sea-faring fisher	Rp.300,000-Rp.500,000	Rp. 300,000-Rp.500,000	Clothing, food, health, education, entertainment, capital to repair fishing tackle and boat
Housewife	Rp.300,000- Rp.600,000	Rp.300,000-Rp.600,000	Clothing, food, health, education, entertainment
Secondary Occupation			
Sea-faring fisher	Rp. 300,000		Supplementary income. Usually done by farmers.
Motor-cycle-taxi driver	Rp.100,000-Rp.200,000	-	Supplementary income.

Source: Questionnaire and interviews with respondents

Further investigation and analysis revealed that most of the respondents owned their own home. Some of these had freehold ownership certificates, some did not. Only a few (the 3 who were not yet married) still lived with their parentsor another relative (Figure 133). Most lived in houses that would be classed as non-permanent and barely fit for human habitation(Figure 134), with bamboo walls and earth floors. Only a very few lived in a permanent or semi-permanent building. Few of the houses had a toilet or bathroom (Figure 135). The people would therefore relieve themselves just anywhere, and bathe in the river.

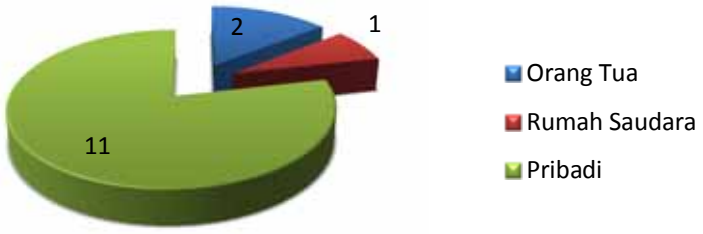


Figure 133. *Home Ownership of Respondents in Desa Kotabaru.*
Captions: Live with parents (Orang tua), Live with a relative (Rumah saudara), Own house (Pribadi)

Figure 134. *Types of Housing of Respondents in Desa Kotabaru.*
Captions: Permanent Building (Permanen), Semi-Permanent Building (Semi Permanen), Non-Permanent Building (Darurat)

Figure 135. *Sanitation Facilities in Homes of Respondents in Desa Kotabaru.*
Captions: With WC and bathroom (memiliki WC dan kamar mandi), Without WC and bathroom (Tidak memiliki WC dan kamar mandi)

The respondents' source of water was from wells dug in the settlement.For cooking, almost 80% of the respondents used firewood as a source of energy. Only a few used kerosene. Not only is kerosene expensive, but they said they felt more comfortable using wood. For lighting, they used oil lamps.However, electricity has now begun to reach village. At present, only those living in Dusuns 1 and 2 can enjoy it. The reason given for the unequal distribution of electricity was the limited access and construction of the electricity infrastructure.

Information on the respondents' assets and debts was also analysed to obtain a description of their level of economic prosperity. The results of these two analyses are presented in Tables 86 and 87. Generally, respondents each owned between 0.5 ha and 2 ha of land, with most of them owning around 0.5 ha. However, there were some farmers who did not own land but usually worked as farm labourers on a production-sharing basis. The main commodities planted are rice and maize. Besides these, they also plant estate crops like coconut and cashew. The agricultural tools they use are still very simple and include mattocks, machetes and hoes. None yet use a tractor, and only a few use buffalo to break up the soil in the paddyfields.Their method of using buffalo to prepare the land differs from that used in Java. In Flores, the buffaloare simply allowed to tramplethe soil, without using any tools such as ploughs. The buffalo are left in the paddyfield for a whole day, while the farmers just sit on the dykes and watch them doing the work. All of the respondents were found to be in the poor to average prosperity category. None were categorised as rich.According to the information obtained, the only member of the community who falls into the 'rich' category is the *adat* leader, the Mosalaki. The Mosalaki controls most of the land in the village, so has bigger harvests and more livestock than the ordinary villagers do.

Table 3. Prosperity Parameters for Respondents in DesaKotabaru Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock per household	More than 20 animals	4-10 animals	1-4 or none
Agricultural yield/harvest (Rice)	More than 50 bags	More than 10 bags	Less than 10 bags
Highest educational level of children	University	Junior & Senior Highschool (SLTP & SLTA)	Primary school (SD) or did not attend school
Type of house	Permanent building (Solid walls, ceramic tiled floor, zinc roof)	Semi Permanent (Timber or halfbrick walls, concrete floor, zinc roof)	Non-permanent (Timber or bamboo walls, earth floor, zinc or thatched roof)
Area of land owned	>10 Ha (Owned by Mosalaki)	2-9 Ha	< 1 ha or none
Agricultural equipment	Tractor	Plough and buffalo	Mattock, machete, hoe
Fishing equipment	Motor boat (*kelong/bagan*) and nets	*Pukat*net and sampan	*Pukat* net, rod and line
Vehicles owned	>2	1	None

As regards debts, very few of the respondents owed money to anybody, whether to family, neighbours or institutions. They prefer to work hard rather than depend on others. Just one respondent owed money to a close relative. Table 87 lists the various sources from which respondents would borrow money if necessary. As regards organisations, all the respondents had begun to acquire the capacity and willingness to organise themselves together. They all participate in at least one (some in more than one) organisation, and have received many benefits from this, particularly in personal development and the improvement of their soft skills.

Table 4. Information on Debts Incurred by Respondents in Desa Kotabaru

Source of Loan	Reason for Borrowing				Annual Interest	Repayment System	Number of Respondents
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service			
Bank	>10 million	Maumere (±30 Km)	• Collateral required • Quite difficult	Good	0.9%-2%	• Depends on size of loan • Usually maximum 5 years	0
PNPM	25 million	Maumere (±30 Km)	• Must be a member of PNPM • Submit loan proposal in advance • Quite easy	Good	1.5%-1.8%	• Depends on size of loan • Maximum 18 months	0
Kopdit Pintu Air	10 million	Maumere (30 km)	• Specific conditions	Good	2 %	• Depends on size of loan	0
Family or neighbours	Variable	Variable	• No binding conditions	Good	0%	• Depends on size of loan	1

3.7.3 Ecosystem Profile for Desa Kotabaru

3.7.3.1 Ecosystems and Natural Resources in Desa Kotabaru

Desa Kotabaru has a fairly flat topography, with 20% of its total area being flat and 26% very steep. Results of the field survey and spatial analysis show that life inDesa Kotabaru is centred on the relatively flat area, with the exception of Dusun 3. This flat topography is highly vulnerable to disaster from flood and tsunami. Information on Desa Kotabaru's topography is presented in Table 88 and Figure 136.

Table 5. Land Area of Desa Kotabarubased on Topography

Gradient	Area (ha)	%
0-8%	846.84	20.0
8-15%	538.79	12.7
15-25%	739.33	17.4
25-40%	1008.51	23.8
>40%	1106.83	26.1
Total Area	4240.31	100.0

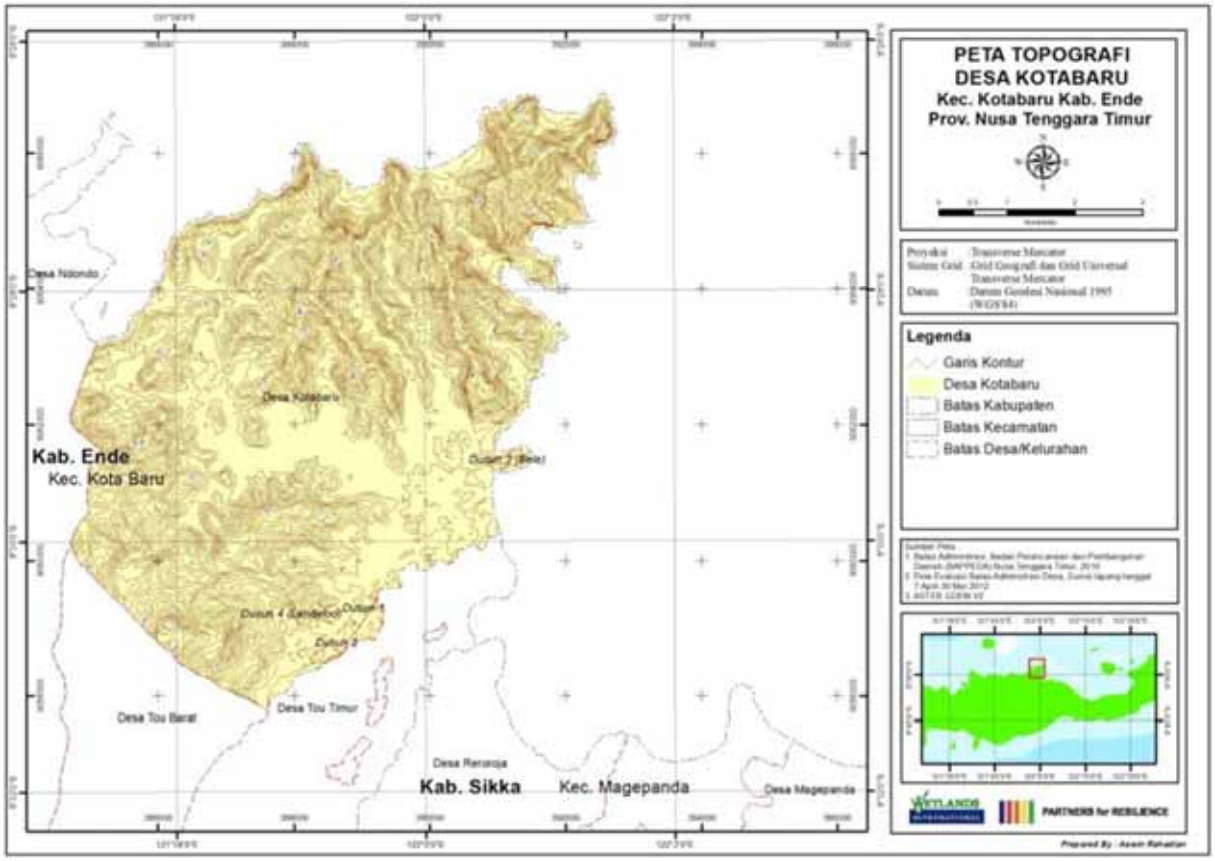


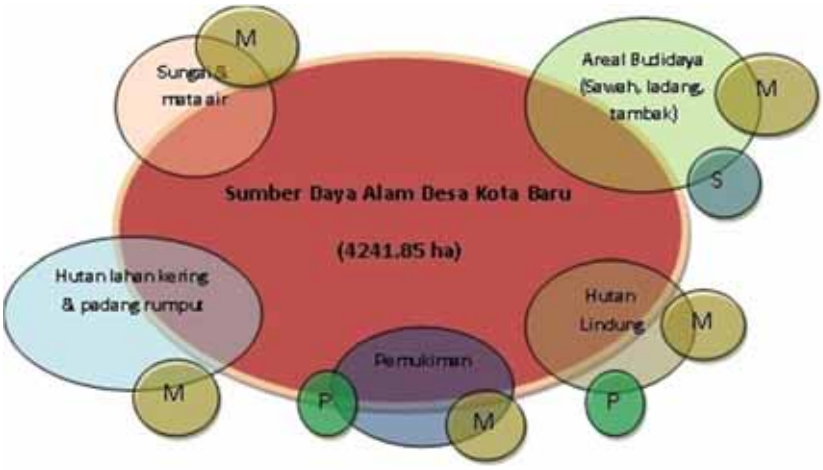
Figure 136. *Topographical Map of Desa Kotabaru.*

Based on the process of their formation, the ecosystems found in Desa Kotabaru can be distinguished into two categories: natural ecosystems and man-made ecosystems. Both cover a range of land-cover classes: human settlement, mangrove forest, mixed plantation, cultivation (dry fields and rice paddies), bush, river, hilly forest (mixed forest) and grasslands. The types and area of ecosystems mapped in the field are presented in Table 89.

Table 6. Types of Ecosystem in Desa Kotabaru

Type of Ecosystem	Area (Ha)	%
Dry land forest	52.44	1.2
Cultivation	702.66	16.6
Bush	695.68	16.4
Grasslands	2643.29	62.3
Human settlement	37.18	0.9
Coastal	20.28	0.5
Mangrove	85.98	2.0
Marine	4.34	0.1
Total Area	4241.85	100.0

Over half of Desa Kotabaru is grasslands (62.3%). These are exploited by the community for their cattle. Farmland is used mainly for growing coconut, cashew and cacao. In the rocky andvegetated hills, the villagers collect wild honey. During the honey season (June–September), up to a thousand bottles of honey can be collected.There are 85.98 ha of mangroveecosystem in Desa Kotabaru, most of which are in quite good condition and more than ten years old. In some places, the mangrove ecosystem needs to be rehabilitated to address the threat of abrasion. A large part of the land in Desa Kotabaru is used for agriculture and the majority of the community live from farming. Much of the natural resources is used directly by the local inhabitants. The relationships between the natural resources and their users in Kotabaru can be seen in Figure 137.



(Key: M = Community, P = Government, S = Private Sector).

Figure 137. *Relationship between Natural Resources and their Users in Desa Kotabaru.*
Captions: Natural Resources in Desa Kotabaru (Natural Resources in Desa Kotabaru), Riversand springs (Sungai dan mata air), Cultivation 9paddy fields, Dry fields, Ponds (Tambak), Dryland Forest and Grassland (Hutan Lahan Kering dan Padang Rumput), Human Settlement (Pemukiman), Protection Forest (Hutan Lindung)
M = Community, P = Government, S = Private Sector

3.7.3.2 Spot Mapping

Desa Kotabaru was mapped participatively together with the community. The purpose of mapping this time was to obtain and supplement information, and to confirm the accuracy of existing data with the community and village government through Focus Group Discussion, in-depth interviews and direct observation in the field. Previous village maps had paid little attention to scale or to proper mapping principles and could be described only as sketch plans. In producing this new map, therefore, participative analysis was integrated with the results of spatial analysis so that the information obtained would be more accurate. Thespot and ecosystem map compiled by the AssessmentTeam together with the community is presented in Figure 138.

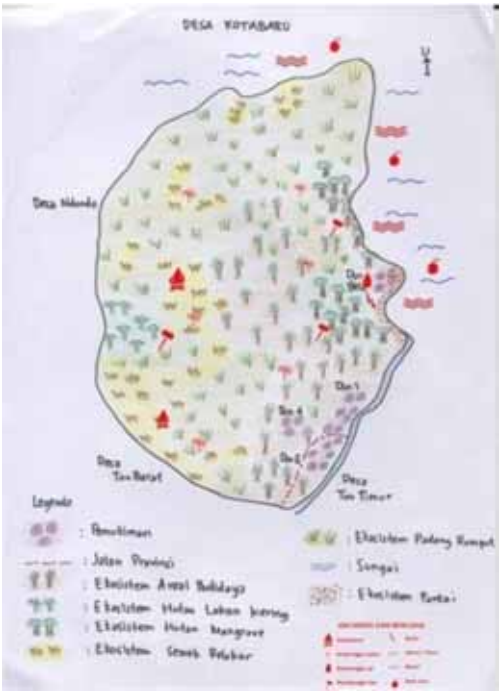


Figure 138. *Spot Map of Desa Kotabaru.*

On this spot map, sites at risk of disaster are indicated by a red symbol. The map was compiled based on the types of ecosystem existing in Desa Kotabaru and the types of disaster threat that could strike the village.Floods occur every year. In 2009, floods and rice pests destroyed paddyfield harvests. In 2010, floods and tornadoes damaged 5 homes. In early 2011, heavy rain caused the river to overflow and flood the nearby paddyfields.In addition, severe drought threatened Dusun Bele. Other threats in Kotabaru include fire, illegal logging, storm, abrasion and fish bombing. Fires often break out in dryland forest and grasslands.Another threat to dryland forest is illegal logging.Several reasons are given for this activity, including: to obtain firewood, to clear a path when hunting, and to clear land for farming.The last of these is usually carried out at the beginning of the rainy season, which is around August-October. The soil becomes arid and water shortages occur when the dry season arrives. This area is highly vulnerable to drought because the dry season is longer than the wet.

3.7.3.3 Transect Mapping and Landscape Change

Like spot mapping, the transect mapping and collection of information on landscape change in Desa Kotabaru were also done participatively. The transect and landscape changes described are the result of the analysis of field observations and spatial analysis. Field observation identified the Desa Kotabaru coast as being generally sandy beach alternating with pebble beach and mud. The transect map and landscape changes in Desa Kotabaru are presented in Figure 139 while information on the ecosystem management dynamics along the transect in Desa Kotabaru are presented in Table 90.

Figure 139. *Transect Map and Landscape Change in Desa Kotabaru.*

Table 90. Transect Map of Desa Kotabaru

	Agricultural Land/ Cultivated Area	**Mixed Plantation**	**Springs**	**Mangrove Forest**	**Hills/ Grasslands**	**Sea**
Land Status	Land in Dusun 1 and 2 belongs to the inhabitants (ownership certificate) Land in Dusun 3 and 4 is communal*hak ulayat*land	Communal *hak ulayat*land, but has been gifted. Land used for housing is *hak ulayat*	Communal *hak ulayat*	Communal *hak ulayat*	Communal *hak ulayat*	State owned
Current use	Rice, maize (in front of house) rain fed	Coconut cashew	For drinking, daily needs; river is not used in the rainy season.	For firewood (in the past), to prevent abrasion, crabsand seafood for personal consumption; some seafood is sold in Maumere	Feed for livestock	Dusun Woloblee for seafarers

	Agricultural Land/ Cultivated Area	Mixed Plantation	Springs	Mangrove Forest	Hills/ Grasslands	Sea
User group	Farmers, farm labourers	Farmers, farm labourers, farmers' group"insaf sadar"	Community	Community crab catchers	Livestock farmers	Seafaring fishers; they have set up a fishers' group called *kotabaru jaya*
Productivity	Rice 6 ton/ha (rain-fed). Maize during period 1 (plantedJan-Feb, harvested in May) higher yield. Maize during period 2 (planted July-August, harvested in Dec-Jan) – the amount planted is only½ that planted during period 1. 15 years ago, the amount of maize planted in both periods was the same	Cashew yields 1 ton/ha. Each household produces about 100-200 kg in 0.5 ha. Each household owns 3-4 plots, each plot measures 0.5 ha. Coconut 0.5 ton copra/ 3months / household Bananas: 1-2 clusters / household	Water source always exists (depth about 6 meter including depth of water) Water in some homes tastes salty, usually where one well is used by a large extended family.	Crabs andseafood used by coastal community in Dusun Woloblee	Plentiful,especially in rainy season. Average number of livestock owned per household:2 cows/ buffalo2 goats, 2 pigs and 2 chickens	Much usedby inhabitants of dusun 3, using traps(*kelong*), nets (*bagan*), rowing boat, motor-boat (*ketinting motor*). Average dailycatchis 5 skewers at Rp. 10,000/skewer (traditional fishers). Net daily profitRp.30,000 ; gross Rp.50,000/day
Constraints	Unpredictable weather, unpredictable rainfall; pests large animals/ livestock	Weather and rainfall Cashew yield increases in March-April and falls as a result of the hot season in June-July.	Dry season, during hot season water becomes murky and salty	Timber extraction for housing, and firewood; abrasion (dominant)	In the dry season, grass turns yellow;at the peak of the dry season it becomes black because it is burnt (grass rejuvenation to stimulate growth of new shoots in the rainy season)	Explosives (fishers from Mageloo-Reroroja) poisons: potassium and tuba roots
Solution/ efforts to overcome the constraints	Rice varieties have to be changed every 3 years			Mangrove rehabilitation; traditional*adat*s hould stress prohibition of cutting down trees, because village regulations are not effective enough		

From Figure 139 it can be seen that from 1960 to 1970 the coastal area of this village was still full of mangrove and hill forests. Clean water springs were plentiful. The forest vegetation gradually declined along with the growth in the number of inhabitants and the clearing of new land for agriculture.People started cutting down trees on the hills and around springs a long time ago.The local people do know about the ban on logging in protection forest, and about the regulations governing the management of buffer zones along rivers, but some do not yet obey them. Besides, mangrove forest management needs to be supported by traditional *adat* regulations in order to maintain and increase the mangrove forestcommunities that are currently dwindling. In 1992, there was an earthquake and tsunami.Mangrove forest in Desa Kotabaru was lost. Abrasion began and much of the hill forest became grassland and critical land. After 1998 (the "reformation" era), the abrasion continued further towards the road and people's houses. Hill forest and grasslands are still burnt every year.Special attention needs to be paid to these issues as part of disaster risk reduction efforts in Desa Kotabaru. For this to happen, cooperation is needed between the various stakeholders in order to reduce the activities that can damage nature and thereby cause disaster in Desa Kotabaru.

Additional information obtained while making the transect in the field included the ownership status of *adat* controlled land in Desa Kotabaru. The Mosalaki has a big influence on this. From interviews with the village head and community leaders it was ascertained that in Dusuns 1 and 2much of the land is owned by individual villagers, who possess legal registration certificates, while that in Dusuns 3 and 4 is traditional community owned*hak ulayat*. No certificates have yet been issued for the *hak ulayat* land.Proof of rights to this land is mostly in the form of tax invoices (SPPT).

3.7.3.4 Water Quality

Analysis of water quality in Desa Kotabaru was performed at several stations. Stations 1 and 2 were samples of waterconsumed by the local people, station 3 was water from mangrove forest, and station 4 was water in the mangrove nursery facilitated by WIIP. Information on the water sampling sites in Desa Kotabaru can be seen in more detail in Figure 140 while the analysis results are given in Table 91. Results of analysis carried out in the field show that water at stations 1 and 2 containsTDS levels above the threshold recommended by the Health ministry for drinking water. Station 2 is near the beach so is more saline than station 1 and therefore tastes a little brackish. Due to its high TDS concentration, water from station 1 should not be drunk for an extended period of time as this would be harmful to health. However, station 2 is the only source of water for people in Dusun 3. Therefore, if it is to be drunk, it should be filtered several times through densely woven cloth to reduce the amount of solids dissolved in it.

Analysis showed low DO levels in the water at stations 3 and 4. These measurements had been taken during the middle of the day, when DO levels are usually at their highest as a result of on-going photosynthesis.It is feared that these low DO concentrations could disturb the growth of organisms and mangrove plants if their oxygen requirements are not met. Water temperature at both stations was found to be suitable for the growth of mangrove. According to Reinnamah (2010),temperature plays a vital role in plant physiological processes. For example, new leaf production in *Avicennia marina* occurs at a temperature of 18-20 ^{o}C and will decrease if the temperature rises above this.*Rhizophora stylosa, Ceriops, Excocaria, Lumnitzera* show optimum growth at 26-28 ^{o}C, *Bruguiera* at 27 ^{o}C, and*Xylocarpus*at 21-26 ^{o}C. Salinity levels at both stations

were good for mangrove growth. However, station 3 comprises paddyfields, where rice growth can be disturbed by high salinity. Therefore, those paddyfields constantly inundated with seawater are no longer suitable for rice and could instead be planted with mangrove seedlings. Rice plants subjected to high salinity become less productive.If the area is made into a nursery for mangrove, then attention must be paid to the supply of fresh water leaving and entering it so as to maintain the appropriate salinity level. Although mangrove species have a mechanism that makes them highly adaptable to salinity, an inadequate supply of fresh water will result in extreme levels of salt in soil and water, which would threaten their survival (Dahuri, 2003).

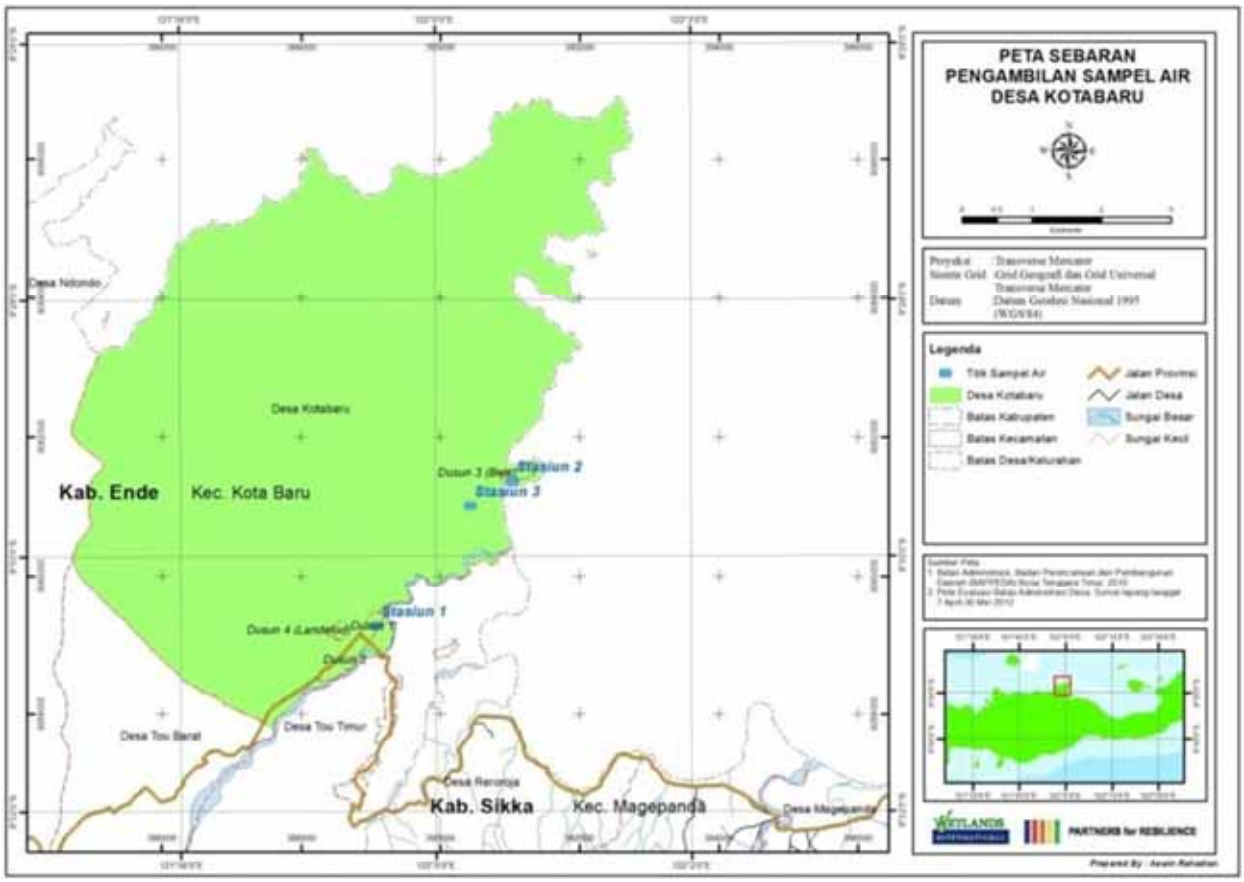


Figure 140. *Map Showing Distribution of Water Sampling Stations in Desa Kotabaru.*

Table 7. Results of Water Quality Analysis for Desa Kotabaru

Parameter	Unit	Station				*		**	
		1	2	3	4	Min	Max	Min	Max
DO (mg/L)	mg/L	4.1	3.6	3.7	1.8	2	-	-	-
Temperature (^{o}C)	^{o}C	30.1	27.4	28	28	-	-	-	Air Temperature ±3
Salinity(ppt)	ppt	0.3	0.5	31.1	31.7	-	-	-	-
TDS (mg/L)	mg/L	606	1105	47800	48600	-	1000	-	500
pH	-	7.51	8.09	8.49	8.62	6	9	6.5	8.5

Notes:

Station 1 : Community well (Dusun 1)

Station 2 : Community well used for drinking water (Dusun 3)

Station 3 : Water in paddyfields inundated with seawater

Station 4 : Water in Mangrove forest

* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Pollution Control

** : Potable Water Quality Standard according to Indonesian Health Minister regulation NO.492/MENKES/PER/IV/2010

3.7.4 Disaster, Vulnerability and Capacity of the Desa Kotabaru Community

3.7.4.1 Information on Disaster in Desa Kotabaru

3.7.4.1.1 History of Disasters and Seasonal Events in Desa Kotabaru

Desa Kotabaru is one of the villages on Kabupaten Ende's north coast that is frequently hit by disasters. Almost every year there is a disaster, whether in the wet season or dry. Information on Desa Kotabaru's disaster history is presented in Table 92.

Table 8. History of Disasters in Desa Kotabaru

Time of Occurrence	Type of Disaster	Remarks	Impact
1969	Flood	• Several days of continuous rain caused river to overflow	• Damage to crops • Loss of livestock
1991	Flood	• Several days of heavy rain • River overflowed and inundated residential area	• Loss of property • Damage to agricultural land • Loss of livestock

Time of Occurrence	Type of Disaster	Remarks	Impact
Every year	Drought	• Dry season lasted longer than rainy season • Rainy season was limited to just the month of February • March – June : drought due to low discharge from springs, so the community suffered from water shortage	• Crops fail, resulting in food shortages • Decreased discharge from springs. • Many animals die • Malnutrition in children
Every year	Fire	• Dry season causes grass to become dry and highly susceptible to fire • Fire usually occurs in the hills • Forest fires are usually the result of intentional burning to clear land	• Damage to grasslands in the hills • Reduced sources of feed for livestock
1992	Earthquake and Tsunami	• At about 2pm, the air temperature suddenly felt very hot • Then there was very strong shaking followed by huge sea waves (tsunami)	• Loss of human lives • Loss of property • Destruction of agricultural land
2001	Flood	• Continuous rain caused water to overflow	• Damage to agricultural land • Loss of livestock
2010	Anthrax	• Anthrax outbreak began by people eating the meat of dead buffalo • Spots appeared on the skin of those who had eaten the meat; the spots grew larger. • The enlarged spots formed blisters and burst • The burst blisters developed into ulcerous wounds	• Many people with anthrax suffered from swollen hands and itching • Many cattle, buffalo and pigs died
2012	Hurricane / Tornado	• Occurred in March • Occurred as a result of climate change • Preceded by 3 days continuous rain, which were followed a night of very strong winds	• 5 houses badly damaged, trees blown over (cashew, coconutand big trees), agricultural land damaged • Electricity poles blown down, causing a total electricity and communications blackout that lasted 1 week

Source: Laporan PFR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

From the table above it can be seen that the most frequent disasters have been flood, drought and fire. Floods result from high rainfall intensity over a period of several days. Because the soil does not easily absorb water, the rainwater overflowing from the rivers reaches people's homes. When the dry season arrives, it seldom rains and the amount that falls is very small, thus causing drought.As a result, much of the agricultural land and water sources dry up. The most frequent threat from this is failed harvests and starvation. Land and grassland fires occur every year due to the irresponsible behaviour of local inhabitants. They do this to clear land. The burnt land will then be planted when the rainy season arrives.One negative impact of this is that the burnt land becomes unproductive. After it has been used for a few years, it will simply be abandoned.

In 1992, almost all the areas bordering directly on the Flores Sea were impacted by tsunami, including Desa Kotabaru.The people did not know the natural or other signs of an impending tsunami. As a result, many died because they did not have time to escape.Based on that experience, the community are now getting to understand nature's tsunami warning signs. An anthrax epidemic struck this village in 2008. According to the head of the local *Puskesmas* public health centre,anthrax is endemic in theKotabaru district. This epidemic started with the sudden death of buffalo, which the people then ate.Shortly after eating this meat, they began to feel the first symptoms of anthrax, blisters that broke to form ulcerated wounds. The epidemic was quickly tackled by the local health authorities. To prevent another outbreak, they promptly disseminated information to the public and sprayed the cattle sheds and land. They also administered anti-anthrax vaccine tothe surviving livestock to prevent transmission of the disease to other animals.

A disaster that has only recently struck this village is tornado. This whirlwind arrived suddenly so many people did not have the chance to save themselves. It happened at night when people were resting.According to information gained in interviews, people chose to stay put at home because they were afraid of being hit by falling trees or electricity poles if they went outside. Losses caused by this disaster were not insignificant.

Besides disaster history, information on routine seasonal disasters throughout the year were also analysed. This information can be seen in Table 93. Disasters occurring during the rainy season include flood, malaria epidemics, acute respiratory infections, and plant pest attack, while those occurring in the dry season are fire, diarrhoea, skin infections, eye infections and withered flowers.

Table 9. Information on Seasonal Disasters that Often Occur in Desa Kotabaru

Type of Event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Fire													• Fires frequent in dry season with high temperatures • Usually occur towards the peak of the dry season, i.e. August-October • During those months, fires result from two types of cause: intentional and

Type of Event	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	unintentional • Unintentional fires occur spontaneously as a result of extremely hot weather • Intentional fires are set to clear land for agriculture
Flood													• Floods caused by high rainfall • Floods occur at the peak of the rainy season when rainfall is very heavy and it rains almost every day
Malaria													• Malaria is common during the rainy season • Malaria is endemic to Nusa Tenggara Timur
Diarrhoea													• Diarrhoea is common during the fruit season (dry season) • Diarrhoea is mostly caused by unhygienic/poor sanitation and eating habits
Acute Respiratory Tract Infections (*ISPA*)													• Frequent during rainy season • Throat complaints, flu, coughs and colds are the most common forms of ISPA
Skin diseases													• Occur in dry season
Eye infections													• Occur in the hot season
Rice pests (caterpillars, brown plant hopper, green padi bug and stalk borer)													• Pests attack if the rainy season is irregular
Withered flowers (cashew)													• Occurs in dry season • Flowers wither due to lack of water to the plant

Source: Laporan PfR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012).

Floods usually occur when the rainy season reaches its peak, around January-March. These months are near to the main harvest-time, which is around March-April. If the rice plants are flooded in March, the harvest could fail. To anticipate this, simple irrigation using rainwater has been initiated.In addition, reforestation is being done along the river banks, although rice is still planted nearby.Pests attackalmost at the same time as floods. If rainfall is irregular, plant pests will come.This poses a severe threat to crops, especially rice that is ready for harvest. Preventive measures and direct action in the field have been done with the involvement of the relevant agricultural agency. These include pest control extension services and the provision of pesticides.Epidemics of malaria and acute respiratory tract infections also regularly afflict the community. Almost every member of the village community has suffered from malaria at some time.Respiratory infections tend to be more common among children and infants. These epidemics usually occur at the end of the rainy season. At this time, the weather is changeable and the amount of dust is rising, leading to less healthy conditions.

Fires regularly occur during the dry season.Some of these are due to natural causes and a few to human activity. Extremely high air temperatures heat up the grasslands and forest. Continuous friction between plants or tree branches can spark off a fire. When land fire is at its height, air conditions around the village deteriorate. As a result, many people suffer from eye diseases and respiratory tract infections. Moreover, in the dry season, water sources are very difficult to find, leading to a deterioration in the village's environmental health. Many people get skin diseases because of poor sanitation.The flowers of estate crops can wither in the dry season, which reduces the harvest.

3.7.4.1.2 Disaster Impact

Information on disaster impact was obtained from in-depth interviews with the public. Their perceptions of the impact following various disasters were also analysed. Information on disaster impact in Desa Kotabaru is presented in Table 94.

Table 10. Disaster Impact in Desa Kotabaru

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on tree felling in upstream forest areas, imposed by village government & local *adat* institutions
Drought										• Ban on tree felling in vicinity of springs, imposed by village government & local

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
										adat institutions • Villagers have begun to construct wells near their homes
Earthquake& Tsunami										• Move people in earthquake-prone areas to a safer site
Hurricane/ Tornado										• Keep away from places with many trees
Fire										• Enforce ban on uncontrolled burning of forest and hilly areas • Extinguish fires as soon as they start, where known, to prevent them from spreading
Anthrax										• Dissemination of information on anthrax • Ban on the eating of dead animals • Free medical treatment for anthrax sufferers • Disinfection and vaccination of livestock in and around the area hit by anthrax
Crop Pest Attack										• Provision of information and pesticides by the relevant agency
Epidemics										• Extension services promoting a healthy lifestyle • Public sanitary facilities (*MCK*) have been built • Construction of water sources such as a well at every home
Withered flowers										-

Key: igh dium

Floods have a huge impact on land and harvests. No less important is the resultant drop in job opportunities.Failed harvests lead to loss of livelihood and thus loss of income.Floods also threaten the supply of foodstuffs, rice in particular. In addition, there is the impact on infrastructures and public facilities if the floods reach human settlements.Efforts at flood prevention have now started, one example being a village bylaw banning the felling of trees in upstream areas.

As with floods, drought also has a direct impact on agricultural land, harvests, and on people. Fields become dry and crops can fail to reach harvest.Worse conditions occur when crops cannot be planted if the dry season goes on for too long, even extending into the following dry season. The impact of drought on human beings can be devastating as lives depend so heavily on water. If people lack water, their enthusiasm for work declines as the fields they farm are dry. Eventually, health and other activities such as study will also be disturbed. Besides drought, fires and tornadoes also impact on farmland. Tornado can blow over tall trees (estate crops like coconut, cashew, tamarind) and poles. This is particularly dangerous if these fall where there are people or houses.

Earthquake accompanied by tsunami has had an enormous impact on the lives of the Desa Kotabaru community. This event caused human deaths, devastated fields and crops, and deprived people of their livelihoods as it destroyed so much of the rural infrastructure. To reduce the impact of possible future tsunamis, the local government has prohibited the building of homes in areas at high risk of tsunami, such as the shore's edge. However, some people have refused to comply with this regulation and still build their homes close to the beach.The anthrax epidemic had an impact directly on the villagers and their activities. The worst impact was death. It is therefore important that efforts be made for experts to teach the community about anthrax in order to prevent a recurrence of this epidemic.

There was a wide variation in people's perceptions concerning disaster impact (Figure 141). Not all the respondents agreed ("strongly agree" and "agree" responses) that their homes or fields in disaster-prone areas should be moved to safer areas.As many as 15% respondents"disagreed" and 8% "strongly disagreed".Their reason was that this land had been handed down to them from their ancestors so could not be just abandoned.Another reason was the distance from the new site to their workplace. For example, fishers wanted to be near the sea so preferred to construct their homes along the shore.Besides, they did not choose to migrate to a safer area but to stay where they were. Another reason was the difficulty of moving their possessions to another place. However, it cannot be denied that after so many disasters hitting their village the community's way of life has changed. Roughly equal numbers of respondents agreed and disagreed with this statement. However, the majority did agree that they were more alert to disaster warning signs in nature as a result of all these disasters. Only 8% said they felt "the same as usual" (*biasa saja*) but several (23%) ignored natural warning signs of disaster. They were of the opinion that these things were normal and nothing catastrophic would happen so they need not worry.For this reason, almost 80% of respondents ("strongly agreed" 54% and "agreed" 23%) stated that they wanted guidance on what to do before, during and after a disaster.

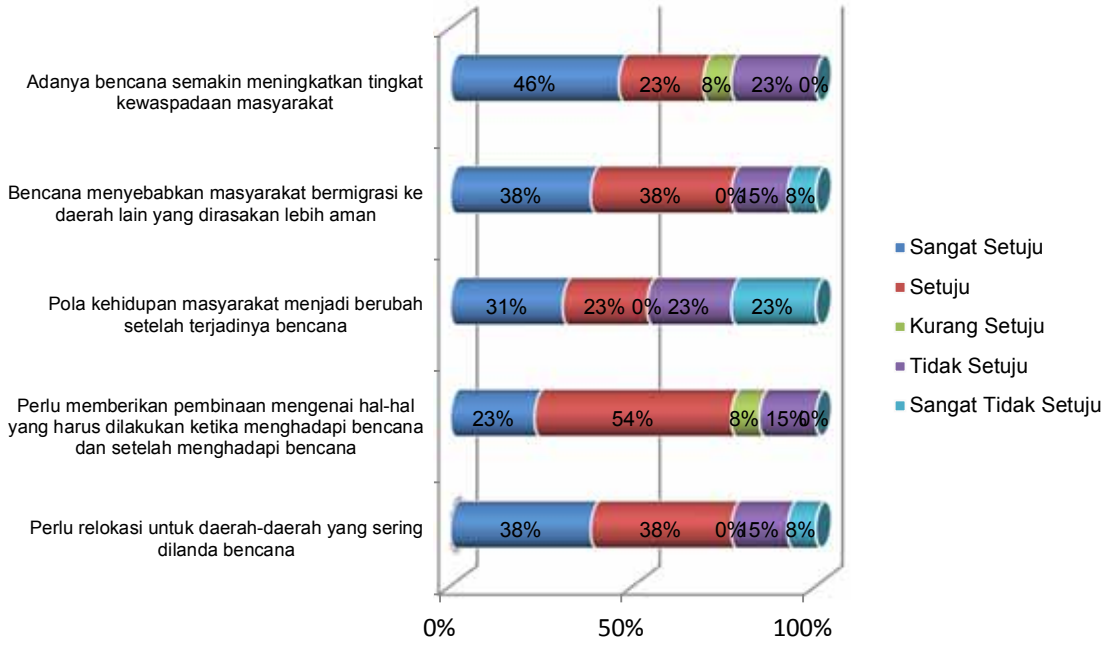
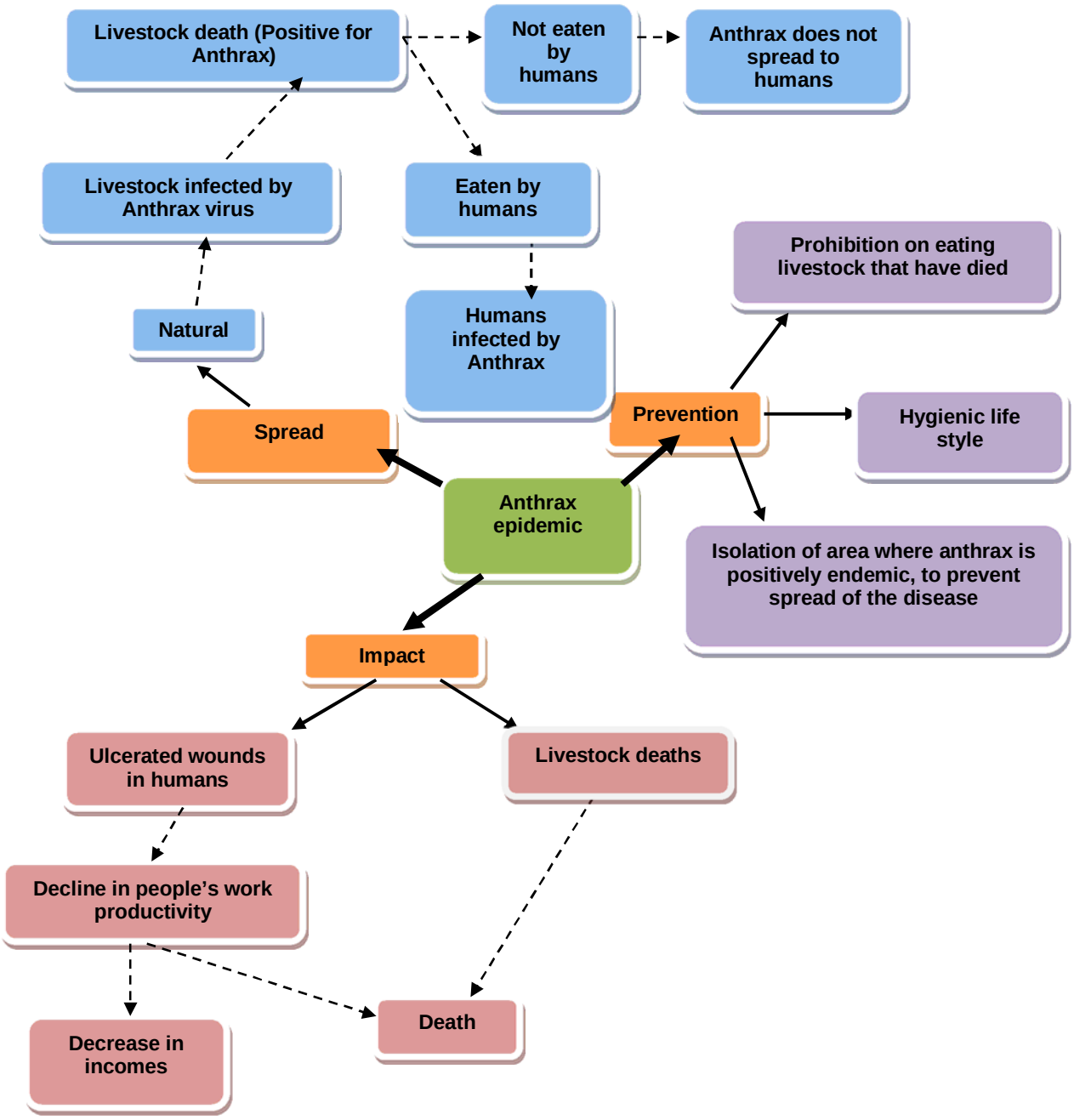


***Figure 141**. Respondents' Perception of Disaster Impact in Desa Kotabaru.*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

3.7.4.1.3 Sample Issue Tree for Desa Kotabaru



3.7.4.2 Vulnerability in Desa Kotabaru

Vulnerability analysis in Desa Kotabaru was the same as in the other villages. Information on vulnerabilities in Desa Kotabaru was obtained through interviews and questionnaire completionby a number of respondents deemed to represent the entire village community. In addition, information was supplemented by direct observation in the field. The information collected is presented in Table 95 in the form of a vulnerability matrix.This matrix also includes local community capacities, both those already implemented and those that will be implemented.

Table 11. Vulnerabilities and Capacities of the Desa Kotabaru Community

Variable	Vulnerability	Capacity
Health, Physical condition,and Environment	1. Infertile/arid soil in Dusun 3 2. Inferior road construction (still mostly dirt tracks) 3. Logging of hill forest 4. Grass and forest fires in hill forest 5. Long dry season 6. Difficulty in obtaining water sources, especially in Dusun 3 7. Epidemics of anthrax, malaria, acute respiratory tract infections and skin diseases 8. Environmental sanitation and sanitary facilities (MCK) still few 9. People defecate just anywhere 10. There are still many homes on the beach 11. No source of lighting	1. Soil preparation equipment, extension services from relevant institutions, dryfield agriculture 2. Some roads have been compacted/tarmacked, but this is limited to about 20% of total road length. Good roads exist only in Dusuns 1 and 2. 3. Create *Adat* and village regulations banning the felling of trees in hill forest 4. Create *Adat* and village regulations banning the burning of trees and grass in the hills, especially when clearing land for agriculture. 5. Community have constructed water storage tanks and have begun to dig a main well in Dusun 3 6. Natural resources 7. Extension services on hygiene, people are beginning to pay more attention to hygiene & do not defecate just anywhere 8. Villagers have begun to construct their own private sanitary facilities (MCK) but not every house has one yet 9. There are sanitary facilities (MCK) in several houses, which can be used by the community 10. Mains electricity has been installed inthe village but onlyas far as Dusuns 1 and 2. People in Dusuns 3 and 4 use oil lamps for lighting
Socio-cultural	1. School drop-outs 2. Low quality human resources 3. Gambling 4. Alcoholism	1. 9-years compulsory education program and aid from BOS (this program is still being promoted) 2. Improvement of expertise (soft skills), education, extension services 3. – 4. -

Variable	Vulnerability	Capacity
Attitudes and Motivation	1. Disaster response 2. Indifference 3. Laziness 4. Insufficient awareness of the need for environmental conservation 5. Non-use of sanitation (MCK) facilities	1. Stilldone traditionally from person to person and using mobile phones 2. Religious guidance 3. Guidance from traditional *adat,* community and religious leaders 4. Guidance from traditional *adat,* community and religious leaders, extension services and 'socialisation'(*sosialisasi*) 5. 'Socialisation'and extension services on hygiene
Institutional/ Organisational	1. Improvement needed to inter-institutional relationships 2. Improvement needed to the activities of various institutions 3. Institutions not yet fully accepted 4. Egocentricity still prevalent	**1.** Coordination and negotiation/discussion **2.** 'Socialisation' **3.** 'Socialisation' **4.** Extension services
Economic	1. Lack of employment opportunities 2. Inhabitants' incomes still low 3. Insufficient innovation and technology for agricultural, fishery and livestock products 4. Many inhabitants still live in poverty 5. High unemployment	1. Extension services and provision of business capital 2. Livelihood diversification 3. Extension services, 'socialisation', and dissemination of information and technology 4. Cash hand-outs (*BLT)* and Family of Hope program*(PKH)*, rice for the poor (*beras raskin*), State health insurance scheme (*jamkesmas)* 5. 9 years free compulsory education

Source: Results from observation in the field (2012)

From the analysis, it can be ascertained that physical vulnerabilities rank top compared to the other types of vulnerability.The main issue in physical vulnerabilities is the availability and ease of access to infrastructure, such as sanitary facilities, roads, lighting, and irrigation. In the socio-cultural vulnerability category, the problem is related to habits, in that most of the village community still have inappropriate habits. For example, drinking alcohol and gambling are considered normal behaviour. As a result, work productivity is low and the village economy underdeveloped. The attitudinal and motivational vulnerability related to disaster needs serious attention. Many of the inhabitants do not care about the conservation and preservation of the village's ecosystems. For example, setting fire to forest and cutting down trees are considered commonplace activities.The local people also clear mangrove forest for fishery or for a place to put boats.Serious effort is needed to improve the attitudinal and motivational capacity to love the environment. So far, institutional vulnerability has started to be addressed through various types of coordination between local government and other agencies in Desa Kotabaru. As regards economic vulnerability, local government and outside agencies have begun to encourage efforts aimed primarily at improving the villagers' level of prosperity.

Information on the risk from disasters that have occurred in the village was also analysed quantitatively in order to ascertain the potential extent of disaster risk to the village. Results of the analysis can be seen in Figure 142. The disaster having the biggest risk potential is tsunami. The threat and vulnerability are high and are not accompanied by high community capacity. There are still many people living in areas vulnerable to earthquake, tsunami, or both. Tsunami struck the village in 1992 so the people are not used to experiencing this kind of disaster. The contrary is true for floods, drought and fire, all three of which occur regularly every year so the people are used to dealing with them.

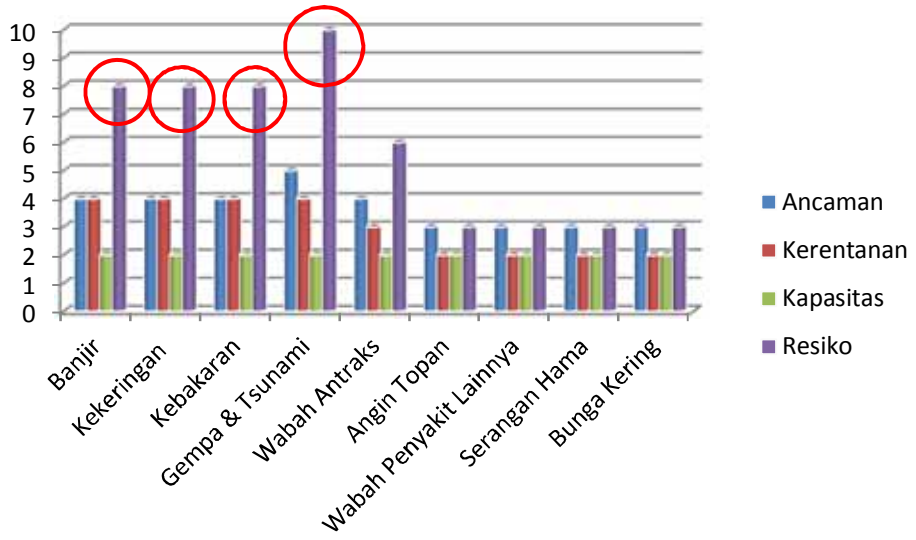


Figure 142. *Threat, Vulnerability, Capacity and Risk of Different Types of Disaster in Desa Kotabaru*
Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Flood (banjir), Drought (Kekeringan),Fire (Kebakaran), Earthquake and tsunami (Gempa dan tsunami), Anthrax epidemic (Wabah antraks, Typhoon (Angin topan), Other epidemics (Wabah penyakit lainnya), Pest Attack (Serangan hama), Flowers wither (Bunga kering)

3.7.4.3 Community Capacity in Desa Kotabaru

3.7.4.3.1 Early Warning System

The Desa Kotabaru community's knowledge of EWS covered a variety of perceptions. This information was obtained through a questionnaire completed by a number of respondents considered to represent the whole community. Analysis of the results indicated that 65% of respondents never knew there would be early warning signsbefore each disaster that hit the village. The others stated that they usually got warnings from several sources, including weather forecasts or signs they could read in nature, public places such as places of worship, the mass media, and simple warnings like the beating of *kentongan* alarms or electricity poles. Details of this analysis can be seen in Fugure 143. Most respondents did not know that there would be an EWS in the village. In other words, the EWS in Desa Kotabaru is not yet sufficiently developed. Desa Kotabaru needs a system whereby specific tasks are assigned and which ensures that in each dusun there is a designated group or individual who forms part of the EWS.

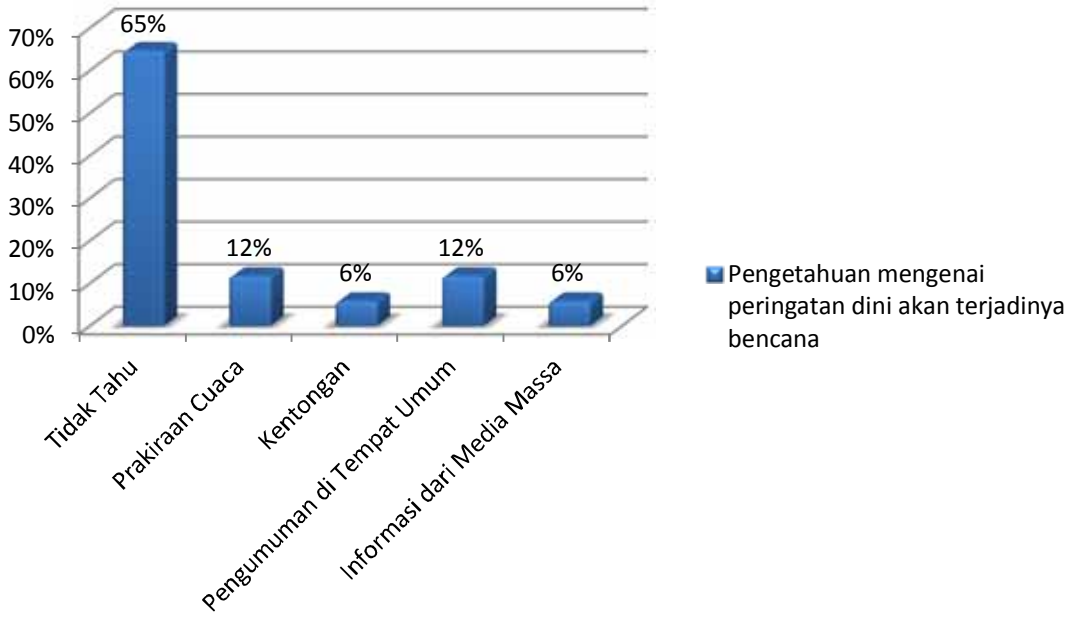


Figure 143. *Desa Kotabaru Respondents' Knowledge of Early Disaster Warning*
Captions: Knowledge of Disaster Warnings (Pengetahuan Mengenai Peringatan Adanya Bencana), Didn't Know (Tidak Tahu), Weather Forecast (Perkiraan Cuaca), Kentongan Alarm (Kentongan), Announcement in Public Place (Pengumuman di Tempat Umum), Mass Media (Media Massa)

If they had known a disaster was coming, said all the respondents, they would have responded very well and prepared everything that it was important to save. For example, if floods were imminent, they would not allow their livestock to go near the river. As an another example, if there were warning signs of a catastrophic disaster such as tsunami, they would promptly leave their homes and seek a safer place, taking with them their family and valuables like money, jewellery and important documents. Information on efforts respondents would make to save themselves and their families in the event of disaster are presented in Figure 144.

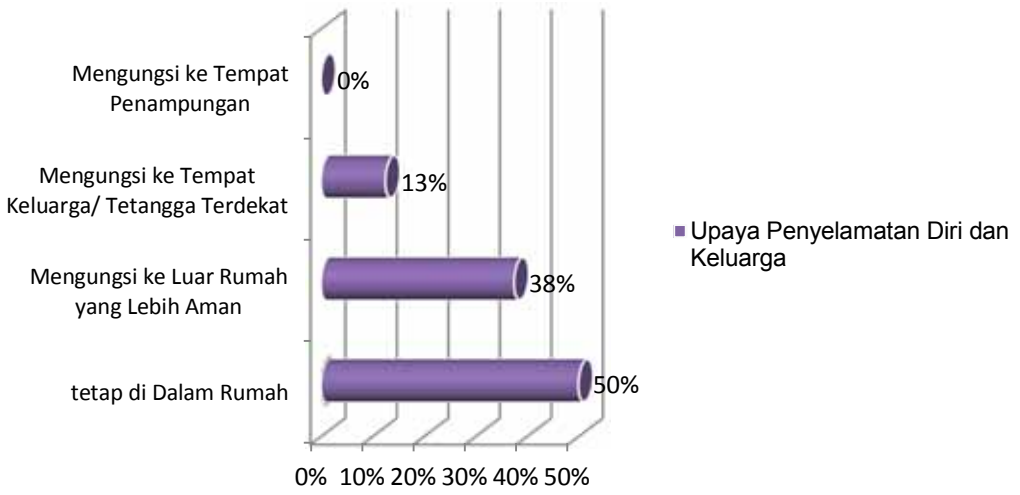


Figure 144. *Actions Taken by Desa Kotabaru Respondents to Save Themselves*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family, neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Stay Inside Home (Tetap di dalam Rumah)

According to the table above, 50% of respondents chose to stay at home. They believed that this was the safest place to be. Another alternative was to go to a safer place like a hill or open field, if the disaster was such that it forced them to find a place of refuge outside their home. A third alternative was to seek refuge in the house of a neighbour or friend nearby.They would not go far from their house and possessions for fear that something would happen to them. None of the respondents chose to go to an emergency shelter because Desa Kotabaru does not have any buildings designated for this purpose.

An EWS will not be developed if it is only the community who contribute. Local government and other relevant agencies have equally important contributions to make and roles to play in developing an EWS in Desa Kotabaru. According to some of the respondents, local government has begun to contribute to an EWS. Respondents' perceptions varied on whether local government had distributed aid, supplied evacuation equipment to look for victims, and provided an emergency shelter. Details of these responses can be seen in Figure 145. Interestingly, a small minority of respondents (7%) stated that local government had never taken any action either before (EWS) or after any disaster. This may be because information did not reach all members of the community, particularly those living far from the centre of government (Dusuns 3 and 4).

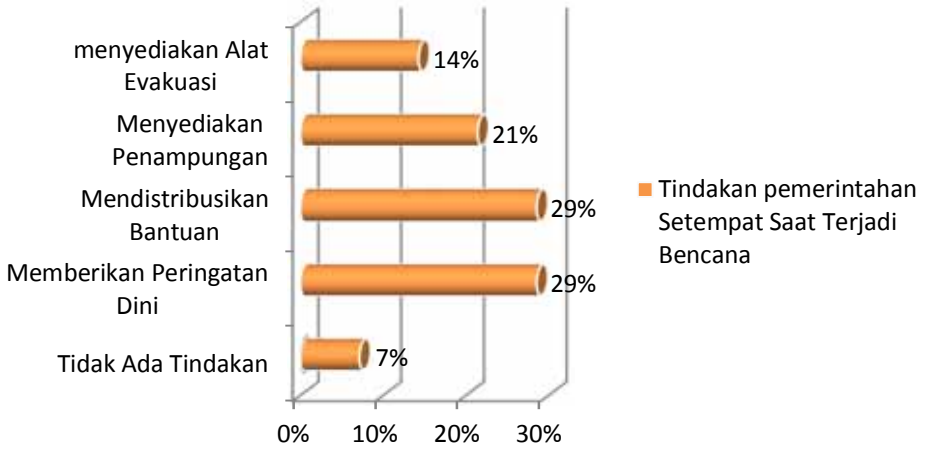


Figure 145. *Information on Action Taken by Desa Kotabaru Government in Response to Disaster Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), Provided Evacuation Equipment (Menyediakan Alat Evakuasi, Provided Shelter (Menyediakan Tempat Penampungan), Distributed Aid (Mendistribusikan Bantuan), Gave Early Warning (Memberikan Peringatan), No Action Taken (Tidak Ada Tindakan)*

3.7.4.3.2 Accessto and Control of Community Assets

Ease of access to facilities, infrastructure and information on who controls the facilities in the village will be of great help in reducing the impact of a disaster. When all those facilities are needed but access is very difficult, the impact of the disaster is likely to be great. Such facilities include a range of things used to save oneself and find safety. For example, village buildings can be used as emergency shelters, motor-cycles can be used for escape, savings can be used to buy life's necessities, etc. Information on access to and control of assets that be used in the event of disaster in Desa Kotabaru can be seen in Table 96.

Table 12. Information on Access to and Control of Assets that can be Used in the Event of Disaster inDesa Kotabaru

Source of Ownership	Accessibility at Time of Disaster								Ownership Control
	Flood	Earthquake and Tsunami	Drought	Fire	Anthrax Epidemic	Typhoon	Pest Attack	Epidemic	
Agricultural Land						Yes	Yes	Yes	Father
Homes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Furniture	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Mother
Valuables	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Vehicles	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father
Clothes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother

Source of Ownership	Accessibility at Time of Disaster								Ownership Control
	Flood	Earthquake and Tsunami	Drought	Fire	Anthrax Epidemic	Typhoon	Pest Attack	Epidemic	
Food				Yes	Yes	Yes		Yes	Father, Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Fuel	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Valuable Documents	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Source of Ownership	**Accessibility at Time of Disaster**								**Ownership Control**
	Flood	**Earthquake and Tsunami**	**Drought**	**Fire**	**Anthrax Epidemic**	**Typhoon**	**Pest Attack**	**Epidemic**	
Places of worship	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Roads	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Market	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Football field	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
Village Hall/ Office	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Village government
Boats	Yes				Yes		Yes	Yes	Communitywith prior permission from owner
Water sources	Yes			Yes		Yes	Yes	Yes	Community
Public bathing, washing, toilet facilities	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community
School buildings	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Community with prior permission

Source: Questionnaire findings and direct observation in the field

According to the information obtained, in the event of earthquake and tsunami, it is likely that few if any facilities, private or public, could be accessed, due to the enormous force and speed of the disaster. In the case of epidemics, almost all facilities could be used because of the time gap which makes it possible to take action. During other disasters, some facilities would be accessible and others not.

3.8 Desa Tou Timur – Kabupaten Ende

3.8.1 Profile of Desa Tou Timur – Kecamatan Kotabaru

3.8.1.1 General Description of Desa Tou Timur

Desa Tou Timur is the part of Kabupaten Ende closest to Kabupaten Sikka. Desa Tou Timur borders directly on Kabupaten Sikka, at Desa Reroroja. Desa Tou Timur was established in 1996 as a result of the growth of Desa Tou. Administratively, however, it did not officially separate from Tou until 1998. Tou Timur covers an area of ± 13.458 km^2 (1345.8 ha) (*Kecamatan Kotabaru dalam Angka Tahun 2012*). However, according to spatial analysis based on field observation, Desa Tou Timur covers 19.77 km^2 (1977.07 ha). The boundaries of Desa Tou Timur are as follow:

- South : Desa Hangalande and kabupaten Sikka
- North : Flores Sea
- East : Desa Reroroja (Kec. Magepanda-Kab. Sikka)
- West : Desa Kotabaru and Desa Tou (Kec. Kotabaru-Kab. Ende)

The exact administrative boundary between Desa Kotabaru and Desa Tou Timur is still unclear because the two villages are part of a single *adat* system. Declaration of a detailed boundary led to conflict which it has not yet been possible to resolve. As a result, it is not yet possible to determine a boundary between the two villages. An administrative map of Desa Tou Timur can be seen in Figure 146. Desa Tou Timur is divided into four dusuns: Dusun Pise, Dusun Ratebobi, Dusun Mulawatu, and Dusun Wolotou. At the time when this assessment was carried out, Desa Tou Timur was bordered only by Dusun Wolotou where Danau Bowu lakelies (Figure 147). Danau Bowu lakeis around 2 km from the sea. Although relatively close to the sea, the lake water does not taste salty. The lake covers an area of ± 12 ha and has high potential.The local inhabitants make use of its natural products, comprising fish (*tilapia,* gourami and *gabus*),shellfish and eels, which they eat each day. They also sell their catch to provide a contribution to the family income.

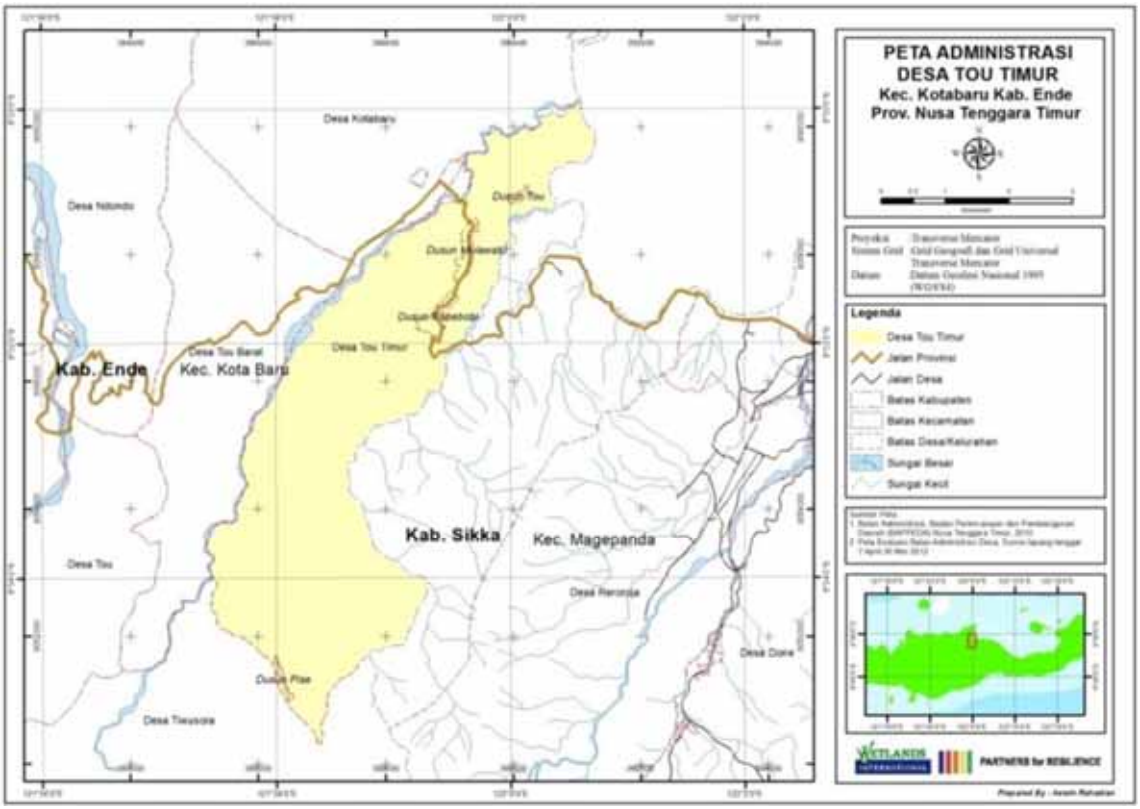


Figure 146. *Administrative Map of Desa Tou Timur.*

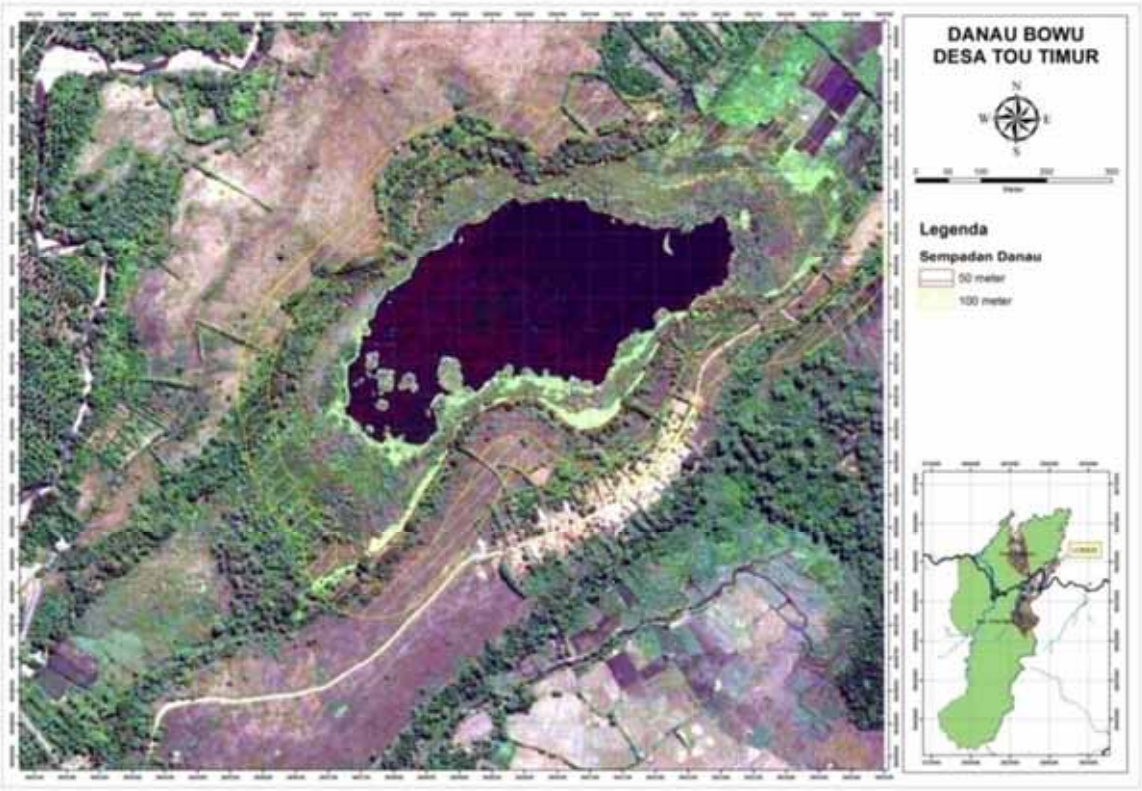


Figure 147. *Location of Danau Bowu Lake*

The inhabitants of Desa Tou Timur belong to the Lio Lise and Lio Ende tribes. They originate from the Wolowaru area in the southern part of Ende. The economic activity of Tou Timur's people, in particular those in Dusun Wolotou, is still dominated by agriculture and plantation crops.They also fish, both at sea and in Danau Bowulake. Some villagers work as construction labourers, farm labourers, unskilled labourers, motor-cycle taxi drivers or livestock farmers. All these activities are aimed at increasing the family income, which is generally quite low.The *adat* system and laws are still strongly held in Tou Timur. *Adat* ceremonies and customs are held for a range of occasions, including harvest-time, the beginning of the farming season, births, deaths, conflict resolution, etc. These are directed and presided over by the Mosalaki. The Mosalaki is both the land owner and *adat* chief in Tou Timur. Besides the Mosalaki, there is also the leader of the Lio tribe, known as the Riabewa. In Dusun Wolotou only, the people do not have any rights to the land. All the land they farm and live on belongs to the Mosalaki. They are given permission to use the land but not to own it.They are still given the right to apply to the *kelurahan* village office for land certification known as *Girik*.

Facilities and infrastructure in Desa Tou Timur are not yet evenly spread throughout the village. Although the main road to the village is tarmacked and in reasonably good condition, the roads between the dusuns are not. For example, the road to Dusun Wolotou (Danau Bowu lake) is in very poor condition, being constructed from earth and stones. The distance from the village to the *kecamatan*(sub-district) is about 3 km, which can be covered in 5 minutes by motor vehicle. Desa Tou Timur is closer to *Kabupaten* Sikka than to *Kabupaten* Ende. The journey to Kota Maumere (the capital town of *Kabupaten* Sikka) takes around 50 minutes, a distance of roughly 40 km, whereas to get to the capital of *Kabupaten* Ende, about 125 km away, takes around 3 hours.

Educational facilities in the village are limited to buildings for PAUD (early learning), kindergartenand primary school. Those wishing to go on to junior or senior highschool (SLTP or SLTA) must go to the town of Maumere. There is a PAUD building in Dusuns Ratebobi and Wolotou, a kindergarten in Dusun Mulawatu, and a primary school in two dusuns:Dusun Pise and Dusun Muawatu. As regards health facilities, Desa Tou Timur possesses a *Puskesmas*public health centre in Dusun Mulawatu. This *puskesmas*has an ambulance and facilities for inpatients. The market opens only twice a week, on Thursdays and Saturdays, so these are the only times when the villagers can shop for cooking needs, such as vegetables and spices. For worship, they normally use the chapel. Desa Tou Timur's government facilities are currently under renovation. The office includes a village hall where villagers can gather to discuss issues or make decisions.

3.8.1.2 Institutions in Desa Tou Timur

As in Desa Kotabaru, the taking of decisions related to environmental management is mostly done on the basis of *adat* rules (Table 97). *Adat* institutions in Tou Timur are more binding than the role of local government.Before a program or activity can be carried out, all the permits must first be agreed by the local *adat* leaders.In addition to *adat* institutions, the village government and village parliament (BPD) also have an important role to play in environmental management. The disaster risk reduction program currently underway in Desa Tou Timur is not free from the participation of local *adat* and government institutions. All the activities included, like those from NGOs, must go through both these institutions. The NGOs in Desa Tou Timur are WIIP and Ausaid. Both are involved in disaster risk reduction but in different ways. WIIP is concerned with the rehabilitation and improvement of the environment, particularly along the coast through the planting of mangroves and other beach plants, while Ausaid plays a role in increasing the community's capacity through the improvement of maternal and child health.

Banks/financial institutions, religious institutions, extension agencies and educational institutions work to enhance the community's resilience and strength in dealing with whatever change might occur, particularly climate change. This improvement in human resources quality is intended to make Desa Tou Timur a village that can stand firm in the face of a variety of changes, both environmental and social. No early warning system has yet been officially set up in this area. There is as yet no institution or agency that is in charge of or possesses a program specifically focused on creating an early warning system, even though an EWS is very important, considering how frequently disasters occur in the Desa Tou Timur area.

Table 13. Institutions in Desa Tou Timur

Type of Institution	Name of Institution	Type of Service	Ranking
NGO	Wetland International Indonesia Program (WIIP)	• Rehabilitation of coastal environments • Reforestation • Community capacity raising through economic activities • Improvement of the village's human resources	4
	Ausaid (AIPMH)	• Maternal and child health	
Banks/ Financial Institutions	Kopdit	• Savings and loans	2
	CU	• Savings and loans	2
	UPK	• Savings and loans	2
	PNPM	• Savings and loans	2
Religious Institutions	Church, OMK , KUB	• Spiritual and religious activities	2
Agricultural Extension Agencies	Association of Farmers' Groups *Gabungan Kelompok Petani (Gapoktan)*	• Agriculture • Provision of fertilizers and seeds, • Savings and loans	3
Government Agencies	Puskesmas	• Health and safety	3
	Sospol	• Social and political education	3
	Village Government	• Implement village government • Plans Annual Regional Budget (APBD) • Issues policy and village bylaws	4
	BPD / Village Parliament	• Implements government together with village officials • Plans Annual Regional Budget(APBD) together	4

Type of Institution	Name of Institution	Type of Service	Ranking
		with village officials • Issues policy and village bylaws • Monitors performance of village officials	
Education	Pre-school: TK/ PAUD (2)	• Education	2
	Primary schools/SD (2)	• Education	2
Early Warning System	-	• -	-
Traditional *Adat* institutions	Desa Tou Timur*Adat* institution	• Performs *adat* rituals and ceremonies in the village • Determines rules related to village life	5

3.8.2 Community Profile for Desa Tou Timur

Respondents were limited to inhabitants from two dusuns: Dusuns Wolotou and Mulawatu. Both are near Danau Bowu lake. Dusun Wolotou is the nearest to the lake. In Dusun Wolotou almost all the inhabitants are Catholics, with just one family being Moslem.This Moslem family were migrants from Java. The respondents came from various ethnic groups, as can be seen in Figure 148. Their average age was 38 years, the youngest being 20 years old and the oldest 50.

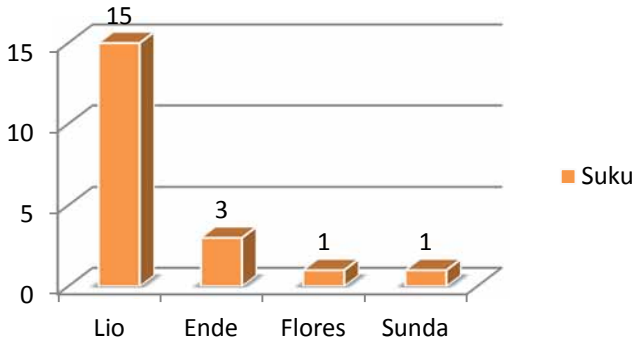


Figure 148. *Ethnicities of Respondents in Desa Tou Timur. Captions: Ethnicity (Suku)*

Most of the respondents belonged to the Lio tribe, which is the indigenous tribe of the Kabupaten Endeand Sikka districts. The Lio in Desa Tou Timur differ from the Lio in Desa Reroroja, however, even though these two villages are close together. According to the respondents from Desa Tou Timur, the Lio people in Desa Reroroja are actually Megolio, meaning that they are Lio who have left their culture. The Megolio are not so tied to the traditional ways, unlike the Lio in Desa Tou Timur. In Desa Tou Timur, the *adat* laws and traditions are still firmly adhered to, such that government and life related to *adat* are headed by the Riabewa and Mosalaki. Respondents were equally divided for gender, as can be seen in Figure 149.

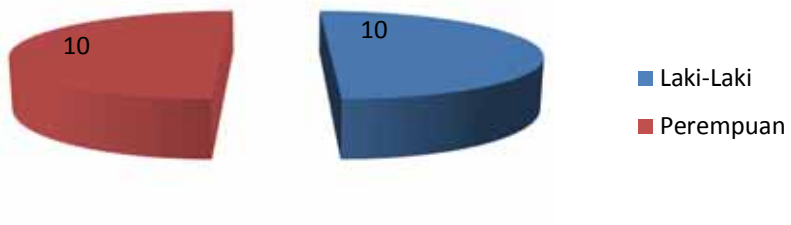


Figure 149. *Gender of Respondents in Desa Tou Timur.*
Captions: Males (Laki-laki), Females (Perempuan)

As regards educational level, most of the respondents had completed primary school. Only a small minority had completed junior or senior high school (Figure 150). According to information obtained from respondents, people are becoming more interested in getting a higher education. Evidence of this is that some of those who can afford to do so now send their children to university.This awareness is not shown by everybody in the village, however, as there are still some parents who forbid their children to go to school, preferring them to help with the work on the farm. All the respondents were married (Figure 151) and had an average of 4 dependants.Further questioning revealed that they had lived in Dusun Wolotou and Mulawatu for 20 years, i.e. since the earthquake and tsunami of 1992. They had migrated to Wolotou after this disaster for fear that another earthquake and tsunami might occur.

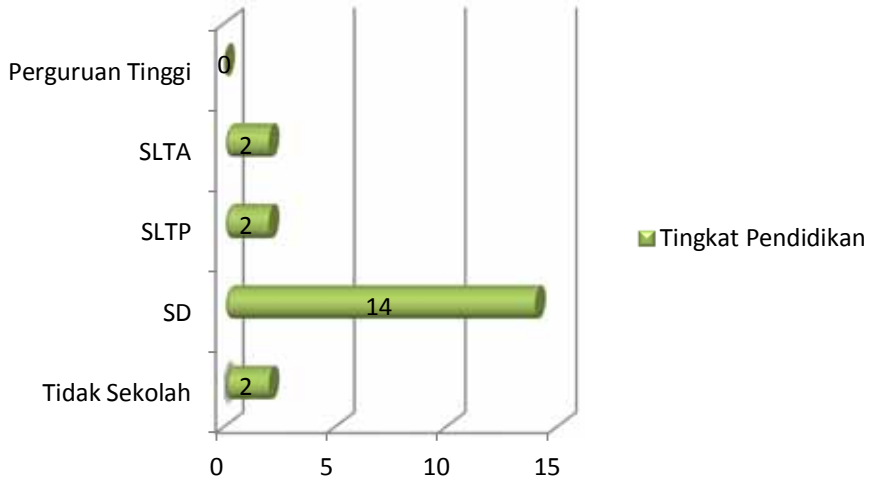


Figure 150. *Educational Level of Respondents in Desa Tou Timur.*
Captions: Did Not Attend School (Tidak Sekolah), Primary School (SD), Junior High School (SLTP), Senior High School (SLTA), Higher Education (Perguruan Tinggi)

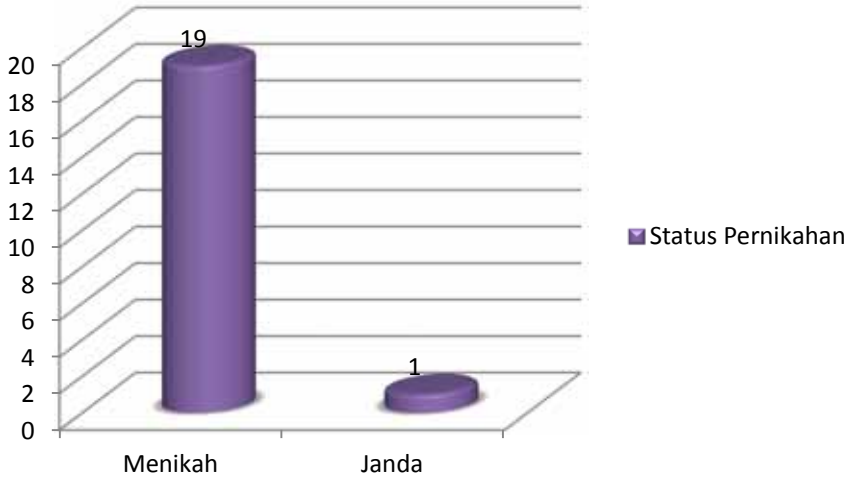


Figure 151. *Marital Status of Respondents inDesa Tou Timur.*
Captions: Marital status (Status pernikahan), Married (Menikah), Widowed or Divorced (Janda)

Almost all the respondents worked as farmers. Only one, who had migrated here from Java, worked as a builder (see Figure 152). Their daily activities consisted of working the dry fields and paddyfields. Respondents from Dusun Mulawatu had paddyfields while those from Dusun Wolotau engaged in dry land agriculture. Apart from rice, they planted maize, mung beans and vegetables.They used the produce primarily for their own daily consumption. Any excess would be sold to obtain money to pay for other expenses, such as education, clothing and shelter.

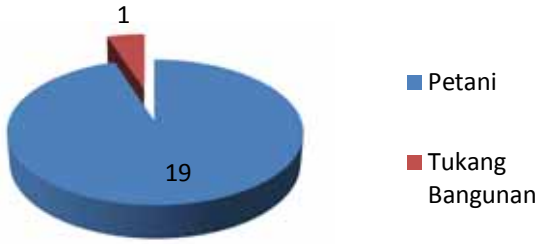


Figure 152. *Primary Livelihoods of Respondents in Desa Tou Timur.*
Captions: Farmer (Petani), Builder (Tukang bangunan)

To supplement their incomes, the respondents did a number of secondary jobs, as shown in Figure 153. The most common of these was fishing. There are two categories of fishers in Desa Tou Timur: those who go to sea, and those who catch fish in Lake Bowu. The respondents who fished normally operated in the Flores Sea or Lake Bowu. Some fished in both places, some just in Lake Bowu. In addition to working every day for money, the respondents also participated in one or more of the organisations presented in Figure 154. This participation has had a positive impact, especially in sharpening their skills and lightening their burden. This has been done mainly through the provision of agricultural information and technology, plus financial assistance and working capital.

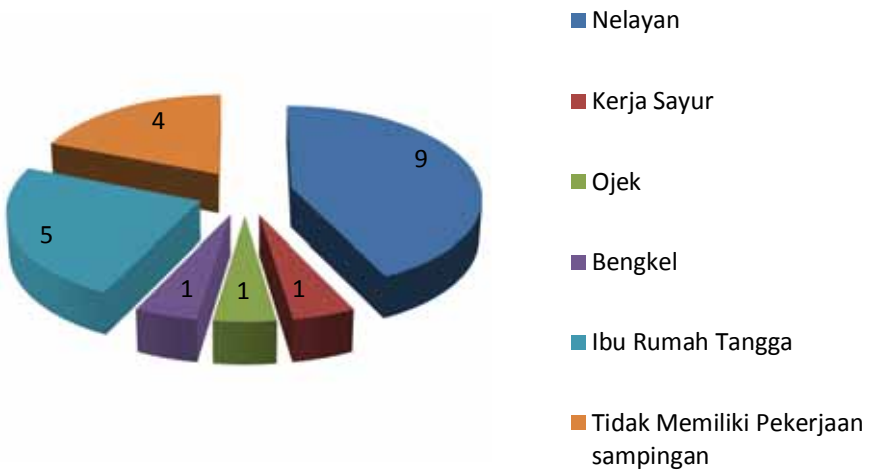


Figure 153. *Secondary Sources of Income of Respondents in Desa Tou Timur.*
Captions: Fishers (Nelayan), Vegetable Farmer (Kerja sayur), Motorcycle taxi (Ojek), Automotive Repair Shop (Bengkel), Housewife (Ibu rumah tangga), No secondary job (Tidak memiliki pekerjaan sampingan)

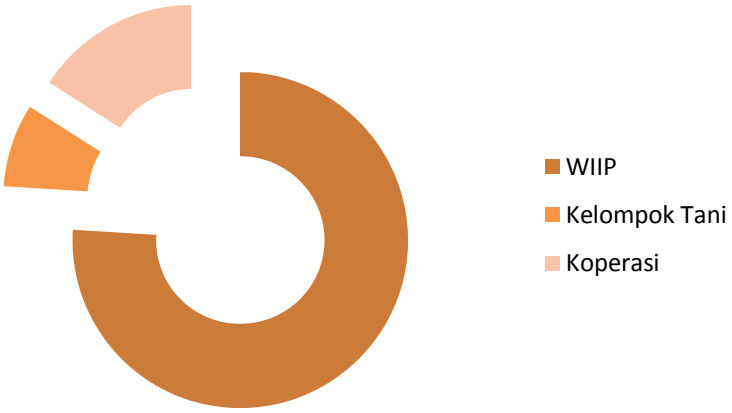


Figure 154. *Respondents'Membership of Organisations in Desa Tou Timur.*
Captions: WIIP, Framers group (Kelompok tani), Cooperative (Koperasi)

Respondents' average monthly incomes range from Rp.500,000to Rp.1 million. On the contrary, their expenditures normally average less than Rp.500,000 a month. The picture given in Figure 155 suggests that the respondents in Desa Tou Timur did not spend much on consumer items. They were careful with their money and lived within their income. Further investigation revealed that the respondents tended to use their money wisely because they were afraid of falling into debt and then not being able to repay the loan. Information on the financial circulation of respondents in Desa Tou Timur is presented in Table 98.

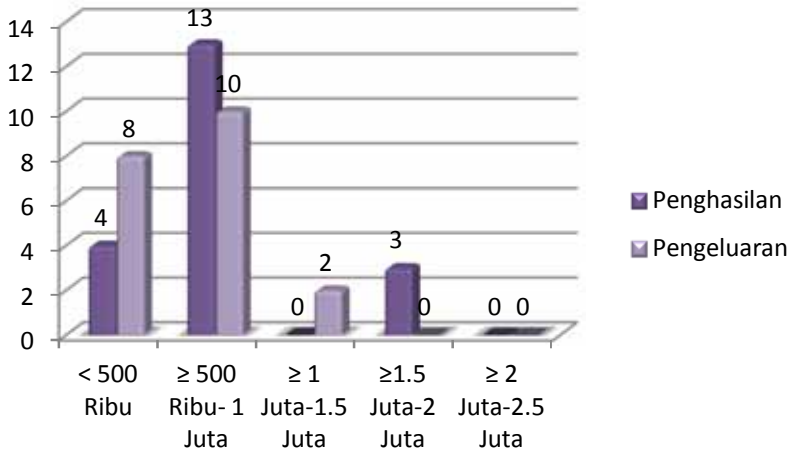


Figure 155. *Incomes and Expenditures of Respondents in Desa Tou Timur.*
Captions: Income (penghasilan), Expenditure (Pengeluaran), Million rupiah (Juta)

Table 14. Details of Financial Circulation of Respondents in Desa Tou Timur

Source of Income	Size of Income	Size of Expenditure	Remarks
Main Occupation			
Farmer	Rp.100,000-Rp. 2,000,000	Rp. 100,000-Rp.1,500,000	Clothing, food, health, education, entertainment, capital to buy fertilizers and seed
Builder	Rp.600,000-Rp.1,000,000	Rp. 800,000-Rp.1,000,000	Clothing, food, health, education, entertainment
Secondary Occupation			
Fishing	Rp. 200,000-Rp. 400,000		Supplementary income. Usually done by farmers
Vegetable growing	Rp.100,000-Rp. 200,000	-	Supplementary income
Motor-cycle taxi driver	Rp.100,000-Rp. 300,000	-	Supplementary income
Workshop	Rp.100,000-Rp. 200,000		
Housewife	Rp. 600,000	-	Income from husband

Source: Questionnaire and interviews with respondents

Further investigation and analysis revealed that most of the respondents owned their own home, although some did not yet have ownership certificates from BPN.Only a very small proportion still lived with parents or another relative (Figure 156). The land on which respondents from Dusun Wolotou had their homes belonged entirely to the Mosalaki. They had only been given permission to build their homes there. Most of their homes were constructed of perishable materials (Figure 157). On the whole, homes in Dusun Wolotou did not have bathrooms or toilets, whereas those of respondents in Dusun Mulawatu had both. Respondents in Dusun Wolotou used the public well for washing and went to the bushes or sea for toilet purposes.In one dusun, only three homes possessed a bathroom complete with toilet. Information on sanitation in respondents' homes is presented in Figure 158.

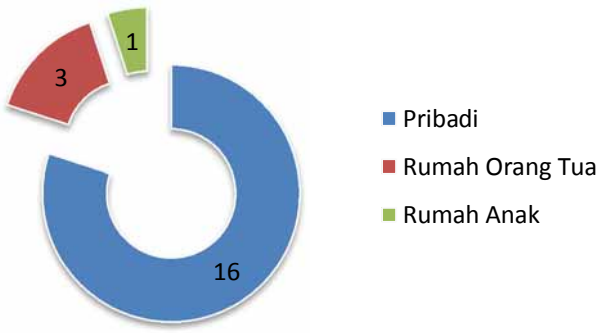


Figure 156. *Home Ownership of Respondents in Desa Tou Timur.*
Captions: Own house (Pribadi), Parent's house (Rumah orang tua), Child's house (Rumah anak)

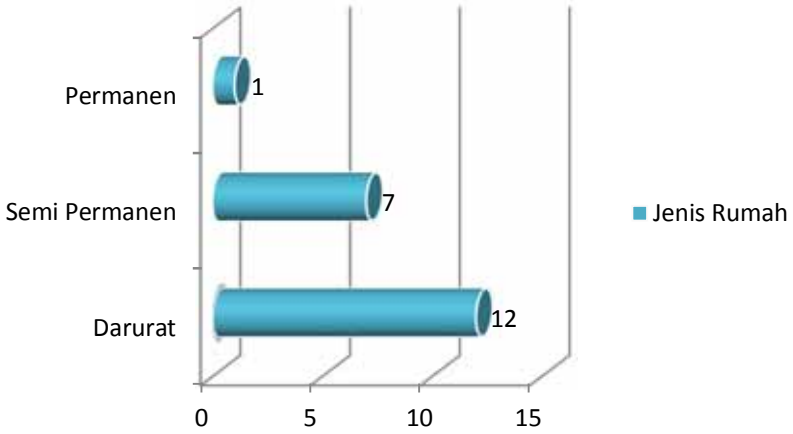


Figure 157. *Types of Housing of Respondents in Desa Tou Timur.*
Captions: Type of House (Jenis Rumah), Permanent Building (Permanen), Semi-Permanent Building (Semi Permanen), Non-Permanent Building (Darurat)

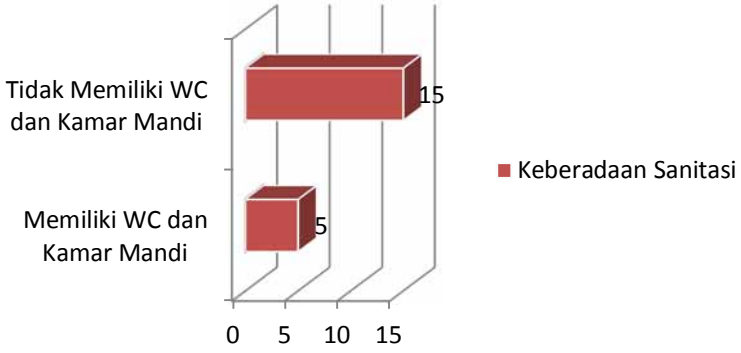


Figure 158. *Sanitation Facilities in Homes of Respondents in Desa Tou Timur.*
Captions: Sanitation conditions (Keberadaan sanitasi), No WC or bathroom (Tidak memiliki WC dan kamar mandi), Have WC and bathroom (Memiliki WC dan kamar mandi)

The electricity source used by respondents is mostly from the State Electricity Company PLN. However, a few still use oil lamps for lighting because they have not yet been connected to the PLN electricity grid. The main reason they gave for this was lack of funds. Water for daily use comes from wells and springs. Respondents from Dusun Mulawatu use artesian spring water which is piped to every house. Respondents in Dusun Wolotau do not enjoy the same facility, however, because the water discharge is not sufficient to reach their area. Instead, they get their water from the public well nearby the public bath. Only a few people in Dusun Wolotou have their own private well. The whole community still uses firewood as a fuel; just a very few have started to use kerosene. The level of prosperity in Desa Tou Timur (specifically Dusun Wolotou and Mulawatu) is low, with a few people in the 'average' category. Details of the respondents' prosperity levels in these two dusuns are given in Table 99. In addition to assets, information on the debts of the villagers in these two dusuns (as represented by the respondents) is presented in Table 100. It can be seen from this table that many respondents did not like to borrow money from agencies or institutions, such as cooperatives for example. They preferred to borrow from neighbours of relatives because the burden was lighter.

Table 15. Prosperity Parameters for Respondents in Desa Tou Timur Based on Assets and Wealth Owned

Ownership Status	Rich	Average	Poor
Livestock per household	20 animals	4 animals	None
Agricultural yield/harvest (Rice)	More than 50 sacks	10-20 sacks	1-10 sacks
Highest educational level of children	University	Junior & Senior Highschool (SLTP-SLTA)	Primary school(SD), or junior highschool(SLTP), or did not attend school
Type of house	Permanent building (Solid walls, ceramic tiled floor, zinc roof)	Semi permanent (wooden walls, zinc roof, concrete or earthen floor)	Simple (Non-permanent, bamboo walls, leaf/reed roof, earth floor)
Area of land owned	>10 Ha (usually owned by LandLord /Mosalaki)	2-3 Ha	0.5-1 ha or none
Agricultural equipment	Tractor	Plough and buffalo	Mattock, machete, hoe
Fishing equipment	Motor boat (*kelong/bagan*) and nets	*Pukat*net and sampan	*Pukat* net, rod and line
Vehicles owned	2	1	None

Table 100. Information on Debts Incurred by Respondents in Desa Tou Timur

Source of Loan	Reason for Borrowing				Annual Interest	Repayment System	Number of Respondents
	Maximum Loan (Rp)	Distance to Loan Provider	Loan regulations	Service			
Bank BRI	>10 million	Maumere(30 km)	• Collateral required • Quite difficult	Good	1.4%-2%	• Depends on size of loan • Usually maximum 5 years	1
Cooperative: *Koperasi Suberhutter*	25 million	(5 km)	• Must be a member of PNPM • Submit loan proposal in advance • Quite easy	Good	2%	• Depends on size of loan • Maximum 18 months	6
Kopdit Pintu Air	3 million	Maumere (30 km)	• Specific conditions	Good	2 %	• Depends on size of loan	3
Koperasi CU		1 million -5 million	• Specific conditions • Must become a member of Coremap	Good	2%	• Depends on size of loan	2

Note: 8 individuals did not have any debts

3.8.3 Ecosystem Profile forTou Timur

3.8.3.1 Ecosystems and Natural Resources inDesa Tou Timur

Desa Tou Timur has a hilly topography with a relatively narrow flat area. Information on the topography of Desa Tou Timur is presented in Figure 159 and Table 101.

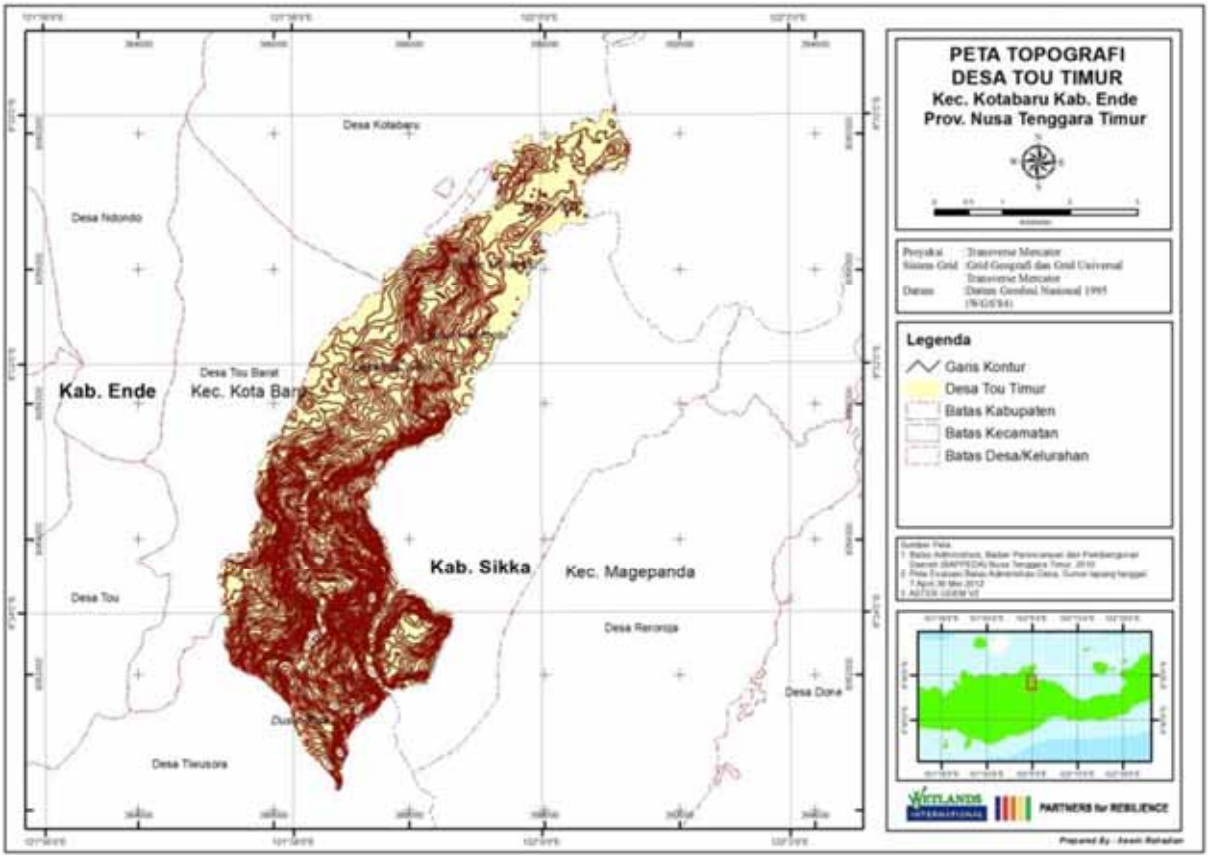


Figure 159. *Topographical Map of Desa Tou Timur.*

Table 16. Land Area of Desa Tou Timur based on Topography

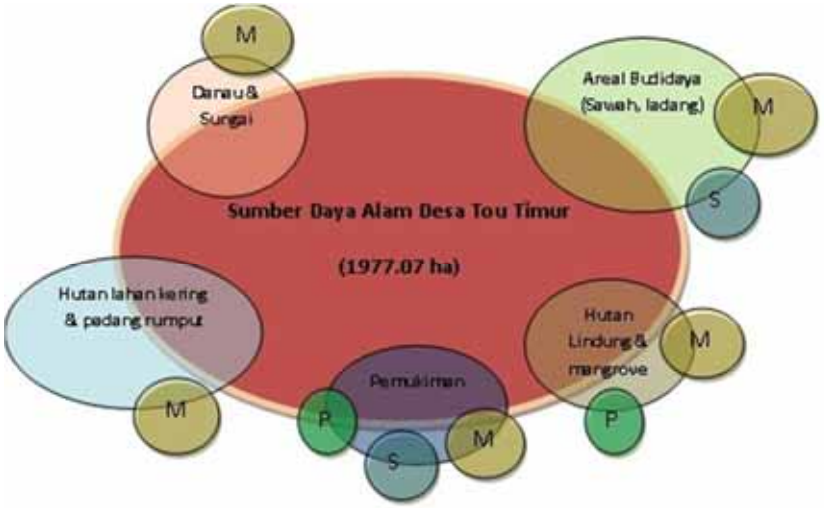
Gradient	Area (ha)	%
0-8%	291.52	14.7
8-15%	226.92	11.5
15-25%	334.12	16.9
25-40%	497.33	25.2
>40%	627.18	31.7
Total Area	1977.07	100.0

A field survey and spatial analysis showed that most of Desa Tou Timur has a steep and very steep topography. As much as 31.7 % of the total area is categorized as very steep and 25.2% as steep. Most of the flat land is to the north of Wolowatu (north of Danau Bowu lake) to the coast and is used for wet paddy and dry agriculture. As regards disaster, this area is highly vulnerable to floods in the rainy season.

The study of ecosystems and land cover focused on Dusun Wolowatu, Desa Tou Timur. The range and area of ecosystems identified through field survey and spatial analysis are presented in Table 102. A large proportion of the land in Desa Tou Timur is used for agriculture, and most of the community obtain their income from farming.Many of the natural resources are utilised directly by the local inhabitants. The relationship between natural resources and users in Tou Timur can be seen in Figure 160.

Table 17. Types of Ecosystem in Desa Tou Timur

Type of Ecosystem	Area (Ha)	%
Dry land forest	413.36	20.9
Cultivation	659.05	33.3
Bush	427.55	21.6
Grasslands	389.9	19.7
Human settlement	43.57	2.2
Lake	11.54	0.6
Swamp	21.62	1.1
Coastal	6.6	0.3
Mangrove	1.87	0.1
Marine	2.01	0.1
Total Area	1977.07	100.0



(Key: M = Community, P = Government, S = Private Sector).

Figure 160. *Relationship between Natural Resources and their Users in Dusun Wolowatu, Desa Tou Timur. Captions: Natural Resources in Desa Tou Timur (Natural Resources in Desa Tou Timur), Lake and Rivers (Danau dan Sungai), Cultivation (Paddy fields, dry fields), Dryland Forest and Grassland (Hutan Lahan Kering dan Padang Rumput), Human Settlement (Pemukiman), Protection Forest (Hutan Lindung)*
M = Community, P = Government, S = Private Sector

3.8.3.2 Spot Mapping

Mapping of Desa Tou Timur was done with the participation of the community. This included the construction of a spot map of Desa Tou Timur which shows the spots or locations in the village which are prone to disaster. The spot map for Desa Tou Timur is presented in Figure 161.

Figure 161. *Spot Map of Desa Tou Timur.*

On the spot map for Desa Tou Timur, sites at risk of disaster are indicated by a red symbol. The map was compiled based on the types of ecosystem existing inDesa Tou Timur and the types of disaster threat that could strike the village.The disasters that are highly likely to occur include drought, fire, abrasion, illegal logging and fish bombing. Another disaster that has occurred in Desa Tou Timur is anthrax epidemic. A threat to the ecosystem of Danau Bowu lake is shallowing, which requires serious attention because most of the water sources in Dusun Wolowatu get their water from the seepage from this lake. Shallowing will cause the volume of water stored there to decrease.

Before 1992, the coastal area of Desa Tou Timur was inhabited partly by fishers and indigenous people, who lived and fished along the coast. In 1992 the settlement was destroyed by the earthquake and tsunami so the people evacuated to higher ground, Dusun Wolotou, in the vicinity of Danau Bowu lake. The move from the coast to Dusun Wolotou took place in stages as the people were reluctant to leave their native homes. However, as a result of the frequent abrasion eating away at the shore, the coastal dwellers have now all moved to Dusun Wolotou.

3.8.3.3 Transect Mapping and Landscape Change

Like spot mapping, the transect mapping and collection of information on landscape change in Desa Tou Timur were also done participatively. The local people were invited to walk around the village, explain and supply detailed information related to their village. Most of the irrigated paddy fields are to the north of Dusun Wolowatu and managed using a semi-irrigated system. Dryfield rice growing is done in the other dusuns. Most of the farmers and landlordbelong to the indigenous Suku Lio tribe. The problem most often experienced by the inhabitants of Desa Tou Timur is the uncertainty and extremity of the seasons. In the rainy season there are often floods and tornados in the fields, and in the dry season they experience water shortages and land fires. Field observation ascertained that the Desa Tou Timur coast is characterised mostly by sandy beaches interspersed with stones and mud. The transect and landscape changes in Desa Tou Timur are presented in an illustration in Figure 162 while information from the transect can be seen in Table 103.

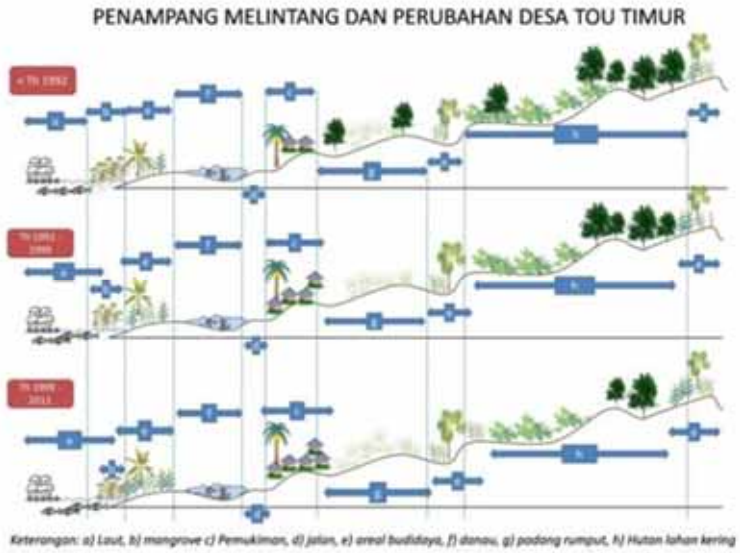


Figure 162. *Landscape Changes in Desa Tou Timur.*

Table 18. Transect Map of Desa Tou Timur

Topic	Cover / Land Use					
	Agricultural Land	**Mixed Plantation**	**Lake&Springs**	**Mangrove Forest**	**Hilly Area**	**Sea**
Land Status	Communal *hak ulayat* land, but has been gifted.	Communal *hak ulayat*land, but has been gifted.	Lake: Communal*hak ulayat* (subject to conflict) Wells: 3 wells in Dusun Wolowatu	Communal *hak ulayat*	Communal *hak ulayat*	State owned

Topic	Cover / Land Use					
	Agricultural Land	**Mixed Plantation**	**Lake&Springs**	**Mangrove Forest**	**Hilly Area**	**Sea**
Current use	Irrigated paddy: *Most is to the north of Danau Bowu lake, semi-irrigated system, source being seepage from lake, rice alternates withmaize&mung beans.* Dry field rice (rain fed): *Mixed with cassava, maize and coconut.* Dry fields: *Usually near the settlement. Commodities include: maize, cassava, beans. Most common crops are rice and maize.*	Land planted with coconut, cacao, bananas, jatropha, and cashew	For drinking (wells supplied by seepage from Danau Bowu lake), daily needs. River is not used in the rainy season.	Firewood (in the past), to prevent abrasion, crabs & seafood for own consumption	Source of feed for livestock	*Pukat* nets, line fishing
User group	Farmers, farm labourers	Farmers, farm labourers	Community	Community, crab catchers	Livestock farmers	Fishers
Productivity	Rice 6 ton/ha (rain fed) Maize during period 1 (plantedJan-Feb, harvested in May) higher yield. Maize during period 2 (planted July-August, harvested in Dec-Jan) – the amount planted is only ½ that planted during period 1.	Cashew yields 1 ton/ha Each household produces about 100-200 kg in 0.5 ha Each household owns 3-4 plots, each plot measures 0.5 ha Coconut 0.5 ton copra/ 3months/household Bananas 1-2	Water source (wells) depend on lake conditions. Decrease in dry season.	Crabs & seafood used by coastal community (minimum)	Plentiful,especially in rainy season. Average number of livestock owned per household: 2 cows/buffalo2 goats, 2 pigs and 2 chickens.	Much used by inhabitants of Wolotou, using traps(*kelong*), nets (*bagan*), rowing boat, motor-boat (*ketinting motor*). Average dailycatchis 5 skewers at Rp. 10,000/skewer (traditional fishers). Net daily

Topic	Cover / Land Use					
	Agricultural Land	**Mixed Plantation**	**Lake&Springs**	**Mangrove Forest**	**Hilly Area**	**Sea**
	15 years ago, the amount of maize planted in both periods was the same	clusters / household				profitRp.30,000 ; gross Rp.50,000/day
Constraints	Unpredictable rainfall. Frequent floods in agricultural land during rainy season. Pest attack by green padi bug&*pipit* birds. Tornados often damage fields during Dec-Feb. Uncertain calendar of seasons. Now: October start to clear land, November start planting, December finished planting 10 years ago: August-September land clearing, September start planting; planting took 3 months	Weather and rainfall Cashew harvest rises in March-April Cashew yield decreases due to hot season in June-July	Dry season, shallowing of lake	Timber extraction for housing, and firewood; abrasion (dominant)	In the dry season, grass turns yellow;at the peak of the dry season it becomes black because it is burnt (grass rejuvenation to stimulate growth of new shoots in the rainy season)	Explosives (fishers from Mageloo-Reroroja) poisons: potassium and tuba roots
Solution/ efforts to overcome the constraints	Forecasts and information on rainfall need to be updated.Alternate land with annual crops	Forecasts and information on rainfall need to be updated.Alternate land with annual crops	Development of tourism &construction of infrastructure	Mangroverehabilitation; traditional*adat*s hould stress prohibition of cutting down trees, because village regulations are not effective enough	Alternate land with annual crops	Optimise enforcement of *adat* laws.

Based on Figure 162, it can be seen that, apart from 1992, Desa Tou Timur was still full of mangrove and hill forests. Clean water springs were plentifuland the vegetation around Danau Bowu lake was still in good condition. The forest vegetation gradually declined along with the growth in the number of inhabitants and the clearing of new land for agriculture. In 1992, there was an earthquake and tsunami.Mangrove forest in Desa Tou Timur was lost. Abrasion began and much of the hill forest became grassland and critical land. After 1998 (the "reformation" era), the abrasion continued further inland. The remaining mangrove consisted of small colonies, except for that in the north of the village. According to an *adat* elder, the mangrove forest was a source of fry for neighbouring villages like Desa Reroroja. To date, the burning of hill forestand grassland is still frequent every year. This issue needs to be addressedbecause it is closely linked to the disaster risk reduction activities currently being carried out in Desa Tou Timur.

3.8.3.4 Water Quality

Analysis of water quality in Desa Tou Timur was carried out at only two stations, which were Dusun Wolotou and Mulawatu (Figure 163). Nevertheless, most of the water sampled originated from sources in Dusun Wolotou. Water analysis was also performed at Danau Bowu lake. The results obtained are presented in Table 104.

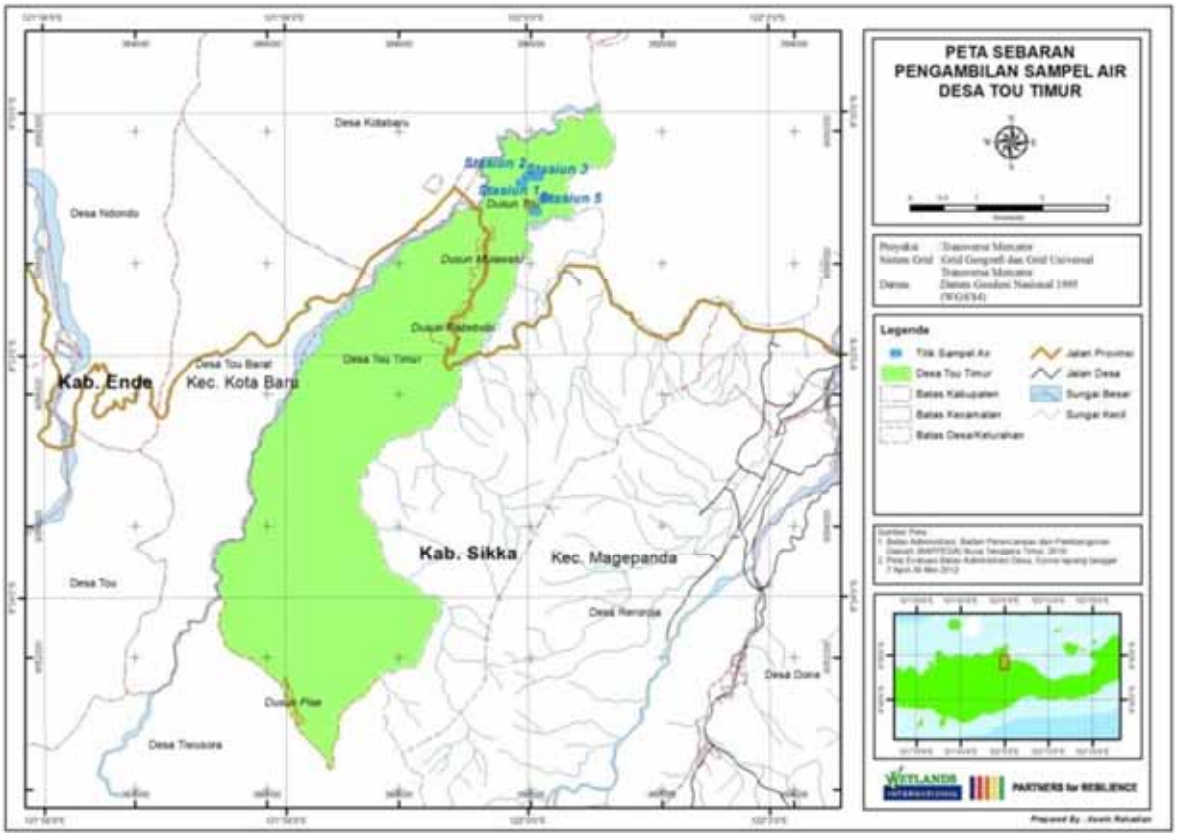


Figure 163. *Map Showing Distribution of Water Sampling Stations in Desa Tou Timur*

Table 19. Results of Water Quality Analysis forDesa Tou Timur

Parameter	Unit	Station						*		**	
		1	2	3	4	5	6	Min	Max	Min	Max
DO (mg/L)	mg/L	7.2	8.2	7.7	7.1	2.3	3.8	2	-	-	-
Temperature (^{o}C)	^{o}C	31.3	32.4	31.9	28.8	29.3	28.8	-	-	-	Air Temperature ±3
Salinity (ppt)	ppt	0.1	0.1	0.1	0.2	0.2	0.2	-	-	-	-
TDS (mg/L)	mg/L	263.9	223.1	240.9	470	403	247	-	1000	-	500
pH	-	8.72	9.6	9	7.4	7.2	7.96	6	9	6.5	8.5

Key:

Station 1 : Danau Bowu lake water (1)
Station 2 : Danau Bowu lake water (2)
Station 3 : Danau Bowu lake water (3)
Station 4 : Community well
Station 5 : Public well
Station 6 : Pamsimas water (Dusun Mulawatu)
* : Quality Standard according to Indonesian Government Regulation Number 82 of 2001 on Water Quality Management and Water Pollution Control
** : Potable Water Quality Standard according to Indonesian Health Minister regulation NO.492/MENKES/PER/IV/2010

From the results in Table 104 it can be ascertained that the water in Danau Bowu lake (Stations 1 to 3) still has a relatively high DO level, so itsoxygen reserves are sufficient to support the life of organisms.The water temperature in Danau Bowu wasfound to be a little high, but still close to the air temperature at the time of measurement, which was in the middle of the day.The lake's salinity level was also low, almost zero, so the water tasted fresh and could provide a home for freshwater organisms such as fish and aquatic plants. Its level of total dissolved solids (TDS) was also below the maximum specified government and Health Ministry standards. This low TDS value was possibly due to the extremely low salinity, so the water did not contain many dissolved solids like salt and other molecules. Besides, the water was still clean and unpolluted. However, the pH value of Danau Bowu lake water was found to be higher than the neutral level (pH=7) specified by the Drinking Water Quality Standard set by the Health Ministry. It is therefore not suitable for human consumption. Nevertheless, it can still support the life of biota and organisms within it, as it does meet the standards for water pollution, although its pH is approaching the maximum stipulated for this.The high pH could be due to the profusion of aquatic plants at the surface of the water, especially at station 2.If this is allowed to continue (the aquatic plants not removed), the pH could rise further and disturb the equilibrium of the ecosystems in Danau Bowu's waters.

Analysis of the water at station 4 (public well used by the community) showed good results. These indicate that the water is fit for consumption. However, it should be filtered first through a cloth or filter because its TDS level was found to be near the maximum allowed by the Health Ministry's drinking water standards. It is feared that the solids dissolved in the water at station 4 could be harmful to health if consumed over a long term. Unlike that at station 4, the water sampled at station 5 had a low DO reading. Station 5 is located on a steep slope with slightly stony soil containing lime. Its relatively low DO means that this water should not be used for farming freshwater fish as it would

disturb their growth. However, it can be consumed, but must be filtered first as its TDS level was found to be near the limit for the drinking water standard. Water quality at station 6 showed a lower TDS level compared to stations 3 and 4, so this water can be consumed directly without filtering. However, its relatively low DO means that it cannot be used for freshwater fish culture.

3.8.4 Disaster, Vulnerability and Capacity of the Desa Tou Timur Community

3.8.4.1 Information on Disaster in Desa Tou Timur

3.8.4.1.1 History of Disasters and Seasonal Events in Desa Tou Timur

Community capacity and vulnerability analysis for Desa Tou Timur focused on the dusun near Danau Bowu lake, i.e. Dusun Wolotou. The information was obtained entirely from interviews with and questionnaire responses from respondents, mostly in Dusun Wolotou but a few also from Dusun Mulawatu. Dusun Mulawatu borders on Dusun Wolotou and is also near to Danau Bowu lake. Information on this area's disaster history is presented in Table 105.

Table 20. History of Disasters in Desa Tou Timur

Time of Occurrence	Type of Disaster	Remarks	Impact
Every year	Fire	• Fires flare up suddenly • Fire is usually due to intentional burning by people to clear land • The land is then used for agriculture • Fires are most frequent in the months running up to the start of the rainy season (August-October).	• Damage to crops and forest • Loss of wildlife habitat • Many wildlife at risk of death due to loss of their habitat
Every year	Drought	• Drought occurs when rainy season is limited to mid-February then March – Juneis dry. • Spring water discharge is small, so people have difficulty obtaining water. • Relatively few members of the community yet possess other sources of water, such as wells.	• Planting and harvests fail due to lack of water • Spring water discharge decreases • Many animals die. • Malnutrition in children. • Villagers at risk of starvation due to food shortage
Every year	Abrasion	• Abrasion occurs in Dusun Wolotou • Caused by large sea waves and lack of natural defences, i.e. mangrove • Mangrove in Desa Tou Timur has been damaged	• Settlements along the shore have been relocated • Shoreline is receding due to erosion by waves

Time of Occurrence	Type of Disaster	Remarks	Impact
1992	Earthquake and Tsunami	• Quake occurred at around 2pm, when the air became very hot • Quake occurred suddenly, with great force • Quake was subsequently followed by huge waves (tsunami)	• Loss of human lives • Loss of property • Destruction of agricultural land • Loss of a seaside market in Dusun Wolotou • Loss of homes along the coast, as they were swept away by the tsunami
2009-2010	Anthrax	• People in Desa Tou Timur, specifically those living in Dusun Wolotou,ate the meat of buffalos that had died • A few days later, symptoms appeared with spots on the skins of those who had eaten this meat. • The spots grew and developed into blisters that burst to form wounds • The wounds looked like wet ulcers	• The anthrax outbreak quickly spread and several people tested positive for anthrax. • Several cattle, buffalo and pigs died. • Local government and health authority promptly administered anthrax vaccines to livestock and disinfected the area around Dusun Wolotou • Anthrax victims were promptly treated at the nearest *puskesmas* public health centre
2010	Flash flood	• Heavy rain for 2 days caused river to overflow into paddyfields	• Damage to paddyfields in Dusun Rate Bobi • Harvest failure threatened crops growing in these fields
March 2012	Strong winds	• Occurred in March as a result of climate change • Preceded by 3 days continuous rain • Winds occurred at night, causing fear among inhabitants	• 1 house badly damaged • Trees (cashew, coconutand other big trees) were blown over, thus damaging agricultural land • Electricity poles were blown down, causing a total electricity and communications blackout that lasted 1 week

Source: Laporan PFR-NTT Tim WIIP (PfR-NTT report by WIIP Team) plus field verification (2012)

Field analysis results indicated that disasters occur every year both in the wet and dry seasons.Floods, abrasion, drought, and fires happen every year in this village. Fires and drought occur every dry season. If the dry season lasts longer than the wet, the village's water sources dry up and so does Danau Bowu lake. Water discharge from the lake will shrink and the water will change colour.As water sources dry up, so daily life and farming become harder for the villagers. They rely heavily on rainfall as their primary source of water, so an extended dry season threatens them with failed harvests and food shortages.

In addition to the drying up of water sources, drought also triggers fires, especially in the hill forests. With the high air temperatures, friction between twigs can spark off a fire. As a result, a lot of land is burnt and air quality will deteriorate. Besides natural factors, fires can break out as a result of human activity. Land is burnt in the months leading up to the rainy season, to clear it for rain-fed agriculture.

Disasters that often occur in the rainy season are floods and abrasion. During January-April, rainfall is usually quite high, causing the rivers to overflow.The soil does not absorb water easily, another reason why floods are common here. In 2010, a flash flood damaged large areas of agricultural land in this village, inundating them with mud mixed with river water. As well as floods, abrasion also occurs every year, especially during the west wind season,in January-April. During these months, winds and waves are high and have the potential to sweep across the coast.Before the earthquake and tsunami in 1992, Desa Tou Timur's coast was inhabited by part of the fishing community, who lived and fished along the coast. In 1992 the settlement was destroyed by the earthquake and tsunami so the people evacuated to higher ground, Dusun Wolotou, in the vicinity of Danau Bowu lake. The move from the coast to Dusun Wolotou took place in stages as the people were reluctant to leave their native homes.However, as a result of the frequent abrasion eating away at the shore, the coastal dwellers have now all moved to Dusun Wolotou. Besides abrasion, in recent years tornados have often occurred in Desa Tou Timur. The most recent was in March 2012, when strong winds damaged the community's plantations.

Epidemics are another disaster in Desa Tou Timur, often causing considerable losses and threatening human lives. This happened in 2009-2010 when there was an outbreak of anthrax in the village. The people's limited knowledge and poor attention to health facilitated the spread of the disease.Those who contracted anthrax said they had not known that animals that had died of "hoof disease" (anthrax) must not be eaten. Poor sanitation and environmental health, moreover, made it extremely easy for the bacteria to spread through soil and water and between animals. When the disease broke out, the local health authority promptly got ready to tackle the disease and prevent it from spreading. A disease that frequently attacks this village is malaria. Almost everyone in the village, in particular those living in Dusun Wolotou, has had malaria. It is therefore essential that the public be taught how to live healthily, through the provision of extension services and information on health and hygiene, as well as the dissemination of information about diseases that spread easily in NTT. The purpose of this is to tackle the disease and reduce its spread.

In addition to Desa Tou Timur's disaster history, information was also obtained on seasonal disasters, which is presented in Table 106. Disasters during November-April are usually those that occur during the rainy season, while disasters during May-October are normally those common in the dry season. Pests usually attack just as the crops are ripening for harvest, while the flowers of estate crops dry up and wither when there is an extended dry season.

Table 21. Information on Seasonal Disasters that Often Occur in Desa Tou Timur

Type of Disease and Disaster	Month												Remarks
	1	2	3	4	5	6	7	8	9	10	11	12	
Fire													Fires frequent in dry season with high temperatures
Drought													Droughts occur when there is little or rainfall during March-June During the following months, there is no rain until the next dry season
Flood													Floods caused by high rainfall Floods usually occur at the peak of the rainy season, between February and April
Abrasion													Usually occurs during January-March when sea waves are high
Malaria													Malaria is common during therainy season Malaria is endemic to NTT
Diarrhoea													Diarrhoea is common during the fruit season (dry season) Diarrhoea frequently attacks village children
Acute Respiratory Tract Infections (*ISPA*)													Frequent during rainy season
Skin diseases													Occur in dry season Hot weather is not accompanied by good environmental
Eye infections													Occur in hot season
Rice pests (caterpillars, brown plant hopper, green padi bug and stalk borer)													Pests attack crops when the rainy season is irregular Pests usually attack at the start of the harvest season or when the rice is ripening
Withering of cashew flowers													Occurs in dry season Flowers dry up and wither when the tree does not get enough water

Source: *Laporan PfR-NTT Tim WIIP* (PfR-NTT report by WIIP Team) plus field verification (2012)

3.8.4.1.2 Disaster Impact

The information on disaster impact in Desa Tou Timurwas obtained from an analysis of disaster impact on several important things in the village and the respondents' perceptions of those impacts.This information is presented in Table 107.

Table 22. Disaster Impact in Desa Tou Timur

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Flood										• Ban on tree felling in upstream forest areas, imposed by village government & local *adat* institutions
Drought										• Ban on tree felling in vicinity of springs, imposed by village government & local *adat* institutions • Villagers have begun to construct wells near their homes
Earthquake& Tsunami										• Move people in earthquake-prone areas to a safer site
Hurricane/ Tornado										• Keep away from places with many trees
Fire										• Enforce ban on uncontrolled burning of forest and hilly areas • Extinguish fires as soon as they start, where known, to prevent them from spreading
Anthrax										• Dissemination of information on anthrax • Ban on the eating of dead animals • Free medical treatment for anthrax sufferers • Disinfection and vaccination of livestock in and around the area hit by anthrax
Crop pest attack										• Provision of information and pesticides by the relevant agency

Type of Disaster	Impact									Solution Applied
	Humans	Land	Agricultural produce	Fishery produce	Infrastructure	Public facilities	Work field	Health	Education	
Epidemics										• Extension services promoting a healthy lifestyle • Public sanitary facilities (*MCK*) have been built • Construction of water sources such as a well at every home
Withered flowers										-
Abrasion										• Planting of mangrove and beach plants

Key: High Medium Low

The disaster having the most serious impact on village life has been earthquake accompanied by tsunami. As well as damaging existing facilities, this disaster also took away the people's livelihoods and sources of income. Just moments after it hit, village life was crippled by lack of food and loss of livelihoods.Droughts and hurricane are a serious threat to agricultural land and crops. The villagers suffer the consequences of both these disasters, especially drought as this impacts on their supply of water, which is vital to life. Floods and fires also pose a serious threat to agricultural land and crops. All four of these disasters will also subsequently impact on job opportunities as most of the villagers work as farmers. They depend heavily on the land, and only a few engage in other activities like fishing at sea, labouring, motor-cycle taxi driving, etc.

Epidemics, especially of anthrax and malaria, can be fatal and spread rapidly in the Tou Timur area. Both pose a serious threat to human health as they may result in death. They also impact on daily work and activities as sufferers cannot work well. As a result, the family's income is reduced and household tasks left undone. Crop pests and the withering of estate crop flowers have the same effect as the four disasters mentioned above; both will directly impact on agricultural yield. Harvests may fail, food become scarce, and incomes shrink.

The community's perceptions related to disaster were investigated through an analysis of the respondents' perceptions. The results are presented in Figure 164. All the respondents were of the opinion (75% strongly agreed; 25% agreed) that people living in disaster-prone areas should be relocated to a safer place. For example, this had already be done regarding those who lived along the beach. As a result of the 1992 earthquake & tsunami and frequent abrasion, these people were eventually moved to Dusun Wolotou, which is near their previous home but higher up. However, some (15%) of the respondents still objected to moving home. Respondents expressed similar views when asked about moving their fields or banning the planting of crops in flood-prone areas. They felt that such a move would be a bit difficult as it would impact on their incomes.

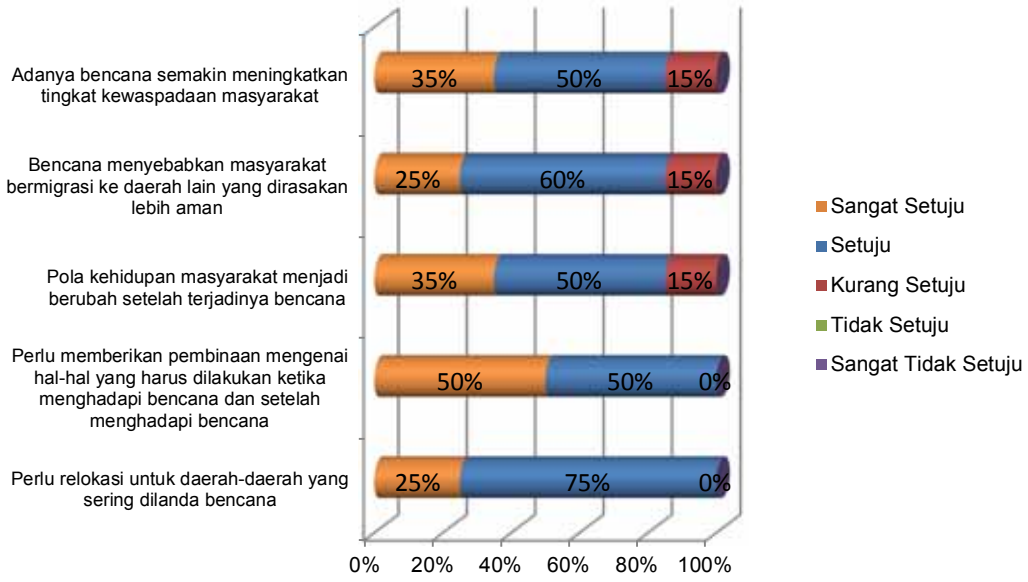
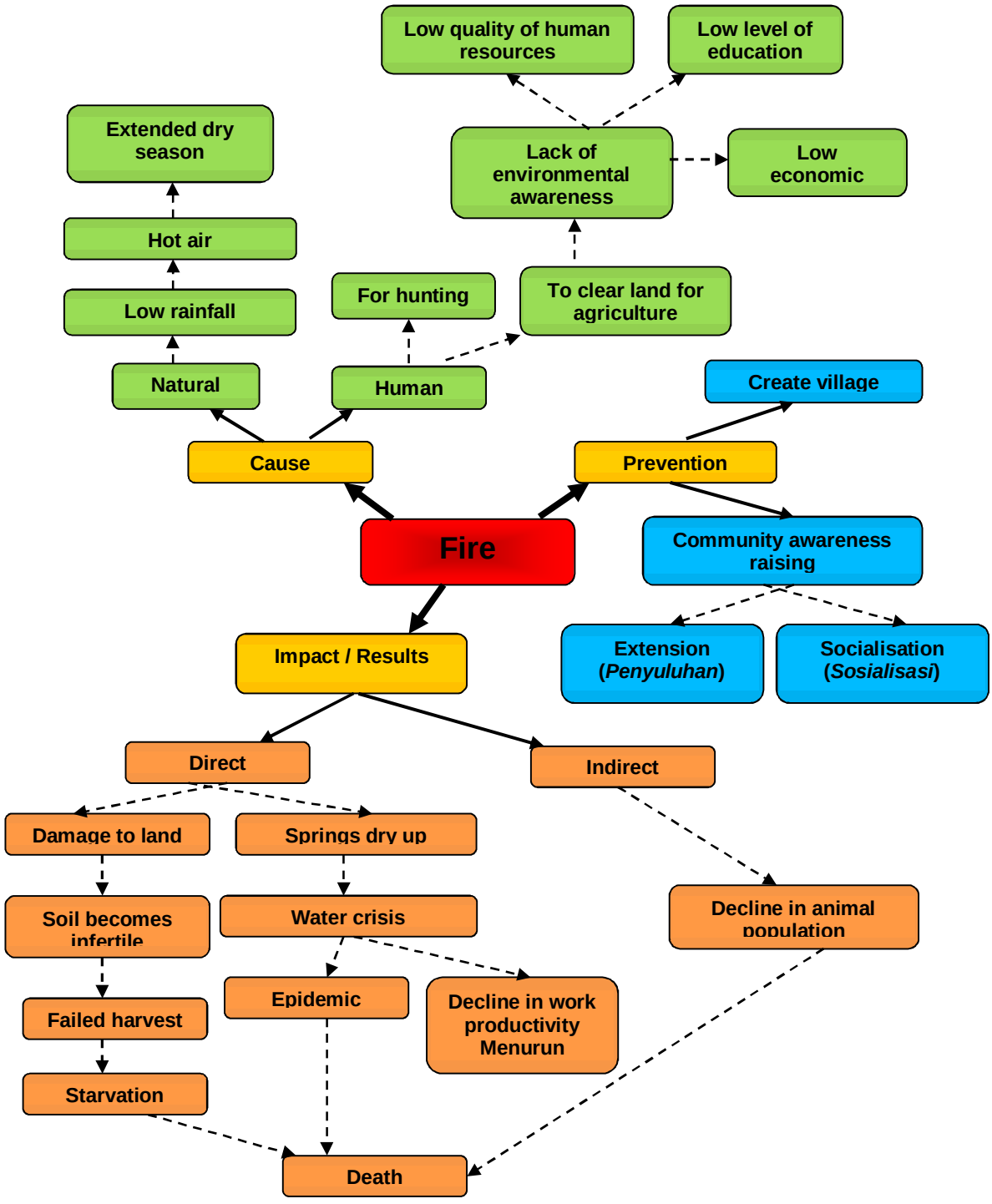


Figure 164. *Respondents' Perception of Disaster Impact in Desa Tou Timur.*
Captions: Due to the occurrence of disasters, the community's level of vigilance has been increasing (Adanya Bencana Semakin Meningkatkan Tingkat Kewaspadaan Masyarakat), Disaster caused the community to migrate to an area considered safer (Bencana Menyebabkan Masyarakat Bermigrasi ke Daerah Lain yang Dirasakan Lebih Aman), The community's way of life changed after a disaster (Pola Kehidupan Masyarakat Menjadi Berubah Setelah Terjadinya Bencana), Guidance needs to be given on what to do during and after a disaster (Perlu Memberikan Pembinaan Mengenai Hal-Hal yang Harus Dilakukan Ketika Menghadapi Bencana dan Setelah Menghadapi Bencana), Relocation is needed for areas often hit by disaster (Perlu Relokasi Daerah-Daerah yang Sering Dilanda Bencana)
Strongly agree (Sangat Setuju), Agree (Setuju), Slightly disagree (Kurang Setuju), Disagree (Tidak Setuju), Strongly disagree (Sangat Tidak Setuju)

A positive outcome of the disasters occurring in the village is that the community, in particular the respondents, have become more alert to warning signs in nature and to information relating to disaster events. Nevertheless, there were still some respondents (15%) who felt indifferent to disaster warnings, whether from natural signs or from other sources of information. They were of the opinion that these were just normal occurrences so there was no need to make any preparations. For the others, however, attention to such signs would have a positive impact. Despite these differences, all of them expressed a keen interest in receiving guidance on what should be done before, during and after a disaster.

3.8.4.1.3 Sample Issue Tree forDesa Tou Timur



3.8.4.2 Vulnerability in Desa Tou Timur

Vulnerability and community capacity are two inter-related components.The greater the community's capacity to cope with a disaster, the lower the disaster risk will be. This capacity can be in the form of physical facilities and infrastructure, and also the community's own attitudes and motivation. Information on vulnerability in Desa Tou Timur can be seen in Table 108.

Table 23. Vulnerability and Community Capacity in Desa Kotabaru

Variable	Vulnerability	Capacity
Health, Physical, and Environmental	1. Infertile soil 2. Very bad condition of road toDusun Wolotou 3. Illegal logging of hill forest 4. Long dry season 5. Difficulty in obtaining sources of water 6. Epidemics of anthrax, malaria, acute respiratory tract infections, and skin diseases 7. Poor environmental sanitation and scarcity of washing/toilet facilities 8. People defecate just anywhere 9. Some villagers still lack a source of electricity lighting	1. Soil preparation equipment, extension services from relevant institutions, dryfield agriculture, formation of farmers' groups 2. Some roads have been compacted/tarmacked, but are now in poor condition 3. Create *Adat* and village regulations banning the felling of trees in hill forest 4. Community have constructed water storage tanks and have begun to dig a main well 5. Natural resources 6. Extension services on hygiene, people are beginning to pay more attention to hygiene & do not defecate just anywhere 7. Villagers have begun to construct their own private sanitary facilities (MCK),though not every house has one yet; or they use a neighbour's toilet 8. There are sanitary facilities (MCK) in several houses, which can be used by the community 9. Mains electricity has been installed in the village but is still limited to a few households only
Socio-cultural	1. School drop-outs 2. Low quality human resources 3. Gambling 4. Social jealousy	1. 9-years compulsory education program and aid from BOS (this program is still being promoted) 2. Improvement of expertise (soft skills), education, extension services 3. – 4. – 5. -

Variable	Vulnerability	Capacity
Attitudes and Motivation	1. Poor level of disaster response 2. Low awareness of hygiene 3. Indifference 4. Laziness 5. Insufficient awareness of the need for environmental conservation 6. Non-use of sanitation (MCK) facilities	1. Only a few villagers have begun to be aware of this; disaster response is still done traditionally from person to person and using mobile phones 2. Guidance on hygiene, through campaign from nearest *puskesmas*health centre 3. Religious guidance 4. Guidance from traditional *adat* , community and religious leaders 5. Guidance from traditional *adat,* community and religious leaders, extension services and 'socialisation'(*sosialisasi*) 6. 'Socialisation' and extension services on hygiene
Institutional/ Organisational	1. Improvement needed to inter-institutional relationships 2. Improvement needed to the activities of various institutions 3. Institutions not yet fully accepted 4. Egocentricity still prevalent 5. Leadership is still centralised and the people are not free to give their opinions	1. Coordination and negotiation/discussion 2. 'Socialisation' 3. 'Socialisation' 4. Extension services 5. -
Economic	1. Lack of employment opportunities 2. In habitants' incomes still low 3. Insufficient innovation and technology for agricultural, fishery and livestock productions 4. Many inhabitants still live in poverty 5. High unemployment	1. Extension services and provision of business capital 2. Livelihood diversification 3. Extension services, 'socialisation', and dissemination of information and technology 4. Cash hand-outs (*BLT)* and Family of Hope program*(PKH)*, rice for the poor (*beras raskin*), State health insurance scheme(*jamkesmas*) 5. 9 years free compulsory education

Source: Results from observation in the field (2012)

The information in the table above was then used to construct a chart to determine the threats, vulnerabilities, capacities and risks in Desa Kotabaru. This information is presented in Figure 165. It can be seen from this chart that the greatest risk of disaster in Desa Tou Timur is from drought, earthquake with tsunami, and abrasion. Drought and abrasion occur almost every year.Drought usually occurs in the dry season when rain intensity is very low, while abrasion happens when the west winds and rainy season arrive. A disaster with great force is earthquake and tsunami. It does not happen every year, but did occur in 1992. The enormous force of earthquakes and tsunami pose a huge risk for the community because they know so little about the warning signs, nor how to anticipate and cope with such a disaster.

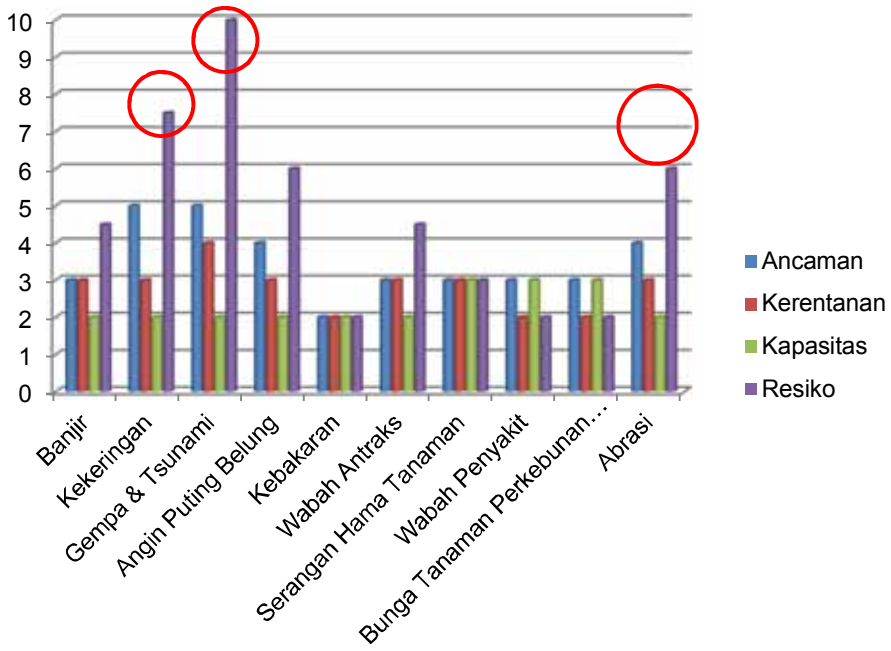


Figure 165. *Threat, Vulnerability, Capacity and Risk of Different Types of Disaster in Desa Tou Timur. Captions: Threat (Ancaman), Vulnerability (Kerentanan), Capacity (Kapasitas), Risk (Resiko), Flood (banjir), Drought (Kekeringan), Earthquake and Tsunami (Gempa dan tsunami), Tornado (Angin putting beliung), Fire (Kebakaran), Anthrax epidemic (wabah antraks), Pest Attack (Serangan hama), Epidemic (Wabah penyakit), Flowers wither (Bunga tanaman perkebunan mongering), Abrasion (Abrasi)*

3.8.4.3 Community Capacity in Desa Tou Timur

3.8.4.3.1 Early Warning System

No EWS system has yet been set up in Desa Tou Timur, particularly in Dusun Wolotou.Besides, cooperation between government and village community, and between the villagers themselves, is still poor. Neither has any EWS initiated by another agency, such as the Indonesian Red Cross (PMI), yet arrived in Desa Tou Timur (Dusun Wolotou). Analysis showed that 95% of respondents stated that they had no knowledge of EWS preceding a disaster. Only a very small proportion (5%) had predicted a disaster from weather forecasts or by interpreting signs in nature. The results of this analysis can be seen in Figure 166.

Figure 166. *Desa Tou Timur Respondents' Knowledge of Early Disaster Warning*
Captions: Knowledge of Disaster Warnings (Pengetahuan Mengenai Peringatan Adanya Bencana), Didn't Know (Tidak Tahu), Weather Forecast (Perkiraan Cuaca), Beating of kentongan alam or electricity poles (Kentongan atau tiang listrik), Announcement in Public Place (Pengumuman di Tempat Umum), Mass Media (Media Massa)

Having no knowledge of early disaster warnings, respondentsfrequently suffer losses, especially from seasonal disasters. If they received an early warning, 65% of respondents said they would respond well (Figure 167). When the village is struck by a really big disaster, the villagers tend to take refuge in their own homes. They feel safer in their home rather than having to go outside to find a shelter. Disasters that force people to evacuate are considered less important, so their decision is to stay at home (Figure 168). Nevertheless, some do prefer to evacuate to a safer place outside, like a field or open land. Details on how the respondents save themselves and their families are presented in Figure 168.

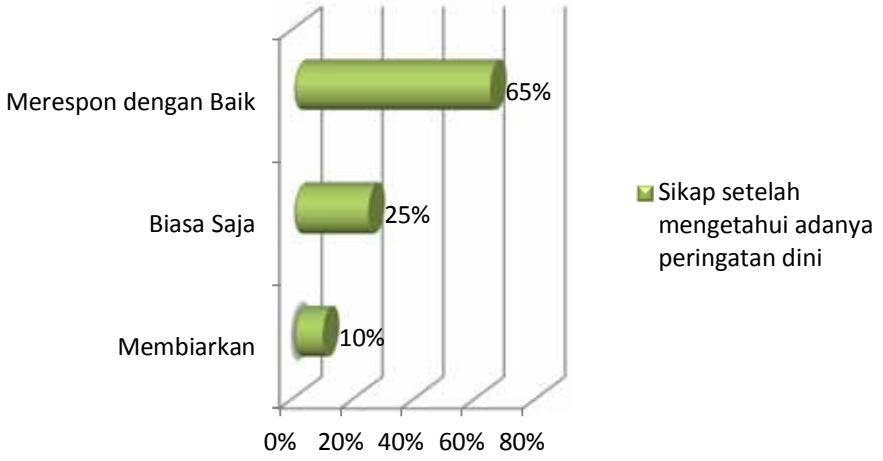


Figure 167. *Desa Tou Timur Respondents' Attitudes Towards Early Warnings.*
Captions: Attitude on receiving an early warning (Sikap setelah mengetahui adanya peringatan dini), Respond well (Merespon dengan baik), Same as usual (Biasa saja), Idnore it (Membiarkan)

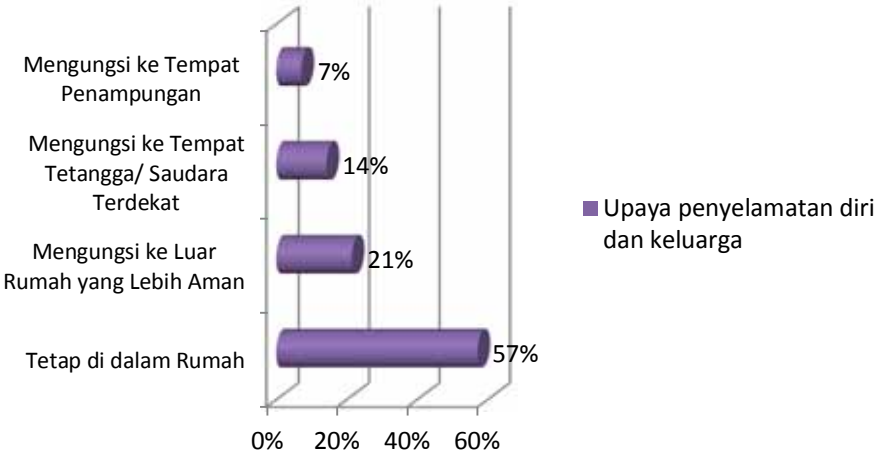


Figure 168. *Actions Taken by Desa Tou Timur Respondents to Save Themselves*
Captions: Efforts to Save Self and Family (Upaya Penyelamatan Diri dan Keluarga), Evacuate to Shelter (Mengungsi ke Tempat Penampungan), Evacuate to Family. Neighbour or friend's home (Mengungsi ke Tempat Keluarga/ Tetangga atau Teman), Evacuate to a Safer Place Outdoors (Mengungsi ke Luar Rumah yang Lebih Aman), Stay Inside Home (Tetap di dalam Rumah)

Local government needs to contribute to settling up an EWS in the village. Analysis indicated that the village government had taken action to help disaster victims, but that this help came after the disaster. No early warning had ever been given before a disaster. A few respondents felt that government had never taken any action at all, while some said government had provided emergency shelter (42%), distributed aid in the form of food, medicines, drink and blankets (42%), and supplied evacuation equipment (13%). The community now needs local government to take action or instigate activities that are preventive in character, to help mitigate disaster and its impacts. Details of respondents' responses are presented in Figure 169.

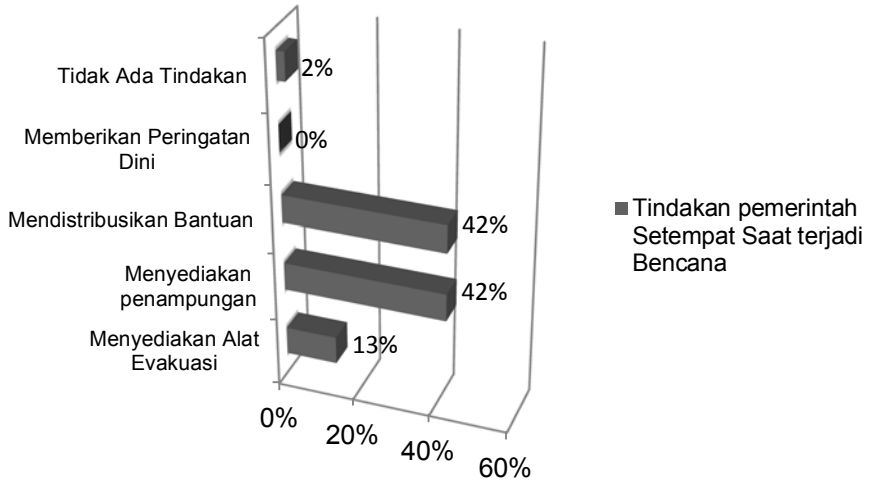


Figure 169. *Information on Action Taken by Desa Tou Timur Government in Response to Disaster*
Captions: Local Government Action When Disaster Occured (Tindakan Pemerintah Setempat Saat Terjadi Bencana), No Action Taken (Tidak Ada Tindakan), Gave Early Warning (Memberikan Peringatan), Distributed Aid (Mendistribusikan Bantuan), Provided Shelter (Menyediakan Tempat Penampungan), Provided Evacuation Equipment (Menyediakan Alat Evakuasi,

3.8.4.3.2 Accessto and Control of Community Assets

Access to and control of assets, in the form of facilities and infrastructure, in Desa Tou Timur covers both private and communal assets.Easy access to all privately and publically owned assets, both during and after a disaster, can reduce its impact. Information on access to and control of the community's assets in Dusun Wolotou, Desa Tou Timur is presented Table 109.

Table 24. **I**nformation on Access to and Control of Assets that can be Used in the Event of Disaster inDesa Tou Timur

Family Owned	Accessibility at Time of Disaster									Ownership Control
	Flood	Earthquake and Tsunami	Drought	Fire	Anthrax Epidemic	Typhoon	Pest Attack	Epidemic	Abrasion	
Agricultural Land							Yes	Yes	Yes	Land Lord (Mosalaki)
Homes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Furniture	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Mother
Valuables	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Vehicles	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father
Clothes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Food				Yes	Yes	Yes		Yes	Yes	Father, Mother
Savings/Money	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Fuel	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Valuable Documents	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Father, Mother
Publically Owned	**Accessibility at Time of Disaster**									**Ownership Control**
	Flood	Earthquake and Tsunami	Drought	Fire	Anthrax Epidemic	Typhoon	Pest Attack	Epidemic	Abrasion	
Places of worship	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Community
Roads	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Community
Market	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Community
Football field	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Community
Village Hall/ Office	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Village government
Boats	Yes		Yes	Yes	Yes		Yes	Yes		Communitywith prior permission from owner
Water sources	Yes			Yes		Yes	Yes	Yes	Yes	Community, Land Lord (Mosalaki)
Public bathing, washing, toilet facilities	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Community
School buildings	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Communitywith prior permission

Source: Questionnaire findings and direct observation in the field

Almost all the assets, private and public, could be accessed in the event of disaster in Dusun Wolotou, Desa Tou Timur. In the case of earthquake and tsunami, however, most of them would not be accessible. The main reason for this is the people's lack of knowledge about the warning signs of tsunami, even though it is preceded by an earthquake and other natural signs.In addition, they stay put at home instead of thinking about escaping to higher ground or saving their valuables.

Ownership control of public assets belongs mostly to the community. Only those facilities related directly with government, such as the village office, public health centre, etc., come under the local government's control. The source of water in Desa Tou Timur belongs not to the government but to an individual, the Mosalaki or local *Adat* leader.This water is used for the benefit of the community but is situated on private land. Therefore, the owner's permission is required to use it. Similarly, agricultural land is under the control of the Land Lord. Respondents have permission to live on it and to farm it, but do not have ownership rights. Therefore, if there is a disaster, permission to use the land is under the control of the Mosalaki or Land Lord.

4. Disaster Risk Reduction Plan

The community vulnerability and capacity assessments carried out at these selected sites were done with the aim of reducing the risks of disaster, especially those disasters caused by climate change. Therefore, a community based disaster risk reduction plan needs to be drawn up and put into practice. Before starting to plan, however, it is important to understand the various concepts related to disaster risk, such as *vulnerability*, *hazard*, *disaster risk*, and *capacity*.

Vulnerability is an important part of research into hazard and disaster risk. Vulnerability refers to "the susceptibility of people, communities or regions to natural or technological hazards"(Kumpulainen 2006). Vulnerability is described as a set of conditions and processes that result from an increase in physical, social, economic or environmental weaknesses caused by the impact of a hazard (ESPON Hazard Project 2003). IPCC (2001) explains that vulnerability is a measurement of how susceptible a system is to the effects of climate change, including variable and extreme climates. Vulnerability is a function of exposure, sensitivity and adaptive capacity, where:

- Exposure (E) is the degree to which a system is open or exposed to the effects of changes in climate or ecosystem
- Sensitivity (S) is the level to which a system is influenced by changes in climate or ecosystem.
- Adaptive Capacity (AC) is the ability of a system to respond to the impacts of changes in climate or ecosystem.

Hazardis an integral part of people's daily lives. This is because nature or environment constantly produce natural events that are hazardous to humanbeings, like storms, high waves, earthquake, etc.A hazard will become a disaster if it interacts with a human population and environmental conditions that are weak or have low adaptive capacity to all the changes that occur. For example, the illustration in Figure 170 shows the relationship between *hazard*, *vulnerability*and*exposure* that gives rise to disaster risk. Disaster risk itself is defined as the probability of human beings or environment being exposed to a hazard. A region will experience high disaster risk if hazard, exposure and or vulnerability are high in that region.

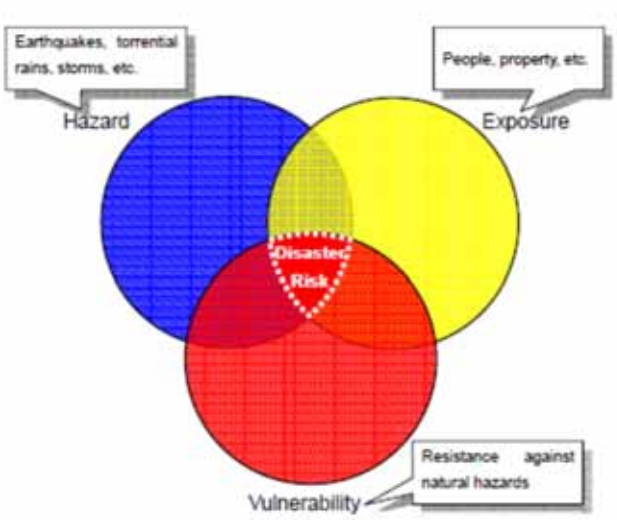


Figure 170. *Hazard plus Vulnerable Populationis the Cause of Disaster*

There are several ways of reducing disaster risk, like reducing the level of threat and vulnerability that could occur at that site, and or increasing the community capacity. Capacity is defined as a set of abilities that enable a community to increase their resilienceand ability to cope with the impact of a hazard that threatens and or causes damage. Capacity is very closely linked to the resources, skills, knowledge, and organisational ability (stakeholder) to respond and act to address a particular crisis.Endeavours to enhance the community capacity at a disaster prone site should heed the following criteria:

1) Human resources, including their motivation, attitudes, habits, skills, gender, age, physical completeness, and senses.
2) Nature and environment, including access to landscapes, soil, plants, animals, water and food, as the means for life.
3) Physical factors, including access to infrastructure and facilities.
4) Social factors, including the public's access to well-maintained social systems (family, organisations, institutions, social networks).

One of the steps that can be taken to reduce disaster risk is to identify all the potential hazards in a region.When the hazards have been mapped, then the risks are evaluated, because not all hazards give rise to high risks. Therefore, it is essential to establish priorities for determining risks and hazards. The next step is to draw up a prevention plan to reduce those risks and hazards.The final step is to evaluate whether the risk and hazard reduction activities have succeeded or not. If not, then other methods can be tried. If they have been successful, however, they should be further enhanced and or other plans made to ensure that these activities continue, and do not deteriorate or disappear. Wetlands International Indonesia Programme (WIIP) has already undertaken several activities in the context of disaster risk reduction that incorporate the concept of *management risk reduction* as part of *climate change adaptation*. These activities have been carried out both at policy level and directly in the field. In the following discussion, the activities that WIIP has done and is doing in the context of disaster risk reduction will be described one by one. The current information will continue to growalong with the developments in the field until the end of this PfR project.

4.1 Environmental Management Priority Strategy

The development of disaster risk reduction activities can be done by setting a scale of priorities for environmental management. In general, this can be done by looking directly at the conditions in the field, or by eliciting the local community's aspirations(known as the *participatory approach*), or a combination of both.In order to carry out an environmental management priority strategy at the assessment sites, WIIP's approach was to undertake direct observation in the field and to elicit the people's aspirations. The community was approached through a number of respondents, to discover their wishes and perceptions regarding ecosystem management in their respective areas.

Respondents were given a number of choices regarding priorities for management. They could choose between environmental, socio-economic or institutional priority for management. Next, they were given choices of who should manage the activities: government, the community, or private enterprise. Three choices of management scenario were given, based on natural resources management, social activities and economic activities in Kelurahan Sawah Luhur. The three scenarios were:

- Scenario A : Environmental management done entirely by the government
- Scenario B : Environmental management handled jointly by government and the public, with government as the leader.
- Scenario C : Environmental management handled by a third party, such as private enterpriseor an NGO having an interest in the site concerned.

An outline of the ecosystem management strategy can be seen in Figure 171.

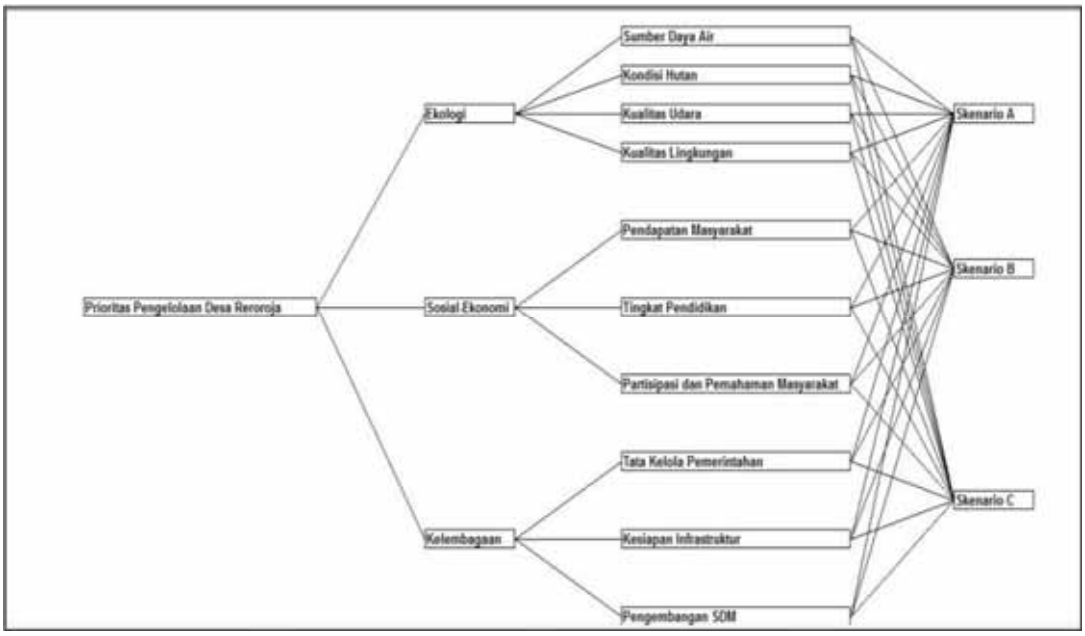


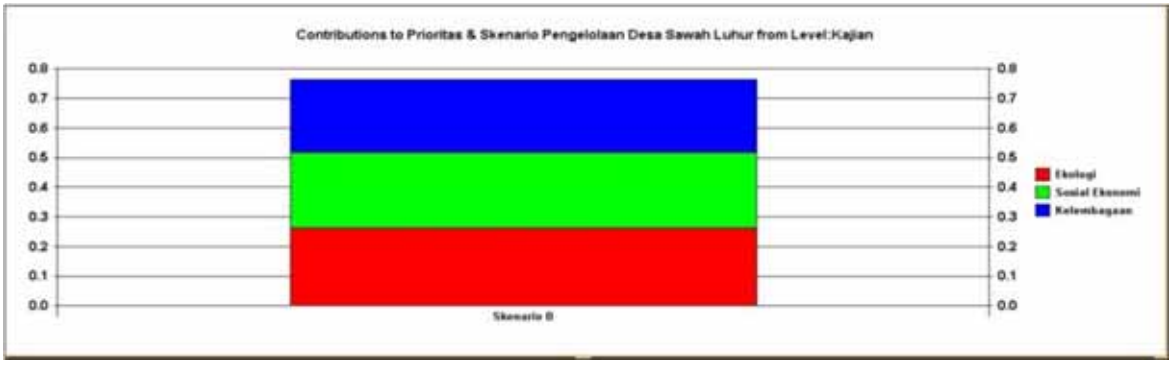
Figure 171. *Outline of Environmental Management Priority Strategy at PfR Assessment Sites*
Captions: Management priorities for Desa Reroroja (Prioritas pengelolaan Desa Reroroja), Ecological (Ekologi), Socio-economic (Sosial ekonomi), Institutional (Kelembagaan), Water resources (Sumber daya air), Forest condition (kondisi hutan), Air quality (Kualitas udara) Environmental quality (Kualitas lingkungan), People's income (pendapatan masyarakat), Educational level (Tingkat pendidikan), Community understanding and participations (Partisipasi dan pemahaman masyarakat), Governance (Tata kelola pemerintahan), Infrastructure readiness (Kesiapan infrastruktur), Human resources development (pengembangan sumber daya manusia)

4.1.1 Kelurahan Sawah Luhur

TheKelurahan Sawah Luhur community chose scenario B for environmental management in their area.However, the scores for A and B were almost equal (Figure 172). This could have been influenced by the respondents' educational level. It is known that the numbers of respondents with a low educational level (primary or none)and a higher level (secondary and tertiary) were fairly balanced. The tendency was for those with lower educational level to choose scenario A and those with a higher level to choose scenario B. This is an interesting issue because the agencies concerned will have to bridge this difference in perceptions.

Figure 172. *Environmental Management Scenarios forKelurahan Sawah Luhur.*

From the analysis, it is known that ecological assessment is the top management priority for this area. Respondents were of the opinion that ecological damage was the cause of disasters. And when disaster occurs, their socio-economic activities are disrupted. Details of environmental management priorities in Kelurahan Sawah Luhur are presented in Figure 173.



Key:
- Ecological Assessment
- Socio-Economic Assessment
- Institutional Assessment

Figure 173. *Environmental Management Priorities at Assessment Levelin Kelurahan Sawah Luhur*

Within ecological assessment, the top priority for improvement chosen by respondents was water resources. The issue of water resources is related to paddyfield irrigation management, water supply from Sungai Padek river for aquaculture ponds, and the supply of drinking water. As regards paddyfield irrigation specifically, the group of farmer respondents said that the water supply had decreased because several villages upstream had expanded their area of paddyfields, so the water supply had to be shared. Water pollution was also an issue needing attention. The aquaculture farmers generally blamed industry in the vicinity of Sawah Luhur for dumping waste in the river and thereby reducing pond yield. In fact, this is not entirely the cause of the decline in pond harvests. Poor production management and pond construction are also factors in this decline. Another water supply problem was difficulty in obtaining a source of waterfor domestic use.Respondents felt that the water currently available was of poor quality. The water they consume tastes brackish, so many of the villagers now purchase drinking water. This involves them in extra expense, so they are anxious to find an alternative way of addressing this problem. Environmental management priorities at ecological assessment level are presented in Figure 174.

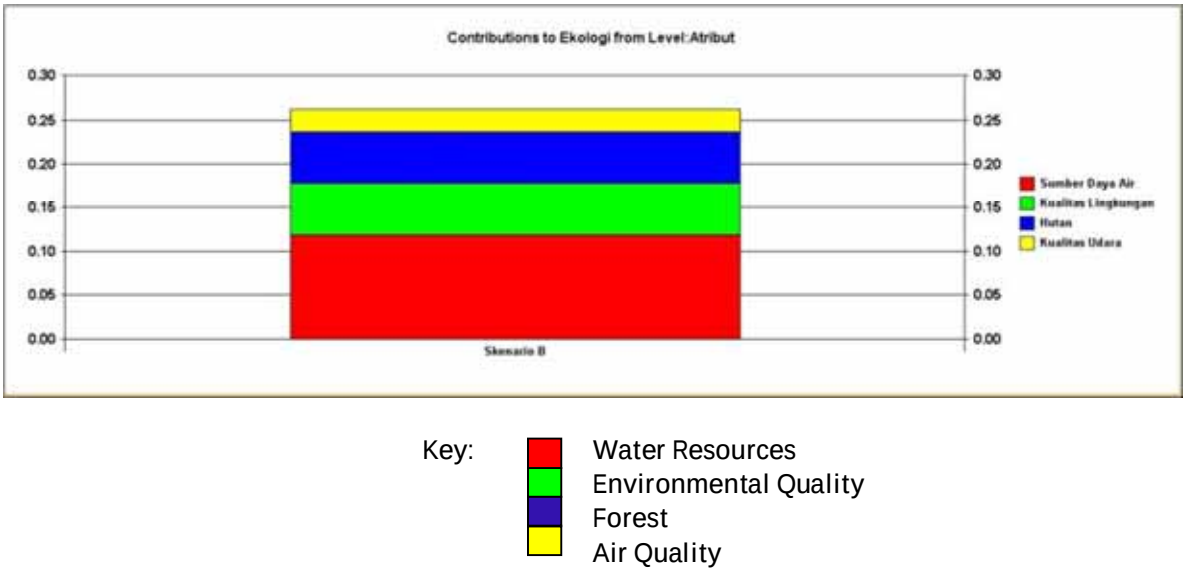
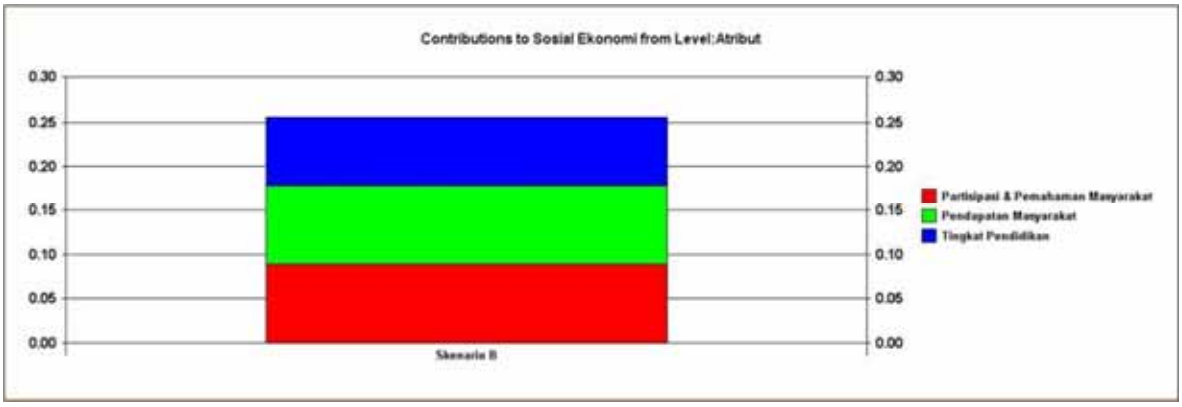


Figure 174. *Environmental Management Priorities for Ecological Assessment in Kelurahan Sawah Luhur*

Respondents' second priority for ecological assessment was the issue of environmental quality. High housing density and poorawareness of environmental hygiene make Sawah Luhur look like a slum. Third priority was given to forest condition, while air quality ranked bottom. The number of trees in the housing area has been steadily decreasing with the result that this area is now very dusty, especially duringthe daytime and in the dry season.

As regards socio-economic assessment, the main target was the participation and understanding of the community concerning disaster impact reduction.The local people are now aware of the importance of knowing how to cope with a disaster, so as to reduce its impact on them. They have facilities for information transfer, like training sessions and "socialisation" (*sosialisi*) related to knowledge about the various measures for coping with disaster and trying to prevent it.Second priority was given to the issue of incomes. The community want work opportunities, especially jobs that do not require a high level of education.In interviews, they said that they expected the government to play an active role in creating work opportunities. The types of facilitation that they want from the government are work opportunity, and capital for opening new businesses or improving existing ones.Third priority was the villagers' low educational level. To address this issue, an effort is needed to make them aware of the importance of education. In addition, assistance is

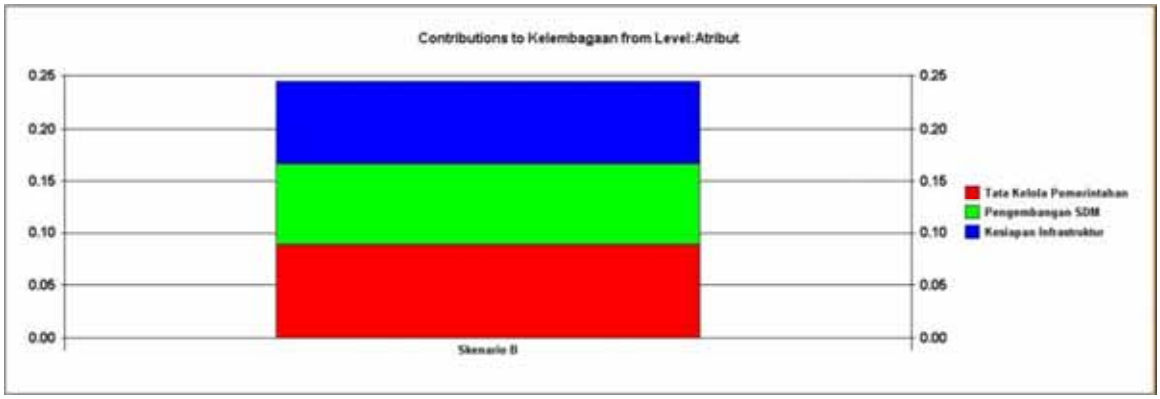
needed from relevant agencies to help with the costs of education. Economic difficulty was the main reason given for the low educational level in this village.If the education problem can be overcome, then the villagers will automatically be better able to educate their children to a higher level. Information on management priorities in socio-economic assessment is given in Figure 175.



Key: Community Participation and Understanding
People's Incomes
Educational Level

Figure 175. *Environmental Management Priorities for Socio-Economic Assessmentin Kelurahan Sawah Luhur*

As regards the institutional and infrastructure aspect, non-government respondents assumed that these were entirely the government's responsibility. In their opinion, the roads and irrigation infrastructure needed to be improved, whereas health and educational infrastructure was adequate as it had just been built.They expressed a strong desire for governance to be improved so that infrastructures not yet available could be provided. Human resources improvement was equally important, considering the people's low educational level and low incomes.Training in*soft skill*sor diversification of livelihoods would be ways increasing their incomes and improving the quality of Sawah Luhur's human resources. Information on management priorities for institutional assessment in Sawah Luhur is presented in Figure 176.



Key: Governance
Human Resources Improvement
Infrastructure Readiness

Figure 176. *Environmental Management Priorities for Institutional Assessmentin Kelurahan Sawah Luhur.*

4.1.2 Desa Reroroja

Results of the environmental management priority analysis conducted with the participation of the community in Desa Reroroja indicated that they were more inclined to choose scenario B for the management of their area (Figure 177). The score for B was somewhat higher than that for the other two scenarios.In interviews, however, they said what they wanted was for the environment to be managed jointly by government, community and NGO.They expected that cooperation among all three of these elements would get the most out of all the activities currently in progress as well as those yet to be undertaken.

Figure 177. *Environmental Management Scenarios for Desa Reroroja*

Further analysis revealed that ecological assessment was the respondents' top management priority (Figure 178). The villagers assumed that if the environment was well managed then the risk of disaster would be reduced. In addition, they would also receive other benefits that would have an increasingly positive impact on their socio-economic life.Another perception that arose concerned institutions, particularly local government. They expressed a strong desire for government to make a bigger effort to deal with environmental issues (both physical and socio-economic) in the village. They hoped that government programs related to environmental management would involve the local community and NGOs there.

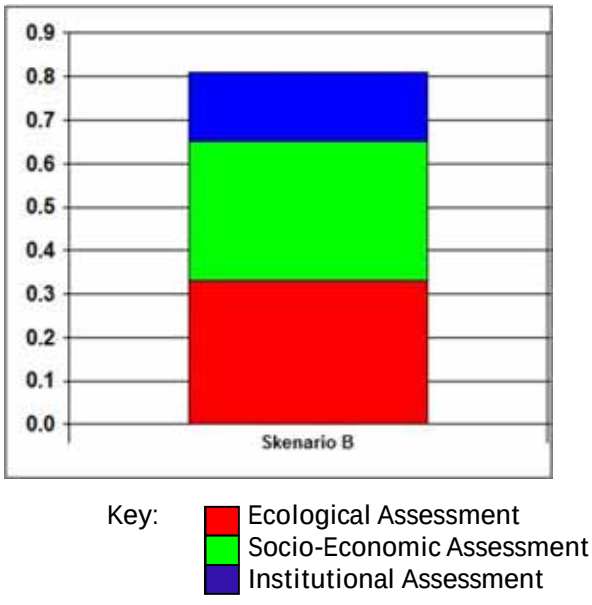


Figure 178. *Environmental Management Priorities at Assessment Level in Desa Reroroja.*

As regards ecological assessment, the top priority for improvement according to respondents is water resources (Figure 179). Difficulty in obtaining a source of water, especially in the dry season, is a problem for the villagers every year.This also makes irrigation difficult, with the result that agriculture in Reroroja depends totally on rainfall.The people want some other measure or simple technology that can help them to overcome this shortage of water sources in their region. The next issue is the condition of the forests. Reroroja's forests are being destroyed. Much of the upstream forest has been cut down for timber or burnt to clear land for agriculture. Although there are now village and *adat* regulations that prohibit the felling of trees, the community's participation in conserving upstream forest is crucial. Similarly, the mangrove forest is in equal need of repair. Since the earthquake and tsunami in1992, a large proportion of the village's coastal mangrove has been destroyed. It will take about 20 years to restore. Mangrove reforestation in Reroroja owes much to the actions of one of the villagers, Babah Akong, who is deeply concerned about the continued existence of the mangrove forest. Even though the condition of the mangrove has now improved, there is no guarantee that this will continue. Efforts and awareness are needed on the part of all concerned to ensure that mangrove conservation continues into the future.The respondents expressed a strong desire for cooperation among local government, the community and third parties to undertake activities related to mangrove conservation.

The third priorityfor improvement in the ecological assessment was given to environmental quality. This includes sanitation and environmental conditions in and around homes. Some members of the community do not yet have proper toilets. Toilets are still primitive. Bathrooms, for washing, bathing, etc. are communal and in poor condition. This situation can be improved by, for example, constructing decent public toilets and public wells. Another environmental problem is the amount of animal dung near homes. This is because livestock are not kept in pens but allowed to wander outside, so they leave excrement wherever they go. Bottom priority went to air quality as Reroroja's air quality is still considered good,there being no pollution(from motorcycle, car, etc) as yet.

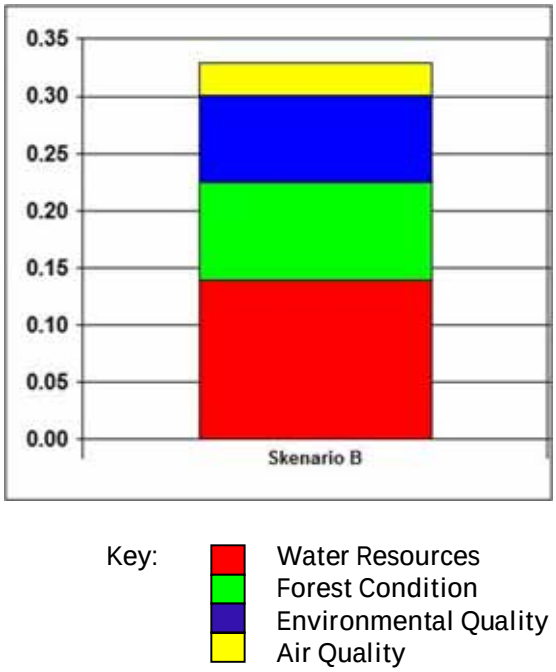


Figure 179. *Environmental Management Priorities for Ecological Assessment in Desa Reroroja*

As regards socio-economic assessment, the issue which most needed improvement was said to be work opportunity (Figure 180). Most of the villagers tend to do the same type of work, i.e. farming and fishing. This made business opportunity difficult. Another reason was that there was very little private investment, either local or international, in Desa Reroroja. Several years ago, a pearl company had opened a pearl culture business in the waters around Reroroja. However, this did not run well due to conflict with the local community. Lack of job opportunity has led to a drop in incomes, and impacts on the community. In this context, “drop in income” means that the incomes of the people in this area are smaller than the amount they have to pay out each day. The negative impact of this is that they make use of destructive practices in an effort to increase yields. Examples of such practices include fish bombing at sea, and burning forest and grasslands to clear land.

Educational level is an issue of no less importance in socio-economic assessment. According to information obtained in interviews with members of the community and village government, most of the villagers have completed only primary or junior high school. One of the reasons for this is low incomes, so both these issues need to be addressed together as they are closely linked. As regards community participation and understanding in relation to disaster, a large proportion of the community has begun to respond to disaster. They are starting to become aware of the importance of looking after the environment. Although there is still some way to go, this awareness has started show in them.Their understanding and participation takes the form of, for example, planting trees, conserving mangroves, a reduction in logging, and a reduction in building homes on the beach.

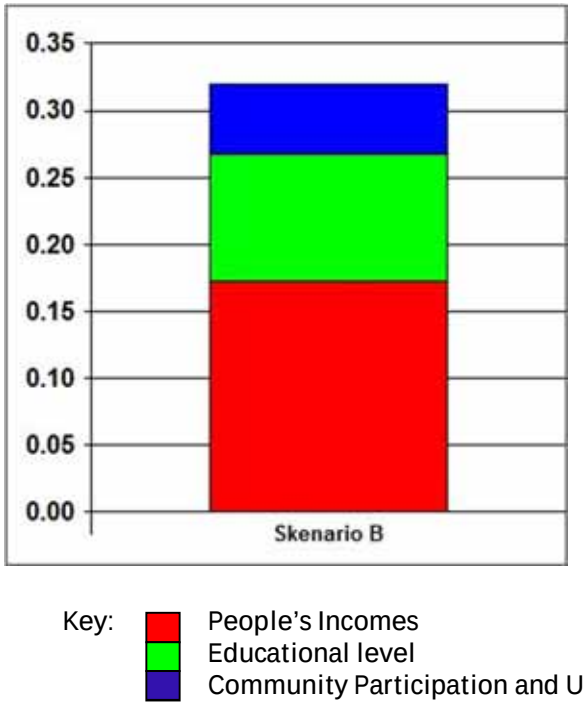


Figure 180. *Environmental Management Priorities for Socio-Economic Assessmentin Desa Reroroja*

For institutional assessment, human resources development was given top priority (Figure 181). Low educational level plus lack of variety in livelihoods had led to the low quality of human resources. If this situation is allowed to continue, it is feared that they will not have the ability to cope with the changes that happen.To address this issue, the community want help from the government and other agencies, such as extension services on cottage industries for processing natural products, and skills training for villagers of productive age.

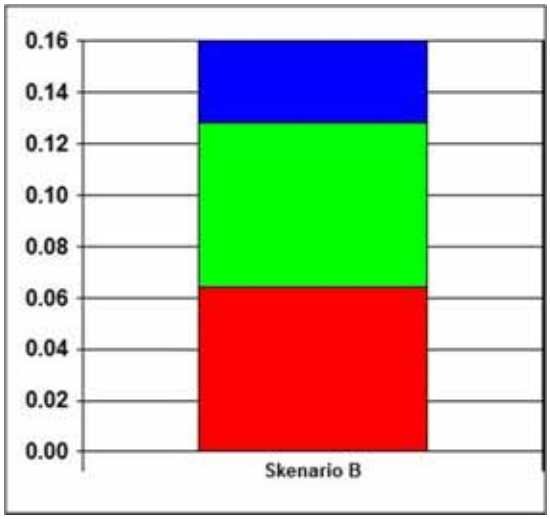


Figure 181. *Environmental Management Priorities for Institutional Assessment in Desa Reroroja*

The second management priority was infrastructure readiness. The infrastructure meant here is the condition of the roads linking the dusuns, public facilities such as *polindes*, health services, school buildings, places of worship, electricity network, etc. The people want easier access to these. Easy access to and availability of the primary infrastructure needed by the community will help in developing the village and also facilitate escape and rescue in times of disaster. The role of local institutions (local government) and the quality of governance took third place respectively. The local government has made a visible contribution to several activities related to ecology and socio-economics. Nevertheless, the community still want to see more concrete proof, such as easier bureaucracy, and better action in the future monitoring and management of the village's assets.

4.1.3 Desa Done

Analysis of environmental management priorities in Desa Done showed that scenario B was chosen by more respondents than either of the other two scenarios. This indicates that these respondents would like to take part in the environmental management programs in their village. They prefer to get involved directly and develop their village so that the disasters that strike it almost every year can be reduced.Results of the analysis of management scenario chosen by respondents in Desa Done are presented in Figure 182.

Figure 182. *Environmental Management Scenarios forDesa Done.*

Further analysis showed that the top priority for environmental management was socio-economic. This can be seen in Figure 183. Socio-economic issues are extremely important in the lives of the Desa Done community. From the information obtained, it can be ascertained that the ecological and institutional problems in the village are a result of socio-economic inequality. The respondents believed that social and economic prosperity would have a positive impact on people's enthusiasm for conserving the physical environment and managing the institutions in their village.

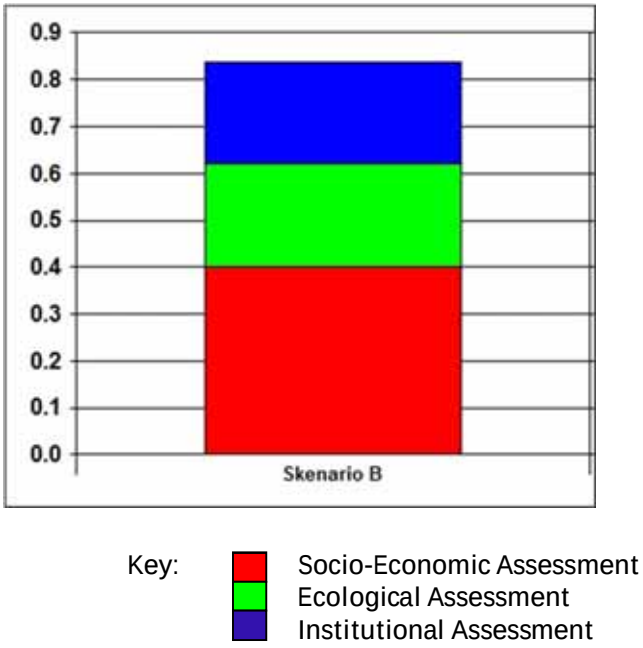


Figure 183. *Environmental Management Priorities at Assessment Level inDesa Done*

According to the information in Figure 184, the Desa Done respondents wanted the community's participation in and understanding of disaster risk reduction to be improved and increased. They asked for activities, in particular the provision of information and knowledge on what must be done to reduce disaster risk in their village.In addition, they also need motivation and activities that build enthusiasm and cooperation for that purpose.Educational level and people's incomes ranked almost

equally as the second and third socio-economic areas needing improvement. The low level of education was blamed as the reason for low incomes and low participation in disaster risk reduction activities.An awareness of the need to go to school and seek knowledge is the most important factor in this. Many children still choose to go to the fields rather than go to school. Cost is also a reason for this. All three points regarding socio-economic assessment must be addressed together as they are all inter-connected.

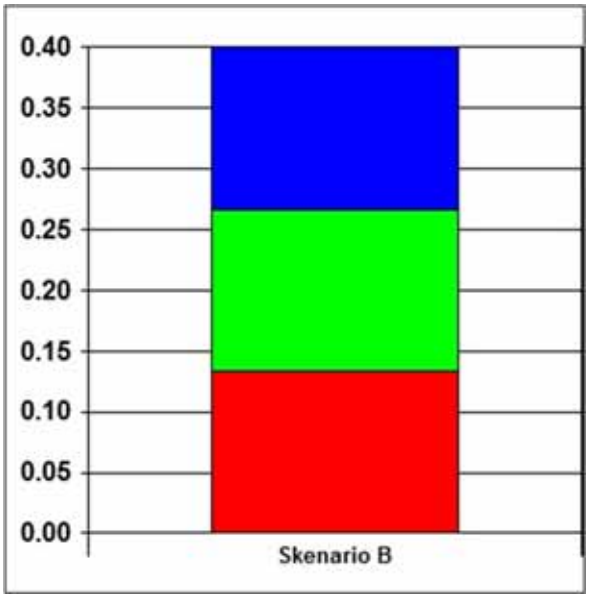


Figure 184. *Environmental Management Priorities for Socio-Economic Assessmentin Desa Done*

The respondents' second priority for improvement was ecology.The main issue in this assessment was the need to restore the condition of the forests. The forest is an integral, inseparable part of the Done community. The forest is part of traditional *adat*, livelihoods, and a source of life for them. Forest conditions have deteriorated in quality to the point where the community have become aware of the need for reforestation, especially in the vicinity of springs. Forest conservation is done by planting trees in areas that have become barren as a result of illegal logging and burning by irresponsible people. Forest conditions are closely linked to water resources, because almost all the villagers get their water from the springs in the forest. Therefore, both of these attributes must be managed together. Fear of drought has made the community, specifically the respondents, more concerned about the condition of the forest and water sources. The community are now heeding the *Adat* rules that ban the cutting of forest, and carrying out tree-planting programs around springs. These activities involve cooperation between the community and the government and WIIP. This program is expected to help conserve the village's forest and springs. Environmental and air quality are the next important points for management. Environment, in this case, refers to the environment around homes. The condition of this environment in Desa Done is quite good, but care needs to be taken to ensure that its condition is maintained and even improved. Details of management priorities for ecological assessment are presented in Figure 185.

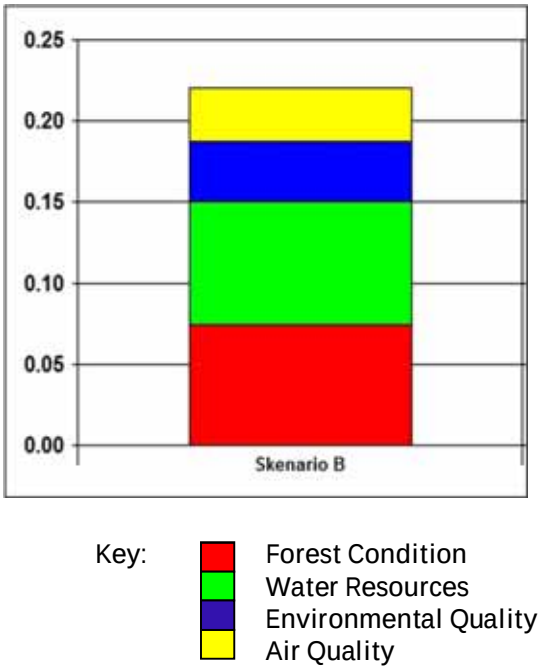


Figure 185. *Environmental Management Priorities for Ecological Assessment in Desa Done*

The last assessment for management and improvement is institutional. In this context, "institutional" refers to anything connected with local government.Analysis indicates that respondents want improvement to the quality of the village's human resources.Because of the relatively low quality of human resources in the village, there is very little variety in their livelihoods, and their ability to compete outside the village is poor.Another reason for the poor quality of human resources is their low level of education. They badly need information and soft skills development in order to improve the quality of human resources. It is hoped that the community, in particular the respondents, will acquire additional expertise other than farming, so that they can increase their incomes and be better able to withstand change, especially climate change.

Infrastructure readiness was the second point needing urgent improvement in their opinion. The most important problem they wanted addressed was the source of lighting. Electricity is a crucial part of people's lives. The next point requiring improvement, they said, was governance. Respondents complained of government's lack of synergy, especially in the provision of disaster information. They wanted cooperation between local government and the local community in managing the environment and disaster-related information, such as an early warning system, information on evacuation routes, etc. Details of management priorities in institutional assessment are presented in Figure 186.

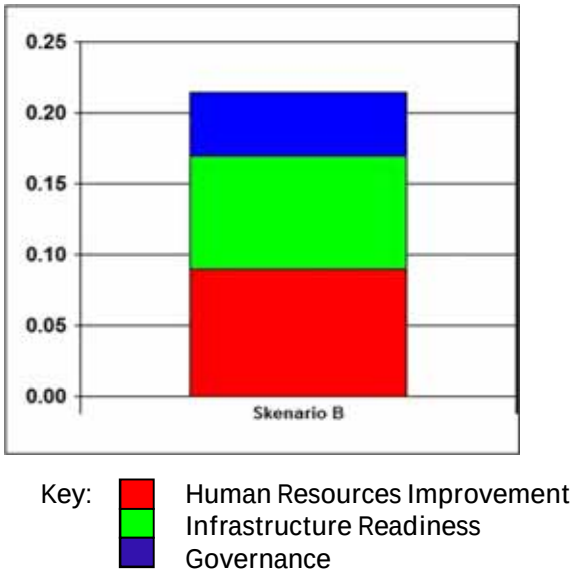


Figure 186. *Environmental Management Priorities for Institutional Assessment in Desa Done*

4.1.4 Desa Darat Pantai

Analysis of environmental management scenarios and priorities in Desa Darat Pantai showed that the community, represented by a number of respondents, chose scenario B for the management of their environment. The value obtained for scenario B was significantly higher than for either of the other two scenarios, suggesting that a large proportion of the respondents wanted cooperation between local government and community in managing various issues in their village. Details of this analysis are presented in Figure 187.

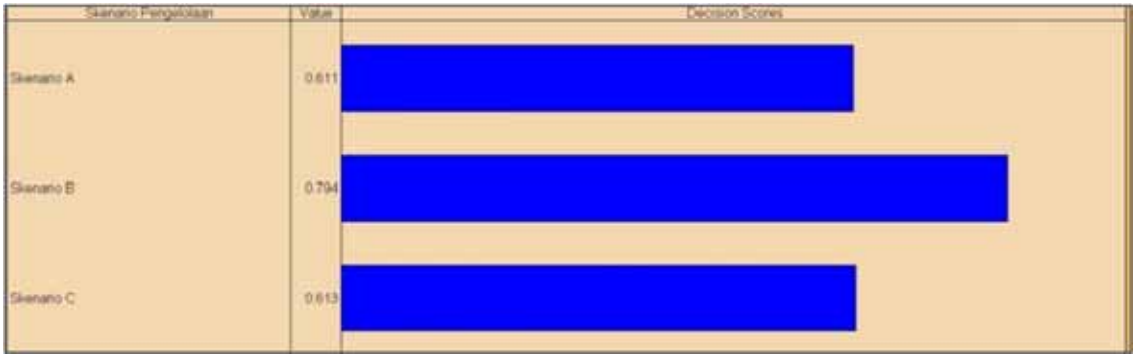


Figure 187. *Environmental Management Scenarios for Desa Darat Pantai.*

Further analysis revealed that ecological assessment was the top priority for improvement in this village. This was because the many environmental problems that have frequently arisenrecently stem from the ecological environment. The various disasters that often strike the village are the result of the ever-worsening condition of its ecology. Other problems arising in the village, particularly economic problems, are an indirect result of the impact caused by ecological problems.Besides this, institutional assessment also contributes to the increase in the village's problems. Information on management priorities at assessment level in Desa Darat Pantai can be seen in Figure 188.

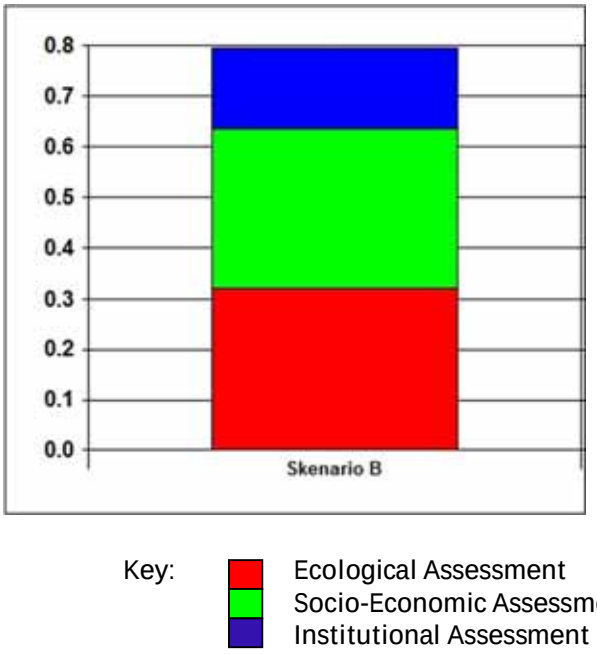


Figure 188. *Environmental Management Priorities at Assessment Level in Desa Darat Pantai*

At ecological assessment level, almost half of all the respondents chose water resources as their top priority for prompt improvement (Figure 189). Difficulty in obtaining a source of water, both in the dry season and the wet, was their main reason for this choice. In the dry season, water is difficult to find in the village because the sources dry up, while in the wet season the water is of poor quality, tasting brackish. Although there is now a *Pamsimas* program,a large part of the community has not yet benefited from this facility. They are anxious to find another alternative that can help them overcome the water problem in their area.

The second issue they wanted addressed was the condition of the forest in the hills.Its condition has become degraded mainly as a result of logging and irresponsible burning by a number of individual villagers. As a result, floods carrying muddy sediment attack the village almost every year. These floods damage the fields, thus frequently threatening the community with failed harvests. Losses are considerable and can even result in loss of livelihood. So far, *adat* and local government have begun to impose a ban, but this has not yet been declared in writing.

Like the hill forest, coastal forest is also under increasing threat. Although the area of mangrove forest in Desa Darat Pantai is still much greater than that in the other villages mentored by WIIP, it is still being damaged by human activity. This threat needs to be dealt with promptly in order to ensure continued conservation of the mangrove forest. Mangroveis of great value both to the ecosystem and to the local inhabitants, one of its main benefits being to protect the village from abrasion and high waves. Dusun Napong Gelang is one part of Desa Darat Pantai which is almost devoid of mangrove forest. As a result, its coast is subject to abrasion, especially during the rainy season and west winds in January-March. The local government has begun to enforce a ban on the cutting down of mangrove. In addition, efforts to plant mangroves have begun with the help of facilities from WIIP. Still, this will not be enough if the villagers themselvesdo not make any effort to take care of them. Other efforts are therefore needed to ensure that activities already underway can be carried out successfully. Environmental and air quality ranked third and fourth as priorities for

improvement. Although these received relatively low scores, they both require attention. Environmental health and sanitation in the residential part of the village need improvement. Toilets and bathrooms are scarce, so the quality of sanitation there is still poor. Few villagers have toilets, so they usually relieve themselves just anywhere, such as in bushes, on the beach, and the ground.

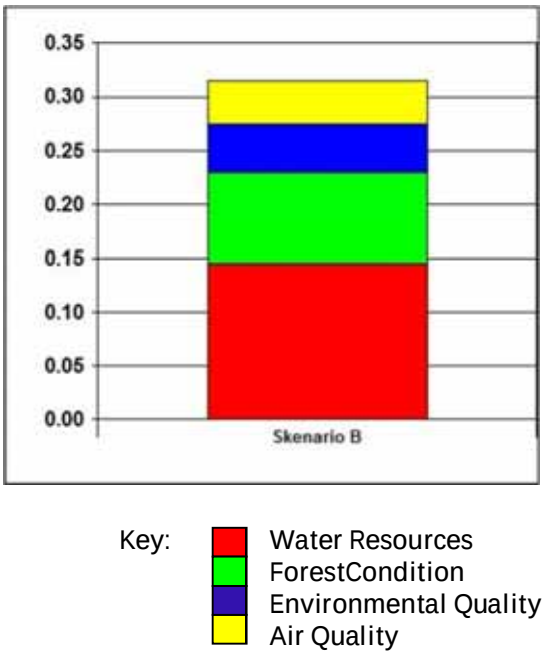


Figure 189. *Environmental Management Priorities for Ecological Assessment in Desa Darat Pantai*

As regards socio-economic assessment, analysis showed that the issue most in need of urgent improvement was the level of education (Figure 190). Most of the villagers have only completed primary school, while some have never attended school at all and are illiterate. In the past, access to school was difficult. Also, awareness of the importance of schooling was much lower than it is today. Most of the illiterates are therefore among older people. This problem is not confined to the past, however. It still exists and is one of the obstacles to village development.Not all the villagers are aware of the importance of education. In addition, difficult access to the school plus economic difficulty are major reasons why the level of education in this village is still low. The only school available in the village is the primary school; for a higher level (junior high and senior high), they have to go to Desa Talibura and Kota Maumere. Not only are these far away, but many parents cannot afford the expense. Therefore, they choose to look for money rather than seek an education.

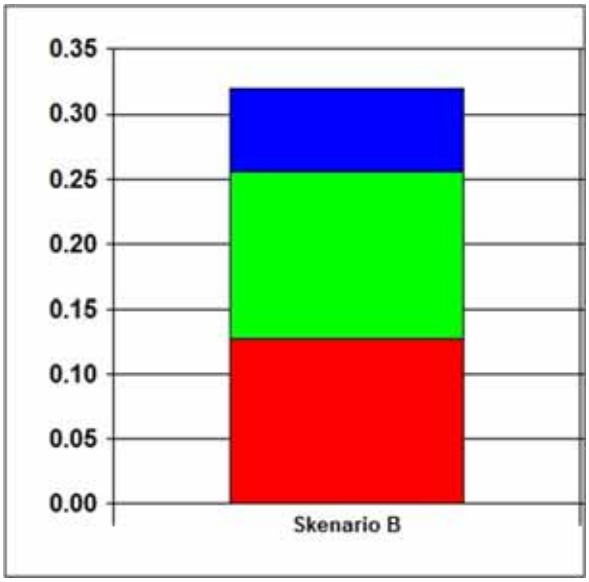


Figure 190. *Environmental Management Priorities for Socio-Economic Assessment in Desa Darat Pantai*

The next issue in socio-economic assessment was people's incomes. Low average incomes, both daily and monthly, are one of the factors that inhibit village development. Low incomes are a result of the community's low educational level.Both issues must be addressed and overcome together in order to create a community capable of withstanding all types of change, in particular those due to climate change.Agriculture in this village depends heavily on the seasons, so harvests are not possible all year round.Another factor affecting success is the difficulty in obtaining sources of water for each farming activity.A business with good prospects in Desa Darat Pantai is animal husbandry. Livestock feed in the form of grass is plentiful there. However, the scarcity of rain in the dry season causes the grasslands to become dry, so a solution is needed if these prospects are to be realised. For example, reservoirs could be constructed to store water in the rainy season for use in the dry. Nevertheless, even without that, the livestock farmingalready undertaken by several villagers has shown very positive results compared with agriculture or sea-fishing. Interviews with respondents revealed that they badly needed extension services and help with capital for their livelihoods.In addition, they also need help in learning other skills so as to diversify their businesses and improve their incomes.

Community participation and understanding ranked last in the socio-economicassessment. Analysis indicated that respondents felt that the villagers' educational level and incomes were more important than their participation and understanding in coping with disaster impact.Even though disasters are fairly frequent in the village, awareness related to reducing their impact is not high. They believed that when the economic problem was solved, they would be more enthusiastic about reducing disaster impact, as then they would not be worrying about where their next meal was coming from or other daily needs.So, although they ranked participation bottom, in fact this issue needs to be addressed promptly.

Last to be analysed was institutional assessment. The results indicated that improving the quality of human resources was the problem that respondents wanted addressed first and quickly (Figure 191). They wanted joint action by government and community to seek alternatives for raising the quality of the village's human resources. Their poor education and limited skills were, respondents felt, the main reason for the low quality of human resources there.Another reason was that facilities and infrastructure failed to provide adequate support. These included facilities for education, health, information and lighting, thus hindering the people's mobility and access to information.

This is supported by further analysis, which shows that infrastructure was given second priority after human resources improvement. Some facilities have been built but they do not reach all parts of the village. As a result, many villagers' needs are not met. If this issue can be resolved, the community will be better able to withstand and cope with hazards and changes. Local governance must also be improved.A government which has a really good system of village management will help community and village development programs to run smoothly. Institutional assessment shows a strong need for measures to facilitate development, such as the building of infrastructure, community capacity and skills.

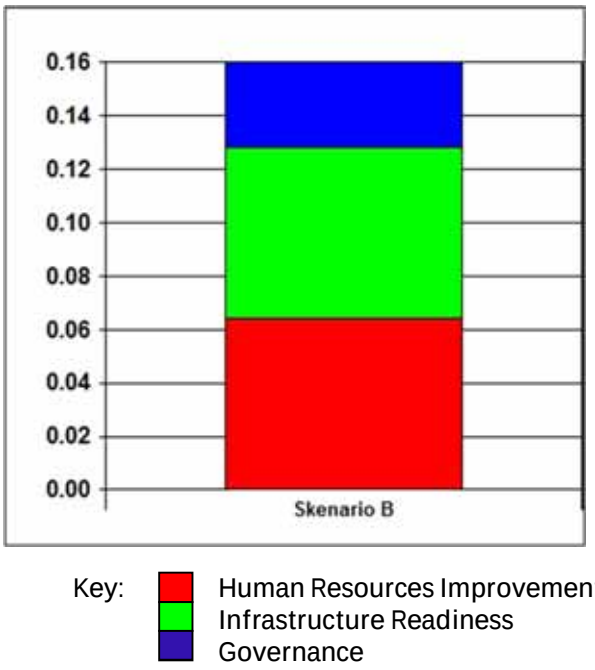


Figure 191. *Environmental Management Priorities for Institutional Assessment in Desa Darat Pantai*

4.1.5 Desa Talibura

Analysis of environmental management priorities in Desa Talibura showed that scenario B was chosen by slightly more respondents than either of the other two scenarios. They wanted environmental management in their village to be undertaken by government and community but with the government as leader. They would be delighted to be involved in any environmental management practices, whether initiated by government alone, government and community together, or government with another agency such as an NGO. Information on Desa Talibura respondents' choices of scenario can be seen in Figure 192.

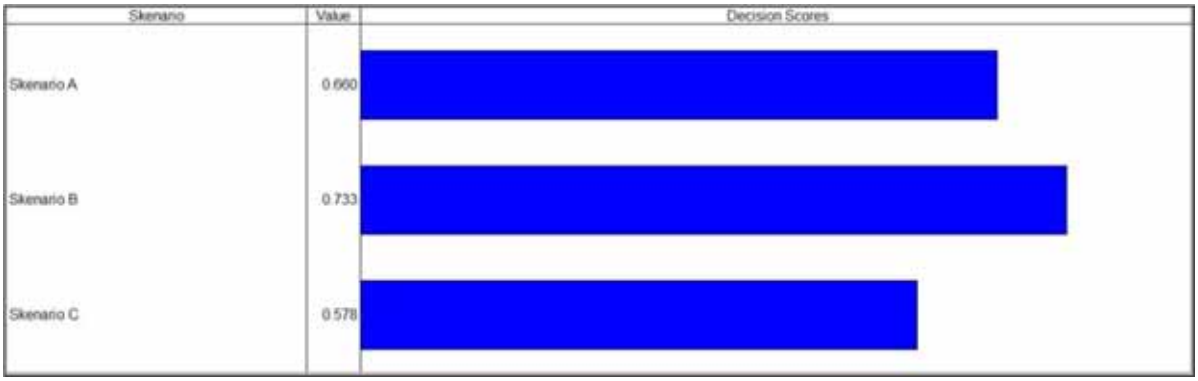


Figure 192. *Environmental Management Scenarios for Desa Talibura*

Analysis indicated that more respondents chose ecological assessment as their top priority for urgent action. This information is given in Figure 193. They were of this opinion because many of the disasters that now frequently strike the village are related to poor environmental management. They are anxious for the environmental quality of their village to be improved so that the occurrence and impact of disasters can be reduced. Changes in the ecological setting of the area influence the socio-economic assessment. Thus, this was their second priority for improvement. However, neither of these assessments will succeed unless supported by good governance, which was therefore ranked third..

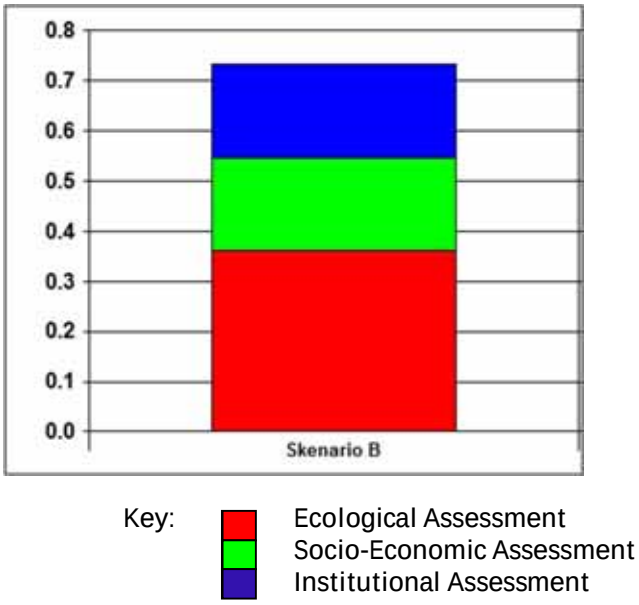


Figure 193. *Environmental Management Priorities at Assessment Level in Desa Talibura*

Further analysis of ecological assessment indicated that water resources were the issue most in need of urgent improvement (Figure 194). Although the Pamsimas program has begun here, it has not yet reached every part of the village. Respondents and other members of the community in Dusun Tanah Merah and Habihodot receive water from the Wairlaki and Wairlaka springs, so are less at risk of drought than the other two dusuns. Dusun Talibura and Kampung Baru are situated near the coast, so obtain their water from wells they have dug. Part of Dusun Kampung Baru already has Pamsimas facilities. This clean water comes from Wairlaki spring. Respondents without Pamsimas facilities often suffer from dried up water sources, especially in the dry season.

The second issue requiring prompt attention was environmental quality, especially along the coast. The frequent abrasionthere is the reason why the respondents feel that this disaster must be promptly addressed. Efforts that have been made so far have been coastal rehabilitation through the planting of mangroves. This activity was initiated by an NGO, Wetlands International Indonesia Programme, working together with the village government and community. It is strongly hoped that this activity will continue to run well and will reduce the impact of abrasion on the village. Air quality and forest condition ranked third and fourth. These two issues are inter-related, especially when the forest is being burnt to clear land for agriculture. When the villagers burn forest and grasslands to open up new land for farming, the smoke will impact on the village's air quality. Respondents complained of frequent breathing difficulty and coughs. The local government has now brought in a ban on forest burning. For this to work, other measures are needed, such as extension services to teach the villagers the dangers of smoke to air quality, and case studies that will help the rural community to comprehend the importance of conserving the forest.

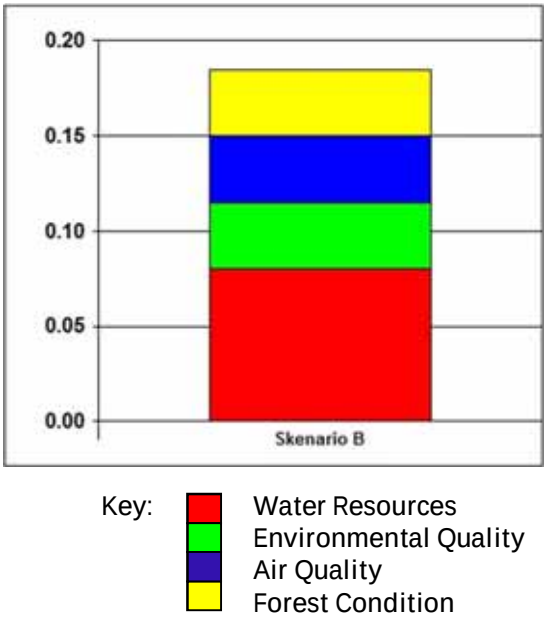


Figure 194. *Environmental Management Priorities for Ecological Assessment in Desa Talibura*

As regards socio-economic assessment, analysis showed that the issue respondents considered to be in most need of urgent improvement was people's incomes (Figure 195). Although the respondents' average monthly incomes were sufficient for their needs, in general people's incomes in Desa Talibura are still quite low.The Desa Talibura village head said that most of the community work as farmers and fishers, so their incomes depend heavily on natural conditions and harvests/catches. Respondents hoped for other efforts such as diversification of work opportunity, help with business capital, and training in appropriate soft skills for cottage industries that could be applied in their village. The next priority went to educational level. There are still some villagers who are reluctant to educate their children beyond primary school. Moreover, the only senior high school is in the town of Maumere, which involves the extra cost of travel expenses.The respondents expressed a strong desire for various programs and activities that could overcome this, such as the provision of scholarships, distance learning at senior highschool level, etc. Community participation and understanding related to disaster impact reduction took bottom place in the socio-economic assessment. Respondents want government and other agencies to address this issue.They were keen to be involved in activities to improve participation and understanding in the context of disaster risk reduction.

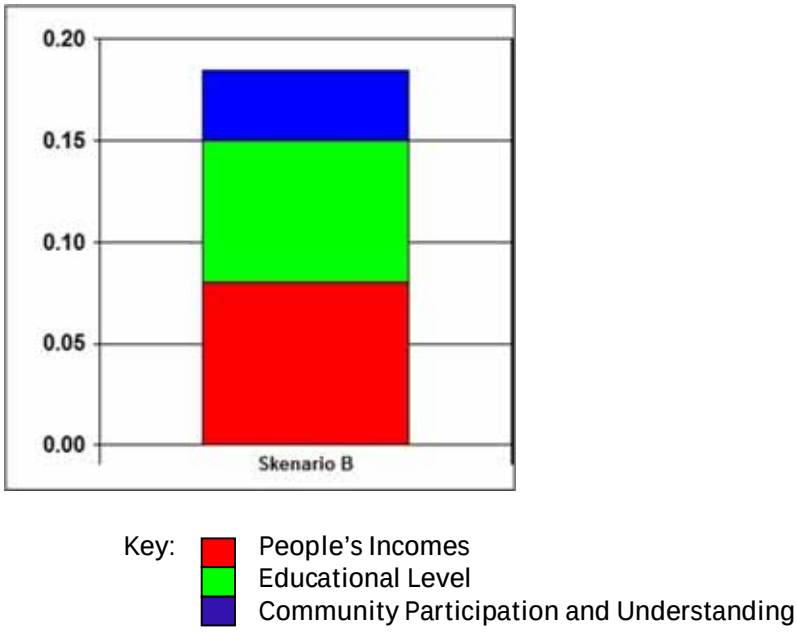


Figure 195. *Environmental Management Priorities for Socio-Economic Assessment in Desa Talibura*

Last to be analysed was institutional assessment. The results indicated that improving the quality of human resources was the problem that respondents wanted addressed first and rapidly (Figure 196). The poor quality of human resources is one of the main reasons for low incomes.Poor human resources quality is due to poor education, scarcity of technological information from outside, and poor accessibility, as well as a range of other reasons. Respondents expressed a strong desire for efforts or activities to improve their human resource quality so that they could create new fields of work or be able to compete in seeking jobs outside the village. In addition, better human resource quality could enhance incomes through the creation of innovations that could first be applied to their work. Therefore, it is hoped that government and relevant agencies will play a role in raising the community's human resource quality, so that they will be better able to cope with the rapidly changing times and environmental changes. Besides this, the participation and enthusiasm of the respondents in particular and the community in general are also needed for all these activities to run well.

Governance ranked second, after human resources improvement. Respondents said that village management was already quite good, but they wanted improvement in other things. Moreover, all the problems and wishes that the respondents had listed could be dealt with successfully if governance was good. Infrastructure readiness was their third priority for prompt improvement. Infrastructure such as roads, health facilities, banking facilities, market, etc. already existed in the village, so it was not difficult for respondents to use them. Infrastructure which needed attention included the roads to Dusun Tanah Merah and Habihodot, which were still just dirt tracks, more pamsimas water storage tanks, etc.

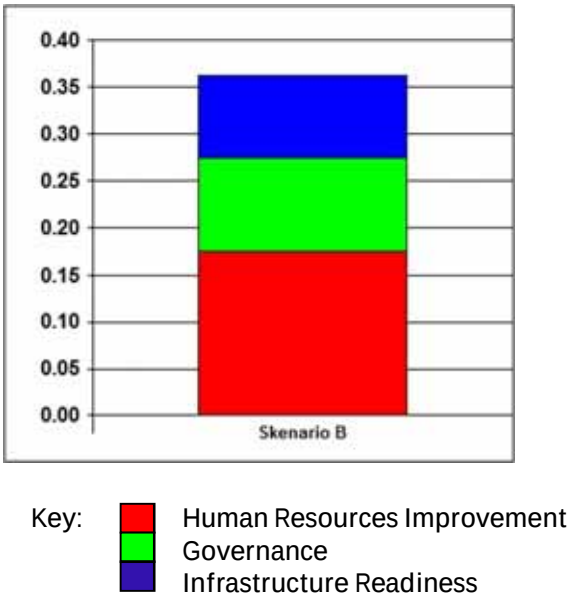


Figure 196. *Environmental Management Priorities for Institutional Assessment in Desa Talibura*

4.1.6 Desa Nangahale

Analysis of environmental management priorities in Desa Nangahaleindicated that although a sizeable proportion of respondents wanted the environmental management of their village improved using scenario B, almost as many wanted scenario A. Based on this information, it can be seen that some want environmental management in Desa Nangahale to be undertaken entirely by the government, while others want to be involved in it themselves. The percentage choosing scenario C was also quite high, meaning that a significant number wanted third parties, i.e. NGOs, to contribute to resolving environmental issues in the village. This information can be seen in Figure 197.

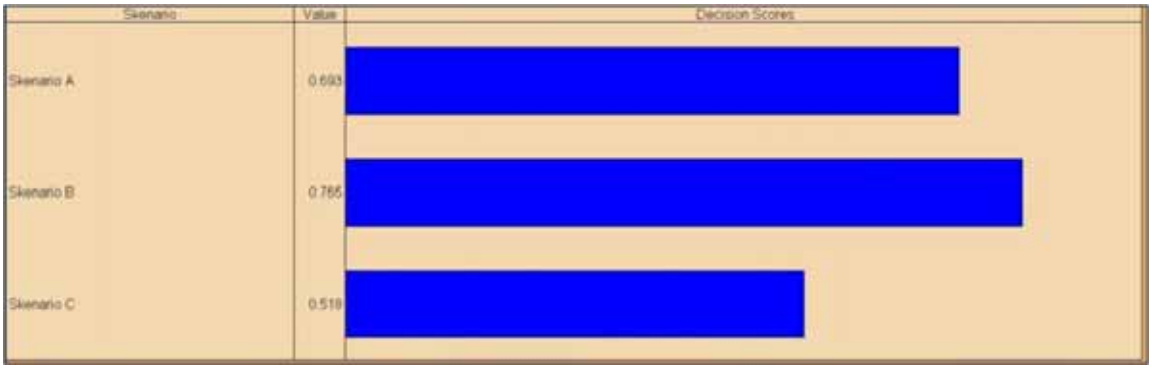
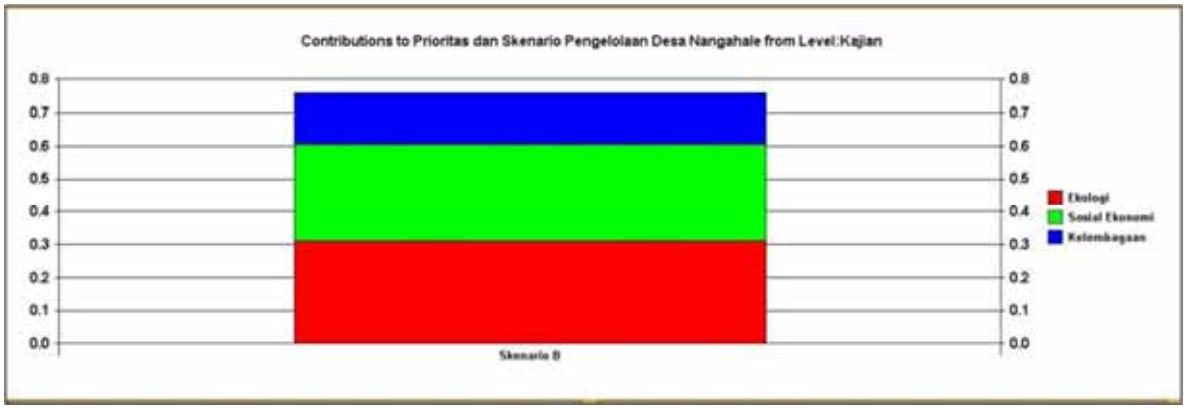


Figure 197. *Environmental Management Scenarios for Desa Nangahale*

Further analysis indicated that the top environmental issue they wanted improved urgently was ecological assessment. A very close second was socio-economic assessment, followed by institutional assessment. Information on management priorities at assessment level is presented in Figure 198.



Key:
Ecological Assessment
Socio-Economic Assessment
Institutional Assessment

Figure 198. *Environmental Management Priorities at Assessment Level in Desa Nangahale*

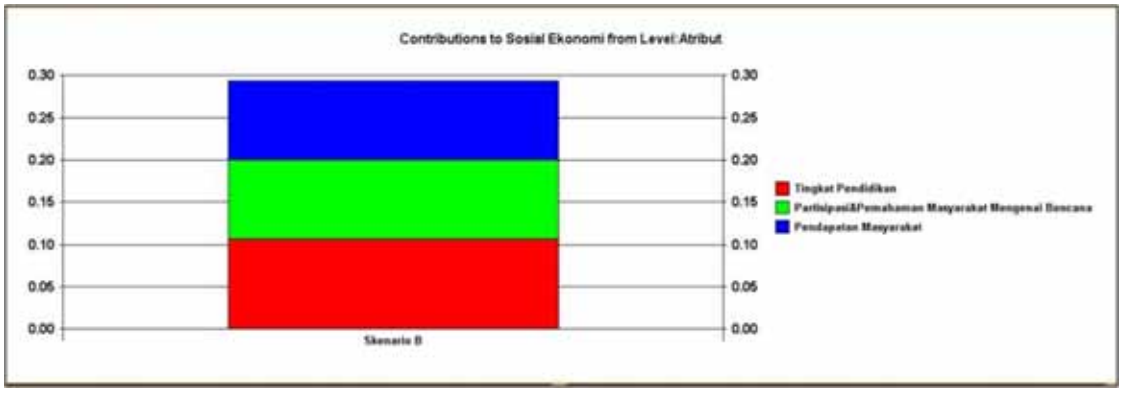
Further analysis regarding ecological assessment indicated that the issue they wanted addressed urgently was environmental quality (Figure 199). The continual increase in Desa Nangahale's population (specifically in Dusun Nangahale and Namandoi)without any increase in the settlement area means that the settlement is densely populated and looks like a slum. Houses crowded together with very little space between them and poor environmental management are serious problems in these two dusuns. The respondents were not happy with the situation but possessed no other land on which to build a house. In addition, urgent action needs to be taken to deal with the unhygienic conditions resulting from the lack of an organised system of sanitation and domestic waste disposal. The next issue requiring urgent action was water resources. Most of the inhabitants of the four dusuns have their own well, but the amount of water available from each well shrinks in the dry season and some wells even dry up completely. Moreover, some wells near the coast taste salty in the dry season. The inhabitants of Dusun Utan Wair and Lekong Gete still have another alternative source, spring water, but those in the other two dusuns do not. Forest condition was the third issue needing to be addressed, especially the condition of forest along the coast. Desa Nangahale is highly vulnerable to abrasion and high waves. Ironically, the mangrove forest and beach in that area have been destroyed. Mangrove trees and beach plants are very rare in that area.As well as coastal forest, the hill forest is also being destroyed.Such conditions trigger floods and landslides. These disasters can endanger the people living in Dusun Lekong Gete and Utan Wair. The deteriorating forest conditions have stimulated awareness among the community, to protect and conserve the forest. Reforestation and mangrove forest conservation programs have been started by various agencies. These activities involve cooperation between the community, local government and WIIP. In addition, to anticipate logging and burning of the forest, the village government and *adat* have issued bylaws and *adat* laws. For these to have any effect however, efforts are needed to raise public awareness to protect the village's forests, both on the coast and in the hills. The last problem needing resolution is air quality. In view of the density of habitation in Dusun Nangahale and Namandoi, one way of addressing this problem would be to plant trees around the settlement.

Key:
- Environmental Condition
- Water Resources
- Forest Condition
- Air Quality

Figure 199. *Environmental Management Priorities for Ecological Assessment in Desa Nangahale*

Further analysis regarding socio-economic assessment indicated that respondents' first priority for urgent attention was educational level (Figure 200). Many of the villagers have a low level of education, and there are still children who drop out of school for several reasons, such as lack of money or motivation.They are more interested in looking for money. To overcome this, one solution could be the government's 9-years free, compulsory education, and financial assistance for children from poor families.However, to create a community with high quality needs an awareness and understanding of the importance of education for life, and especially for the future. Education can be considered as an investment for coping with change, which is becoming increasingly intense.

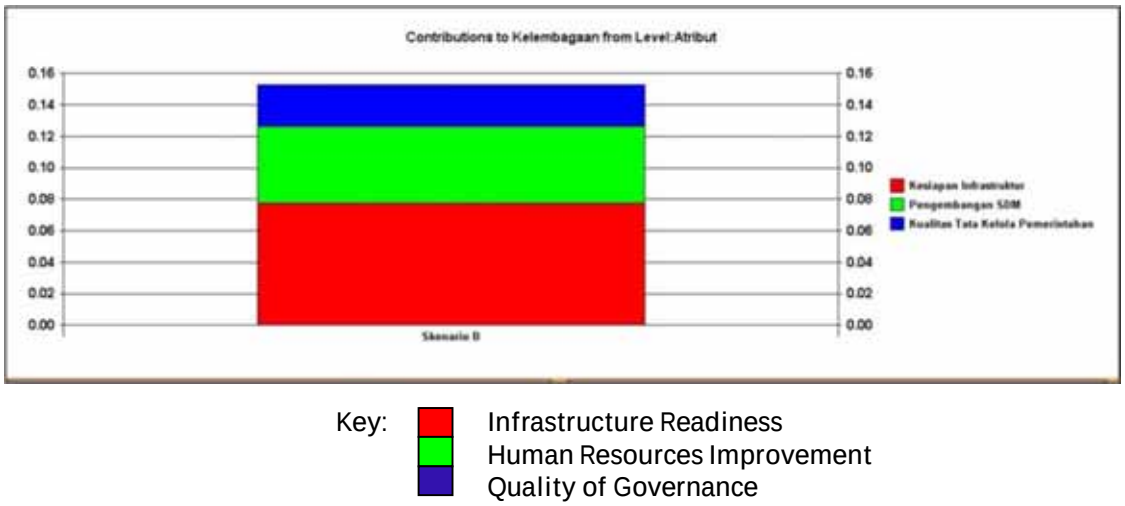
The next issue that needs to be addressed is community participation in and understanding of disaster impact reduction.In interviews, respondents said they wanted programs that could help increase their participation in and understanding of measures to reduce disaster impact.This was because their motivation was still low as they expected to get paid for doing it. The final socio-economic assessment issue in need of improvement was the people's incomes. Difficulty in getting jobs impacts on incomes. The lack of livelihood diversity and their limited capability to do other types of work hinder their development and ability to increase their incomes.



Key:
- Educational Level
- Community Participation and Understanding
- People's Incomes

Figure 200. *Environmental Management Priorities for Socio-Economic Assessment in Desa Nangahale*

The last assessment to be analysed was institutional assessment. This refers to the relationship with local government.Based on this analysis, it was ascertained that infrastructure readiness was the top priority for urgent improvement (Figure 201). Although the roads between dusuns are quite good (already surfaced), the gutters alongside the roads need attention. When it rains, the road often floods.Another infrastructure needing urgent work is the construction of breakwaterdefences along the coast of Nangahale, because many of the homes and salt huts there have been lost as a result of abrasion.The next issue requiring attention is human resourcesdevelopment, as the low quality of human resources results in limited skills, which makes it difficult for the villagers to find work other than farming and sea-fishing. Low educational level and low motivation are two of the reasons for the low quality of Desa Nangahale's human resources. Measures that could be taken to address this issue include the provision of skills training and extension services, business capital, and motivation to manage more progressively and creatively. The quality of local governance ranked bottom as a priority for Desa Nangahale's environmental management. Respondents said that to improve this would require discussion and consensus concerning the wishes of the community and the programs offered by local government.



Key:
Infrastructure Readiness
Human Resources Improvement
Quality of Governance

Figure 201. *Environmental Management Priorities for Institutional Assessment in Desa Nangahale*

4.1.7 Desa Kotabaru

Analysis of environmental management priorities in Desa Kotabaru showed that scenario B was chosen by more respondents than either of the other two scenarios. Although there is only a small difference between the scores for A and B, Figure 202 shows that scenario B ranks highest.The respondents want there to be cooperation between community and government in managing the village's environment.They said they would be very happy to be involved in a range of programs and activities related to environmental management.

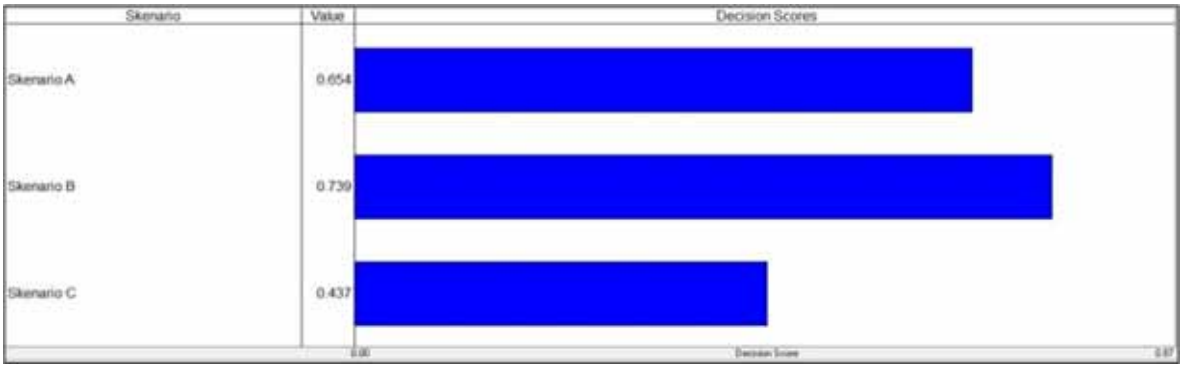


Figure 202. *Environmental Management Scenarios for Desa Kotabaru.*

Analysis indicated that institutional assessment had top priority for management and improvement in Desa Kotabaru (Figure 203). Respondents were of the opinion that coordination and quality of local government in undertaking environmental management related activities constituted an important parameter for the conservation of the village's environment. Good coordination will determine success inenvironmental management in the village. In addition, ease and availability of facilities and infrastructure will support their performance in managing the environment.

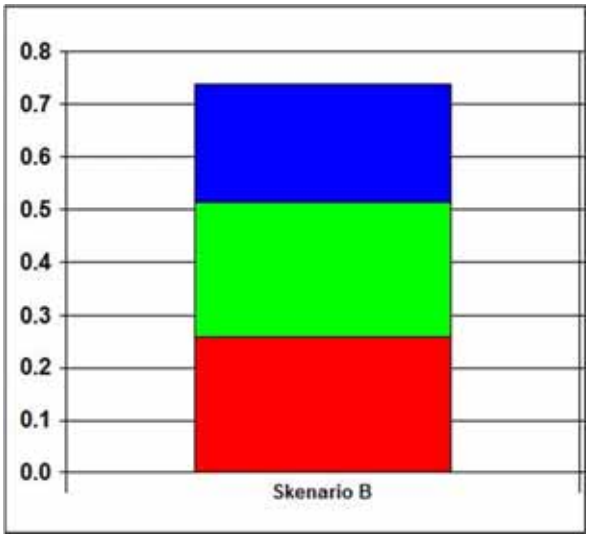


Figure 203. *Environmental Management Priorities at Assessment Level in Desa Kotabaru*

Looking in more detail at institutional assessment, analysis indicated that respondents wanted improvement to the quality of human resources in Desa Kotabaru. Their low quality impacts on many things, in particular on their economic prosperity. As a result, many of the villagers exploit natural resources unwisely to meet their financial expenses and life's necessities. Such irresponsible exploitation affects coastal and hill forests.

The next issue where respondents wanted prompt improvement was infrastructure readiness. Availability and ease of access to infrastructure are still inadequate, especially as regards vital facilities and infrastructure like roads, lighting, water supply, etc. This is a threat as it seriously reduces the village's capacity to cope with environmental changes resulting from climate change. They are anxious that the quality and quantity of infrastructure be raised. Governance ranked last in the assessment of institutional issues requiring prompt improvement.Governance is a support in the implementation of all activities related to environmental management. Details of the results of the analysis of environmental management priorities for institutional assessment can be seen in Figure 204.

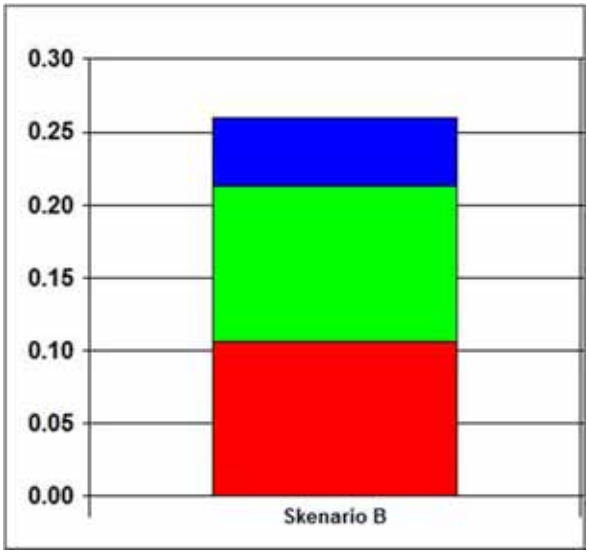


Figure 204. *Environmental Management Priorities for Institutional Assessment in Desa Kotabaru*

Respondents' second assessment choice was ecological assessment, with forest condition having top priority (Figure 205). The continuing degradation of the forests worries them because the villagers' lives depend on the forest. The deteriorating quality of the forests began to affect the villagers 15 years ago. Illegal logging by irresponsible persons plus the impact of disasters that hit the forests, such as fire, landslide and floods, have made this deterioration in forest quality even more worrying. In addition, conversion of forest for the purposes of housing or agriculture has also contributed to its degradation.Besides the hill forests, the mangrove forests on the coast are also part of this problem. Mangrove forests began to be damaged/destroyed/degraded by the action of ocean waves and also the unwise actions of human beings (logging for firewood and timber for house construction) in the past. For these reasons, the respondents are anxious that efforts be made to restore the forests' quality and quantity in their region, both those in the hills and the mangrove forests on the coast. One activity that has started is the planting and rehabilitation of mangrove forest, undertaken by WIIP, village government and village community. It is hoped that this activity till help improve the quality of the village's mangrove forest. To bring this about, this activity requires the support of many parties, in particular the awareness and concern of the village community.

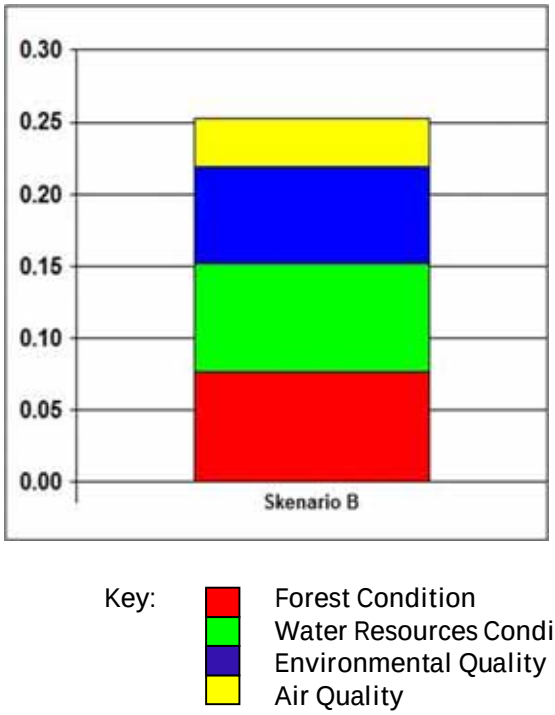


Figure 205. *Environmental Management Priorities for Ecological Assessment in Desa Kotabaru*

The second issue spotlighted was the condition of water resources. This cannot be separated from the problem of forest degradation because the springs are in the forest. The people have begun to experience difficulty obtaining water, especially when the dry season comes.The inhabitants of Dusun 3in particular badly need innovation in water sourcing as their present supply of water is unfit for consumption. Not only does it taste brackish but it is limited to just one source,so in the dry season this whole dusun is threatened by a water crisis due to a lack of clean water.Environmental and air quality ranked third and fourth as problem needing prompt improvement. By environmental quality is meant the villagers' sanitation conditions, which are still poor. They still defecate indiscriminately as there are very limited toilet facilities. Moreover, awareness of hygiene is poor. In general, Desa Kotabaru's air is still clean. Air conditions do become a matter of concern during the dry season and land burning season. A large section of the community then suffers from respiratory tract infections or symptoms of other health problems caused by the deterioration in air quality.

The final assessment analysed was socio-economic. In this assessment, community participation and understanding related to disaster impact reduction was given top priority for urgent improvement (Figure 206). Respondents hoped that both government and other parties would become better aware and more motivated to always protect the environment. They hoped to be able to work together to develop this. Second priority went to people's incomes. They wanted a program that would link physical environmental conservation and management activities with improvement in incomes and education. If these issues could be resolved together, then the Desa Kotabaru community's capacity to cope with disaster would be likely to improve.

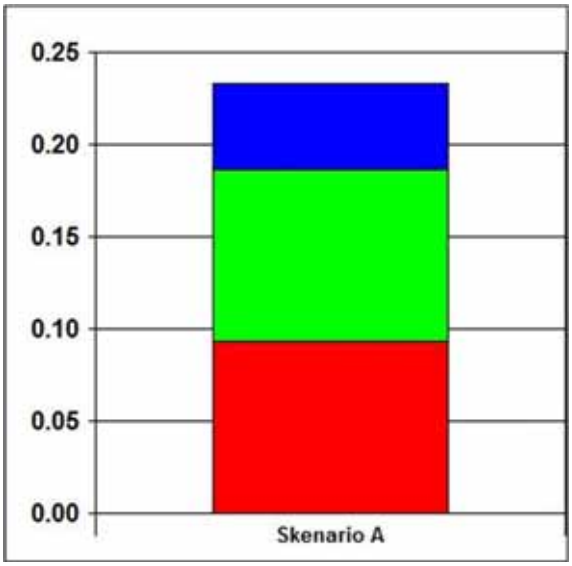


Figure 206. *Environmental Management Priorities for Socio-Economic Assessment in Desa Kotabaru*

4.1.8 Desa Tou Timur

Analysis of environmental management scenario and priorities for Desa Tou Timurwas undertaken in just two dusuns, which were Dusun Wolotou and Mulawatu. This was because the environmental management priorities considered were more closely related to the management of Danau Bowu lake and the coastal area in Dusun Wolotou. Results showed that more respondents chose scenario B than either A or C (Figure 207). Although the scores for scenarios B and A are close together, the results can be interpreted to mean that many respondents want cooperation between themselves and the local government in managing the environment. The village community in general and respondents in particular would help with technical implementation in the field, so that both elements could actively participate in village development and disaster mitigation, particularly through environmental management of a preventive character.

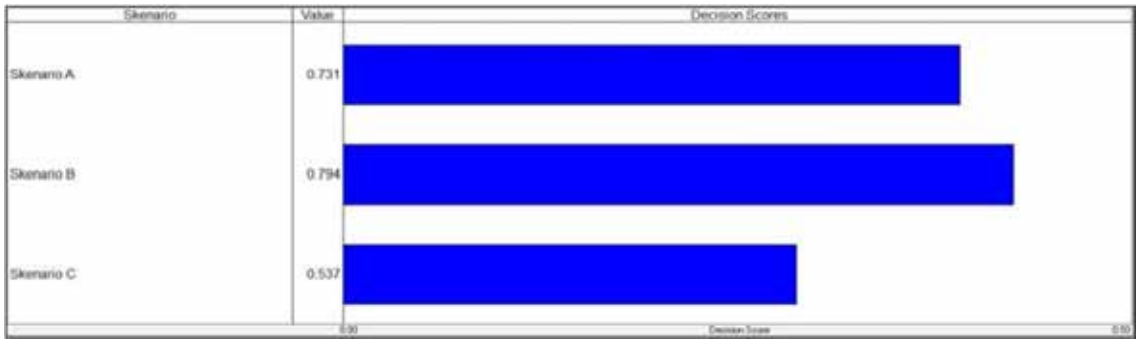


Figure 207. *Environmental Management Scenarios for Desa Tou Timur.*

Environmental management priorities focused on three types of assessment: ecological, socio-economic, and institutional. Results of the analysis indicated that the first priority for Desa Tou Timur was socio-economic assessment (Figure 208). Respondents admitted that there were more problems involved in socio-economic assessment than in the other two. These problems were one of the reasons for poor management in the other two, because the villagers tended to prioritise themselves in the pursuit of money and prosperity rather than conserve the environment (Figure 208).

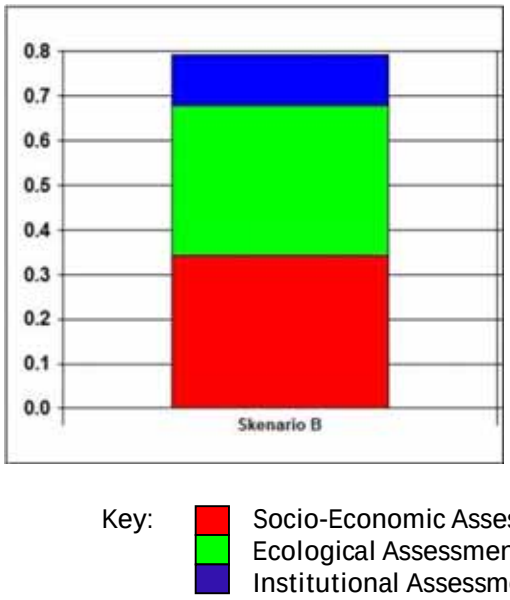


Figure 208. *Environmental Management Priorities at Assessment Level in Desa Tou Timur*

As regards socio-economic assessment, the main issue that respondents urgently wanted managed better was community participation and understanding in order to reduce disaster impact (Figure 209). The community's poor environmental awareness is an important point that must be developed and improved. Exploitation of natural resources that is not balanced by environmental awareness is a major cause of problems in ecological assessment. The next socio-economic assessment issue requiring urgent attention was people's incomes. Respondents' low incomes were due to a lack of livelihood diversity and poor abilityto manage natural resources. The sea, forest and Danau Bowu lake, which formed the heart of the respondents' livelihoods, are not yet well managed. Also important is the improvement of their educational level because this is closely related to income level. Limitations in the management and utilisation of the village's natural potential are more a result of the community's own limitations in ability and information. Consequently, almost every generation has the same livelihood and human resource quality, with an almost uniform level of prosperity and way of life.

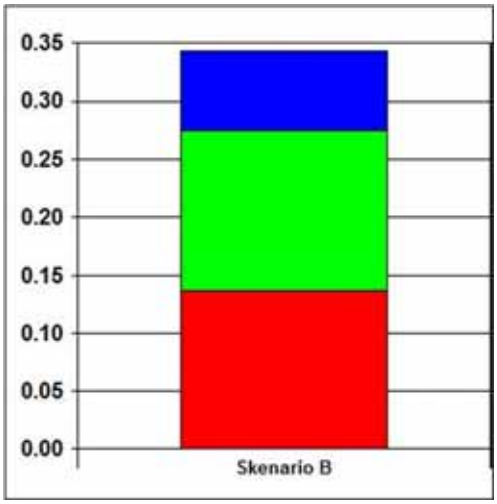


Figure 209. *Environmental Management Priorities for Socio-Economic Assessment in Desa Tou Timur*

The second assessment prioritised by respondents for urgent improvement was ecology, and the top priority within that was environmental quality (Figure 210). This refers to the environment in the settlement and on the coast.Damage to the coast, especially to the mangrove forest, is the reason for the deterioration of environmental quality in Dusun Wolotou. In addition, policy on the management of Danau Bowu lake is not yet fully implemented by the community because they are still centred on the *adat* leader. However, management and a logging ban for coastal forest and the area around Danau Bowu lake are now underway, both through*adat*laws and bylaws issued by local government.

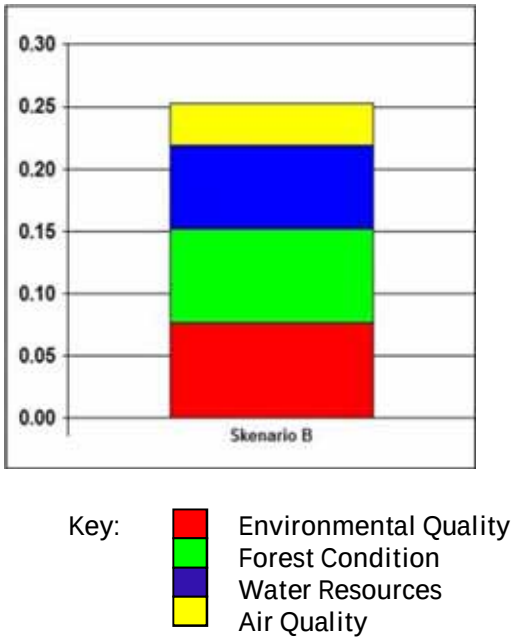


Figure 210. *Environmental Management Priorities for Ecological Assessment in Desa Tou Timur*

Forest condition was the second priority in ecological assessment. Hill forest, being where the springs are located, is no less important an issue than environmental quality. Both these resources will trigger disaster if not managed well and wisely.Water resources were the third priority in environmental management in Desa Tou Timur. Water resources originating from springs in the hills cannot be enjoyed by the inhabitants of Dusun Wolotou because the discharge is declining and water distribution is not uniform. Water only reaches the Dusun Mulawatu area, while the people in Dusun Wolotau get their water from a public well. There are also a few privately owned wells but their water quality is not good. Both public and private wells will run dry when there is an extended dry season. Therefore, the respondents in particular and the community in general are anxious for local government to find a solution to this water sourceproblem. Although the air quality in Desa Tou Timur in general and Dusun Wolotou in particular is still quite clean, poor road conditions produce large amounts of dust which, during the day, disturb breathing and vision.Respondents therefore want cooperation from the government to finance road repairs so as to overcome the problems of air quality and dust.

Desa Tou Timur respondents' final assessment priority for improvement was institutional (Figure 211). Within institutional assessment, their first priority for urgent improvement was infrastructure readiness. Infrastructure, such as roads, clean water, toilets, bathrooms and lighting, is inadequate and not fully enjoyed by the respondents. Infrastructure limitations will be a constraint if a disaster happens because it will be difficult to access them.Respondents are anxious that the important infrastructures be built in the village.They want help from local government or another related agency to do this. Respondents' next priority for management is the issue of human resources quality in Desa Tou Timur and Dusun Wolotou in particular. Human resources can be developed through training in soft skills and other skills, to increase their range of expertise and the monthly family income.To realise all these demands, support is needed in the form of good governance, such thatcooperation is established between government and respondents in managing Desa Tou Timur's environment.

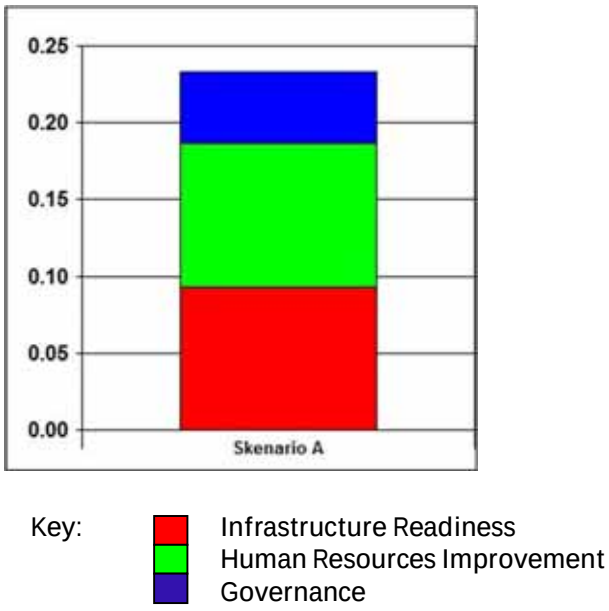


Figure 211. *Environmental Management Priorities for Institutional Assessment in Desa Tou Timur*

4.2 Strategy for Reducing Hazard and Vulnerability

The strategy already used by WIIP in the context of disaster risk reduction includes the implementation of activities that can reduce hazards that might occur. These activities are intended to minimize vulnerability that may arise from those hazards. The activities already carried out are described in the following discussion.

4.2.1 "Socialisation", Coordination, and Consultation

4.2.1.1 "Socialisation" at Provincial Level

1. SSCBDA (South-South Citizenry Based Development Academy) Meeting

"Socialisation" at provincial level took the form of a meeting between the various parties connected with the PfR program. This was a meeting of the *South-South Citizenry Based Development Academy* (SSCBDA). The SSCBDA meeting took place during 20-23 May 2012 with the aim of sharing information among the community, sharing risk analysis and various problems in the community, and exchanging thoughts on solutions and alternatives to resolve existing problems. WIIP sent representatives from each of the groups it mentors and field facilitators. The mentored group representatives who attended were delegated by the chairperson of each group in each village. TheSSCBDA discussed five learning categories, which were:

a) Resilience and water management: Strategies for managing water harvesting in savannah,
b) Resilience and sustainable livelihoods:Bio-rights mechanism and sustainable management in coastal areas,
c) Resilience and adaptive capacity: Agriculture adaptation to climate change for farmers,
d) Resilience and energy: Biofuel, low impact energy consumption in rural communities,
e) Resilience and disaster risk reduction: Community-managed strategies to prepare for floods.

SSCBDA did not just take place in the meeting room but also in the field through field trips for members of the PfR consortium to visit some of the villages mentored by WIIP. The consortium consisted of Wetlands International, Netherlands Red Cross, Indonesian Red Cross (PMI), Karina, Caritas, and RCCCC. These visits took place over a period of two days 28-29 May 2012. On the first day, the team visited Desa Loke (mentored by PMI) and Desa Talibura (mentored by WIIP). On the second day they visited Desa Reroroja and Desa Tou Timur where Danau Bowu lake is located (mentored by WIIP).

2. Meeting in Ende

A meeting was held in Ende on 3-4 June 2012 to find out what progress had been made in the PfR activities in the Kabupaten Ende district. The meeting was attended directly by the PfR coordinator for Indonesia and the Philippines, Ms Guineviene De Jesus. The Kab. Ende government was represented by the head of the Marine Affairs and Fisheries Office (DKP) for Ende. On 3 June 2012 the meeting discussed the cooperation that had been built up between PfR and DKP through WIIP on the Regional Mangrove Working Group (KKMD) inKabupaten Ende. The meeting on 4 June 2012 was held with theRegional Disaster Mitigation Agency (BPBD) for Kabupaten Ende represented by the head of the agency. Further discussions were then held with the Head of the Preparedness Division (*Kepala Bidang Kesiapsiagaan*) and the Section Heads (*Kepala Seksi*) to get more information.

4.2.1.2 "Socialisation" at District/Municipal Level (Kabupaten/Kota)

The PfR "socialisation" and coordination program was then carried out at thelower level, i.e. district/municipal (*kabupaten/kota*). The purpose of this coordination and "socialisation" was to give information about PfR activities and to elicit support from local government. It is also hoped that this PfR program will provide recommendations which can be used in the drawing up of future district/municipal spatial plans, to incorporate disaster risk reduction related to environment and community.WIIP's "socialisation" activities at district/municipal level are shown in Table 110.

Table 25 "Socialisation" of PfR Program at District/Municipal Level (*Kabupaten/Kota*)

Place	Activity
Kabupaten Serang District and Kota Serang Municipality	• Consultation and coordination with agencies, including: ❖ Regional Development Planning Agency (BAPPEDA) forKotaSerang Municipality andKabupaten Serang District ❖ Marine Affairs and Fisheries Office (*Dinas Kelautan dan Perikanan* (DKP)) for Kota Serang Municipality ❖ Forestry Service (*Dishutbun*) for *Kota* Serang Municipality ❖ Regional Disaster Mitigation Agency (BPBD) for Kota Serang Municipality ❖ Regional Environment Agency (BLHD) for Kota Serang Municipality andKabupaten Serang District ❖ Agency for the Conservation of Natural Resources (BKSDA) for Kota Serang Municipality ❖ Kecamatan sub-districts and villages, community leaders, community members
Kabupaten SikkaDistrict	• Consultations and visits to relevant agencies and local NGOs related to the PfR program • Initial consultation and "socialisation" was carried out withthe Forestry Service to collect information related to conditions in the field and future program planning • The second consultation and "socialisation" was carried out withBAPPEDA to obtain information concerning mangrove inKabupaten Sikka • The third consultation and "socialisation" was carried out with BLHD for Kabupaten Sikka, followed by coordination with the Head of Environmental Conservation and Restoration • The fourth consultation and "socialisation" was carried out with BPBD for Kabupaten Sikka, represented by the Head of Division for Prevention and Preparedness (*Pencegahan dan Kesiapsiagaan*) who fully supported the PfR program • The last consultation and "socialisation" was carried out with BKSDAfor Kabupaten Sikka, represented by the Head for Regional Conservation: Kasie Konservasi Wilayah III Resort TWAL Gugus Teluk Pulau Maumere

Place	Activity
Kabupaten EndeDistrict	• Coordination and "socialisation" was first carried out with BAPPEDA for Kabupaten Ende, represented by the Head of Division for Planning and Development II and Sub-divisionHeads, to obtain information on the condition of Ende's north and south coasts, information on the management of mining, and on the process of drawing up the Regional Spatial Plan (RTRW) forKabupaten Ende • The second coordination and "socialisation" was carried out with the Forestry Service (*Dishutbun*)represented by the Head of the Forestry Division, and provided information on the service's activities in Desa Tou Timur and Kotabaru through the community nursery (*KBR: Kebun Bibit Rakyat*) which produces seedlings of mangrove and other forest trees • Coordination and "socialisation" was carried out with the mayor (*Bupati*)of Kabupaten Ende on 17 January 2012, who gave a positive response to the PfR activities in Kabupaten Ende • General "socialisation" with government agencies on 3 January 2012 at the Bappeda office in Kabupaten Ende

4.2.1.3 "Socialisation" at Sub-District Level (*Kecamatan*)

The PfR program was then "socialised" at the kecamatan level for every site where PfR assessment was to be performed. This "socialisation" is very important, considering that the PfR program requires the participation and cooperation of the kecamatangovernment above each village/kelurahan. The PfR program "socialisation" activities conducted by WIIP at kecamatanlevel are presented in Table 111.

Table 26. "Socialisation" of PfR Program at Sub-District Level (*Kecamatan*)

Place	Activity
Kecamatan Kasemen sub-district	• "Socialisation" was carried out first in Kecamatan Kasemen before going toKelurahan Sawah Luhur. The results of the meeting were as follows: ❖ The kecamatan authorities support the PfR program and are willing to cooperate in it.
Kecamatan Talibura sub-district	• "Socialisation" was carried out first in Kecamatan Talibura before going to Desa Talibura, Desa Nangahale, and Desa Darat Pantai
Kecamatan Magepanda sub-district	• "Socialisation" was carried out first in Kecamatan Magepanda and then later in the villages. The results of the meeting were as follows: ❖ The kecamatan authorities' support was declared in the welcoming address at the anniversary of World Wetlands Day on 11 February 2012

Place	Activity
Kecamatan Kotabaru sub-district	• "Socialisation" was carried out with the Secretary to the Head of Kecamatan Kotabaru. The results of the meeting were as follows: ❖ The program would be implemented in two villages: Desa Kotabaru and Desa Tou Timur ❖ Coordination of activities should be carried out between the village government and the Mosalaki or local *adat* leader. • "Socialisation" with young people was carried out at SMKN 4 senior highschool in Ende to elicit cooperation in carrying out an environmental campaign

4.2.1.4 *"Socialisation" at Village Level*

The last stage of program "socialisation" was at village level. This was extremely important because all the PfR activities were to be performed in the village."Socialisation" and coordination with the village government and community were therefore crucial. The PfR program "socialisation" activities performed at village/kelurahanlevel are listed in Table 112.

Table 27. PfR Program "Socialisation" Activitiesat Village/KelurahanLevel

Place	Activity
Kelurahan Sawah Luhur	• Coordination and consultation with village government. The results of the meeting were as follows: ❖ One reforestation group planted mangroves around their ponds, along the embankments (Silvofishery) ❖ The community keenly supported the mangrove reforestation program because of the high level of abrasion in their area, which reduced the productivity of their ponds.
Desa Reroroja	• Coordination and consultation with village government. The results of the meeting were as follows: ❖ Reforestation groups consisted of 2 groups headed by Babah Akong (recipient of the Kalpataru award) and 1 group originating from a working group facilitated by DIPECHO ❖ Meeting with the community was held on 30 January 2012 and attended by 50 participants ❖ The community were very happy and enthusiastic about the reforestation program from WIIP ❖ Babah Akong was asked to share his knowledge of mangrove reforestation efforts in Desa Reroroja ❖ Desa Reroroja is highly vulnerable to floods, abrasion and landslides, whichthese efforts are intended to reduce or prevent ❖ It is hoped that these activities will increase the community's capacity and knowledge in relation to the disaster risk reduction program
Desa Done	• The public "socialisation" program was held on 26 January 2012 and attended by 40 representatives from

Place	Activity
	various elements within the community • The meeting had the following results: ❖ It was hoped that the reforestation activities by WIIP would reduce environmental damage, especially in the vicinity of springs ❖ Reforestation activities to focus on protection and security of springs ❖ Desa Done is highly vulnerable to flash floods and landslides
Desa Darat Pantai	• Coordination and consultation with village government on 2 January 2012 • "Socialisation" with the community on 25 January 2012, attended by 29 participants • The results were as follows: ❖ Support from government for PfR activities ❖ Desa Darat Pantai is highly vulnerable to abrasion and flood ❖ Participants want technical training on mangrove reforestation so as to minimise the risk of planting failure ❖ Participants were very interested in desalination, in anticipation of a shortage of water resources ❖ Bylaws are needed to reduce damage to the mangroves in the village ❖ Dusun Wairwua, Balat, and Napong Gelang have first priority as regards addressing the problem of abrasion
Desa Talibura	• Coordination was first carried out with the Kecamatan Talibura authorities • The "socialisation" program was held on 28 January 2012, attended by 29 representatives from various elements within the community • Results obtained: ❖ The village government fully supported the activities ❖ The reforestation activities from WIIP are expected to improve environmental quality and the people's prosperity ❖ A reforestation group was formed, comprising representatives from each dusun ❖ The inhabitants of Dusun Kampung had just been given the task of planting mangroves, those in Dusun Talibura the task of planting mangrove and beach plants, while those in Dusun Tanah Merah and Habihodot were to plant around the springs.
Desa Nangahale	• The initial coordination and consultation with village government produced the following conclusions: ❖ Correction should be done at group level so that future activities can run better ❖ Coordination among local stakeholders should be improved ❖ Clear group work plans should be drawn up ❖ Development of activities from beginning to end from the previous group

Place	Activity
	• The second coordination and consultation meeting (19 January 2012) with village government produced the following conclusions: ❖ Choice of group members should be more selective and take into consideration their motivation and sense of responsibility for the activities. ❖ Reforestation group to consist of community members in 4 dusuns in Desa Nangahale ❖ "Socialisation" should be attended by inhabitants from all the dusuns in Desa Nangahale • "Socialisation" with the village community on 25 February 2012 was attended by 39 participants from various elements of the community, and produced the following agreements: ❖ Support from village government ❖ Awareness on disaster risk reduction needs to be raised considering that Desa Nangahale is a disaster pronearea ❖ More stringent criteria for selection of new group members.
Desa Kotabaru	• Consultation and coordination were first carried out with the Village Head of Desa Kotabaru • Consultation and coordination was then carried out with the Mosalaki or local *adat* leader • "Socialisation" with the community was carried out on 20 January 2012, attended by 70 participants from various elements of the community • Results of the meeting: ❖ It was hoped that the PfR program would improve the community's welfare ❖ The community were expected to be actively involved in the DRR activities ❖ Activity would focus on planting mangroves and beach plants in the village
Desa Tou Timur	• Coordination and consultation were first carried out with the local village officials • Consultation and coordination was then carried out with the Mosalaki or local *adat leader* • Socialisation" with the community was carried out on 24 January 2012, attended by 40 participants from two dusuns, i.e. Dusun Wolotou and Mulawatu, because the activities would be focused only on the vicinity of Danau Bowu lake • Results of the meeting: ❖ Synergy must be fostered among the community in order for the program to run well in Desa Tou Timur ❖ Activity would focus on the planting of beach plants along the coast of Dusun Wolotou and trees around Danau Bowu lake ❖ The community hoped that this program would improve the welfare of the community and develop ecotourism around Danau Bowu lake

4.2.2 Coordination with PfR Partners

WIIP also carried out coordination with the PfR partners to strengthen cooperation and to develop the program. In addition, coordination was also to facilitate the sharing of solutions to problems that might arise in the field during the implementation of the project at each assessment site. Coordination activities carried out by WIIP for the PfR project include:

- Coordination with NGOs, both local and international.
- Meeting on 4 January 2012 at the CARE office in Kupang, which was attended by representatives from WIIP (Eko), CARE-PIKUL (Tory), L n L Officer (Januar). The purpose of this meeting was to map existing policies, especially those related to spatial planning (RTRW), to produce input on the formulation of materials for the meeting in Yogyakarta on 11 January 2012, and to discuss advocacy strategy processes for the next meeting.
- The second meeting was held on 5 March 2012, attended by CARE (Imelda), PIKUL (Tory), PMI (Faizal and Libry), INSIST (Saleh), KARINA (Ika Retno), and WIIP (Eko). Its purpose was to displaythe progress of the PfR partners' activity at the project implementation site. In addition, the meeting also discussed plans for the SSCBDA meeting in Kupang.
- Routine meeting with PMI Kabupaten Sikka and Caritas Maumere.
- Meeting with CARE and BCRCC-Makassarat WIIP's office in Maumere. This discussed the Bio-rights implemented by WIIP and continued with a field visit to WIIP-mentored bio-rights sites in Desa Reroroja and Desa Tou Timur (Danau Bowu lake).
- Coordination and meeting with PfR partners at national level on 11 July 2012 in Maumere, hosted by WIIP and attended by 20 representatives from WIIP, CARE, Karina, Caritas Maumere, LPTP Solo, and PMI (Jakarta Head Office, Sikka, and Lembata).
- Coordination and meetings with PfR partners on several occasionsduring January- December 2012. Details of these meetings can be seen in **Annex 17**.

4.2.3 Planting of Mangrove and Other Plants at Various Sites

The reforestation program for coastal areas and around springs is the objective of the PfR program undertaken by WIIP. Through planting mangroves, beach plants and other plants, it is expected to reduce the disaster risk for the communities at the assessment sites. The reforestation done by WIIP is not just limited to planting. WIIP provides knowledge and training on how to plant well and in ways appropriate to the field conditions. Besides this, WIIP also endeavours to improve and develop the capacity of the local community and local wisdom, so as to create conformity in implementing the disaster risk reduction program. Mangrove planting already done by WIIP together with the local community comprises the following:

- January-March 2012 : planting at the assessment sites in Kabupaten Sikka and Ende totalled 46,723 seedlings, which comprised 36,500 mangrove seedlings, 6,500 beach plant seedlings, and 3,723 seedlings in the vicinity of springs.

- The number of mangrove seedlings planted in Kelurahan Sawah Luhur up until October 2011 totalled135,838. Mangrove reforestation in Sawah Luhuruses the Silvofishery system whereby mangroves are planted around aquaculture ponds, along the embankments between the ponds.

- Efforts were taken to save the spring area in Desa Talibura by planting trees around the springs.

4.2.4 Advocacy and Policy Dialogue

In addition to physical activities and direct actions in the field to reduce hazards and vulnerability at PfR assessment sites, WIIPhas also undertaken action in the institutional context through advocacy at government level. Advocacy and policy have been carried out intensively with the aim of getting disaster risk reduction programs included into the spatial plan (RTRW) for each area where a PfR assessment site is located. Information on advocacy activities and policy dialogues carried out by WIIP in the context of disaster risk reduction is presented in Table 113.

Table 28. Advocacy Activities and Policy Dialogue Conducted by WIIP in the Framework of Disaster Risk Reduction

Activity	Remarks
Policy related to PfR	• Kota Serang ❖ Regional Regulation No. 6 of 2011 concerning Serang Municipal Spatial Plan for 2010-2030 (*Perda No 6 Tahun 2011 Mengenai Rencana Tata Ruang Wilayah Kota Serang Tahun 2010-2030*) ❖ Input for spatial plan (RTRW) concerning spatial planning of Kota Serang municipality related to coastal zonation • Kabupaten Sikka ❖ Regional Regulation No 10 of 2007 concerning Public Order in Kabupaten Sikka District (*Perda No 10 tahun 2007 tentang Ketertiban Umum Dalam Wilayah Kabupaten Sikka*) ❖ Regional Regulation No 16 of 2007 concerning Types of Government Matters Delegated to the Village (*Perda No 16 Tahun 2007 tentang Jenis Urusan Pemerintah yang Diserahkan Ke Desa*) ❖ Regional Regulation No 24 of 2007 concerningthe Management of General Mining Ventures (*Perda No 24 tahun 2007 tentang Pengelolaan Usaha Pertambangan Umum*) ❖ Regional Regulation No 25 of 2007 concerningCommunity Empowerment in Environmental Management (*Perda No 25 Tahun 2007 tentang Pemberdayaan Masyarakat dalam Pengelolaan Lingkungan Hidup*) ❖ Regional Regulation No 12 of 2008 concerningthe Management of Coral Reefs and their Ecosystems (*Perda No 12 Tahun 2008 tentang Pengelolaan Terumbu Karang dan Ekosistemnya*)

Activity	Remarks
	❖ Input for spatial plan (RTRW) concerning spatial planning of Kabupaten Sikka, which will be appended for discussion by Sikka regional parliament (DPRD) • Kabupaten Ende ❖ Regional Regulation No 11 of 2011 concerning Spatial Plan for Kabupaten Ende District(*Perda No 11 tahun 2011 tentang Rencana Tata Ruang Wilayah Kabupaten Ende*)and final report from Kabupaten Ende ❖ Input for spatial planning(RTRW) related to coastal zonation
Strengthening of Working Groups	• Kabupaten Sikka ❖ Formation of *Forum Peduli Pengurangan Resiko Bencana*(Forum on Concern for Disaster Risk Reduction) facilitated byPlan in 2011. ❖ Forum members are: Caritas, Plan, WTM, BPBD Sikka, and LSM Yaspem • Kabupaten Ende ❖ Proposal for the formation of a Regional Mangrove Working Group (*KKMD: Kelompok Kerja Mangrove Daerah*) to prepare a legal framework for coastal managementin Kabupaten Ende, develop a communal mangrove rehabilitation learning site, and build an Ende coastal mangrove information and data centre.
Mangrove Moratorium	• Make recommendations on Green Belt policy to Bappeda. • Recommendations based on improvements from the mangrove survey results in Kabupaten Sikka and utilisation of satellite image data.
Participation in Various Seminars/Workshops	• Attended a seminar on preparing the script and plans for a Regional Government regulation based on disaster mitigation in Kabupaten Sikka, NTT Province ("*Penyusunan Naskah dan Rancangan Perda Bangunan Berbasis Mitigasi Bencana Kabupaten Sikka, Provinsi NTT*")on 17 February 2012 organised by UNDP, AUSAID, and SC-DRR. • Attended a seminar held by the Regional Disaster Mitigation Agency (BPBD) for drawing up regional documents to act as a reference in disaster risk reduction efforts. These documents were: Regional Action Plan/*Rencana Aksi Daerah* (RAD), contingency plan for eruption of Gunung Api Egon volcano, and a risk analysis for Kabupaten Sikka.

4.2.5 Other Activities

- ***Assistance for Disaster Victims***
  Assistance for victims of natural disasters was given to the inhabitants of Desa Nangahale. This assistance was given one day after the tornado of 28 February 2012. WIIP collected data on the damage done by the tornado. WIIP also donated 40 sheets of zincto repair the roof of the kindergarten.

- ***Disaster Risk Reduction Forum***
  WIIP participated in a primary school/madrasah ibtidaiyah based disaster risk reduction forum (FPRBB-SD/MI) through mangrove planting activity on the Pantai Wuring coast. WIIP's role was to provide 450mangrove seedlings from the nursery in Desa Nangahale. Besides that, WIIP also participated in making banners and disseminating information onhow to plant mangroves on the Wuring coast.

- ***Assessment of Green Belt in Kelurahan Sawah Luhur***
  Green Belt Assessment in kelurahan Sawah Luhur was performed by research done as a result of cooperation between WIIP and IPB (Bogor Agricultural University).The assessment found that the recommended green belt for Kelurahan Sawah Luhur was 91 meter length with a landwards width of 4.97 km, an area of 45.18 Ha, of which 50.1% (22.68 Ha) was part of Cagar Alam Pulau Dua Nature Reserve.

- ***Assessment of Community Capacity and Vulnerability Level at PfR Sites***
  The vulnerability level assessment was performed at PfR sites mentored by WIIP to assess the capacity and vulnerability level of communities at these sites.The purpose was to know and acquire methods of reducing possible hazards and vulnerabilities that could occur there.Another objective was to know what methods could be used to improve community capacity so as to reduce the impact of hazards that regularly occur in those areas.

- ***Development of Facilities and Infrastructure***
  The supporting facilities and infrastructures developed by WIIP for research (observation) and for the planting of mangroves and other plants linked to disaster risk reduction under the PfR program were as follows:

  1) Mud Trapping in Kelurahan Sawah Luhur

     The purpose of constructing a mud trap in Kelurahan Sawah Luhur was to trap sediment during high tide.This net would also function to protect the mangrove plants and emerging land along the seashore. Before making the trap, it was essential to choose a suitable site. It had to possess sufficient mud to enable the creation of emerging land, it had to be safe from big waves at high tide, and be near a guard post to facilitate monitoring and maintenance.

     A mud trap was constructed several times in Kelurahan Sawah Luhur. The first one was made from branches, but failed when struck by high waves. The second used a fishing net, but also failed. This was because the net curled upwards during high waves. Another constraint which the team had to face in the field was the repeated theft of these nets.The last attempt at constructing a mud trap made use of sacks filled with sand, which were then piled on top of each other to form a barricade.This sand-bag mud trap measured around 200 meter length by 20 meter width. It has been successful as it has not been carried away by waves nor stolen.

     After construction of the mud trap, land began to emerge on which mangrove species *Avicennia sp*. grew. In addition, Pulau Dua Nature Reserve was also protected as its coast and mangrove forest were strengthened. Indirectly, the mud trap gradually saved the existence of Pulau Dua Nature Reserve. Fields conditions at the site with and without the mud trap can be seen in Figures 212 and 213. Research on the sediment at Kelurahan Sawah Luhur has been followed by a scientific study of the biota there by WIIP staff member Aswin Rahadian.

     An analysis of these results shows that the process of sedimentation in the Banten Bay began in 1972 and has continued up to the present day (2012).This sedimentation joined Pulau Dua Nature Reserve to the Java mainland in 1979, due to the growth of emerging land between them. This emerging land expanded as a result of the mangroves and beach vegetation that grew on it naturally (Rahadian 2012). Mangrove vegetation formed a natural sediment trap so indirectly this interaction between the two protected Pulau Dua Nature Reserve. Therefore, human assisted sediment trapping (by WIIP) has been started in order to maintain the mangrove vegetation and the Reserve, and to increase the formation of emerging land so that the area behind it can be protected from the abrasionthat has become increasingly prevalent in the last few years.

Figures 212 . Condition of Area where Mud Trap has Not been Constructed, after High Tide

Figures 213. Condition of Area where Mud Trap Has been Constructed, after High Tide

2) Observation Tower in Kelurahan Sawah Luhur

An observation tower was erected in Kelurahan Sawah Luhur not far from the area of aquaculture ponds where mangroves were being planted as part of the PfR project (Figure 214). This tower is used for observation by stakeholders and also by the local community. Currently, it is being used to monitor the growth and development of the mangroves. In addition, this tower is also utilised as a place for watchingwater fowl, which are plentiful in Kelurahan Sawah Luhur , especially those in the ponds and Pulau Dua Nature Reserve.

Figure 214. Observation Tower in Kelurahan Sawah Luhur.

3) Nursery at Every Assessment Site

Nurseries were established to grow mangrove seedlings which would be ready to plant. The seedlings take around 3-4 months to reach this stage. First, the seeds are planted in the nursery, then later moved to the planting site when they are considered strong enough to survive in the wild.The nurseries also serve to protect mangrove seedlings from pests such as crabs.

4) Mangrove Track in Desa Reroroja

A mangrove track was constructed in Desa Reroroja by WIIP and the local community working together, with WIIP as the facilitator and the community providing voluntary labour to construct the track. The mangrove track was constructed to enable the local people to understand better the diversity of mangroves.The mangrove track was also intended to provide easier access when conducting research there, and it can be accessed by anybody who is interested in studying the diversity of mangroves in Desa Reroroja, specifically the mangrove forest resulting from the pioneering work of Babah Akong. Documentation of the mangrove track is presented in Figures 215 and 216.

Figure 215. Constructing the Mangrove Track in Desa Reroroja.

Figure 216. Mangrove Track in Desa Reroroja.

5) Mangrove Library in Desa Reroroja

The mangrove library built in Desa Reroroja is located at the home of Babah Akong. It contains books about mangroves donated by WIIP. It is hoped that the range of information provided about mangroves will bring the community closer to mangroves and broaden their horizons.It is also hoped that the additional knowledge they obtain will help them become more resilient in the face of change, and be able to adapt to climate change.

6) Mangrove Monitoring and Observation Tower in Desa Darat Pantai

To facilitate monitoring of reforestation activities in Desa Darat Pantai, a tower was constructed (Figures 217 and 218). The tower is used to monitor the growth of the mangroves planted there. In addition, it also serves as a lookout tower for disasters hitting the village, such as floods, landslide, land fires, etc. Being 10 meters high, it has a very good view of the area so can be used to monitor a wide range of events.

Figure 217. Construction of Observation Tower in Desa Darat Pantai.

Figures 218. Observation Tower in Desa Darat Pantai.

7) Work Hut in Desa Darat Pantai

A work hut was constructed in Desa Darat Pantai as a facility for members of the community when planting seedlings and moving them to the planting area. The hut is also used as a placeto rest and to discuss problems faced during mangrove planting. The work hut in Desa Darat Pantai can be seen in Figure 219.

Figure 219. Work Hut in Desa Darat Pantai.

- ***Workshop***

Several workshops were held by WIIP on a variety of occasions. Workshop activities were conducted with PfR partners.The activities were held throughout 2012 at various sites, such as Jakarta, Kupang, Bogor, Yogyakarta, Labuan Bajo etc. Details of workshop activities conducted by WIIP and partners are given in ***Annex 18***.

4.3 Strategies for Improving Community Capacity

4.3.1 Formation of Reforestation Groups

Reforestation working groups were set up to improve community capacity at the sites mentored by WIIP which are prone to disasters.The groups were formed through discussion and were subject to the following criteria :

1. Group members should represent all the dusuns in the village,
2. Group members must be local residents of the village,
3. Group members must include both men and women so as to achieve genderequality,
4. Group members must be concerned about the environment and surroundings,
5. Group members should come from poor families,
6. Group members have special needs.

Each group consists of a chairperson, secretary, treasurer, planting section officer, maintenance section officer, security section officer, and members. All the officials are supervised by and are responsible to WIIP and the village government. Information on the setting up of groups at WIIP-PfR assessment sites is presented in Table 114.

Table 29. Formation of Reforestation Groups at PfR Sites Mentored by WIIP

Site	Information
Desa Reroroja	• Group formed on 13 February 2012 , one group had already been set up previously • The old group called “Sabar Subur”, headed by Babah Akong (Kalpataru Award recipient) • The new group called “Sa’ate (meaning: in harmony), known by Bapak Martinus Nong with 21 members. • Economic enterprises to be developed by “Sabar Subur” group under the Bio-rights system comprise the following: group: savings-loans individual members: vegetable garden, pig farming, chicken farming, fishing net purchase, and selling fish • Economic enterprises to be developed by“Sa’ate” group under the Bio-rights system comprise the following : group: duck farming Individual members: ikat weaving, chicken farming, goat farming, pig farming, petrol kiosk, fishing net purchase, vegetable garden, and a grocery kiosk.
Desa Done	• Group formed on 25 February 2012 • Reforestation group was given the name “Tedo Tembu “(meaning: planting must succeed), having 33 members, and known by Bapak Dominikus Gale • Economic enterprise to be developed under the Bio-rights system was goat farming

Site	Information
Desa Darat Pantai	• Group formed on 16 February 2012 • Reforestation group was given the name “Kembang Bakau“(meaning: mangrove flower), having 60 members, and known by Bapak Mustamir • Economic enterprises to be developed under the Bio-rights system were: wild honey and mangrove honey
Desa Talibura	• Group formed on 28 January 2012 • Reforestation group was given the name “Klakat Indah“(meaning: beautiful mangrove), having 20 members, and known by Hortensia Konselfina • Economic enterprise to be developed under the Bio-rights system was chicken farming for meat
Desa Nangahale	• Group formed on 25 February 2012 • Reforestation group was given the name “Nangahale Lestari”(meaning: everlasting Nangahale), having 22 members, and known by Bapak Happitaka • Economic enterprise to be developed under the Bio-rights system by individuals and by the group together was iodised salt production.
Desa Kotabaru	• Group formed on 8 February 2012 • Reforestation group was given the name “Ma’e Welu“(meaning: always together), having 20 members, and known by Bapak Epit Wangge • Economic enterprises to be developed under the Bio-rights system were: group: goat farming individual members: pig farming, vegetable gardening, chicken farming, cattle farming, fish selling, and duck farming.
Desa Tou Timur	• Group formed on 14 February 2012 • Group was given the name “Bowu Sare“(meaning: beautiful Bowu), having 40members, and known by Bapak Rofinus Sega • Economic enterprises to be developed under the Bio-rights system were: pig farming and fish farming (catfish, tilapia, *nila*)

4.3.2 Participatory Risk Analysis(PRA) Activityin Each Village

The purpose of PRA activities was to ascertain the community’s understanding of disaster risk reduction in disaster prone areas. These activities involved community leaders, *adat* leaders (Mosalaki), and the community, including youth and women. The information obtained from the PRA identified threats, vulnerabilities and community capacity at each of these sites.Through these activities, it was expected to find out what the community understood about community-based disaster risk reduction and to improve this in order to minimise the impact of disasters that might occur.

4.3.3 Environmental Campaign

An environmental campaign is part of disaster risk reduction. The community were taught about disaster risk reduction, ecosystem management and restoration, and adaptation to climate change. The aim was to provide them with understanding and knowledge, to get close to the people in order to change their attitudes and habits, and to invite them to participate and care more about the condition of the environment around them.The environmental campaign consisted of a film show, painting competition, swimming contest, sampan rowing contest, cleaning the beach, and a music concert. Details of the environmental campaign activities conducted by WIIP at PfR sites are given in ***Annex 19***.

4.3.4 Economic Enterprise Improvement Program (Bio-rights)

The program to improve the economic enterprises of the communities at the WIIP mentored PfR sites was conducted through Bio-Rights activities. For this, the people were given capital loans in return for certain "compensation".As compensation for the loan, they had to carry out reforestation work. This involved not only planting trees but also tending them and caring for them so that they would survive for a pre-agreed, specified period of time. However, the capital loan was not given immediately at the beginning of the activity. The community's motivation and enthusiasm for rehabilitating their environment was gradually built up first, so that this motivation and willingness truly came from within themselves. Besides, motivation that has developed naturally would be likely to ensure that they would continue to care for the environment after this program finished, so the environment in their area would continue to be protected.

The capital loans provided were allocated for economic enterprises that had potential in the recipient's own area.Thus, each village would have a different range of enterprises, depending on the choices agreed by the group. For example, Desa Nangahale has potential for salt production, so WIIP agreed to help by providing capital and training in the production of iodised salt, so that the product would be of higher quality and competitive on the market.In addition to group enterprises, working capital was also made available to individuals, depending on the request made by each group member. It was hoped that this would lead to diversification of livelihoods so that the community would be stronger in the face of changes, especially those due to climate change.

As we know, most of the communities at the WIIP mentored sites earn their living from farming or fishing, which are highly dependent on the seasons. Now, weather and seasons are becoming increasingly uncertain, so harvests are also becoming more and more uncertain. As a result, the economic gap and decline in the community's prosperity are an ever-present threat. It is hoped that this Bio-rights program will succeed in helping the community with both economic and environmental matters, so that both will synergistically face the climate change that has already begun.

4.3.5 Human Resources Training

To improve community capacity at the PfR program sites, WIIP has given a number of training courses.These cover a range of topics, including mangrove rehabilitation techniques, administration, disaster risk reduction and disaster mitigation, etc. All the activities mentioned in the report were carried out in 2012. Details of training activities already conducted are presented in ***Annex 20***.

4.3.6 Other Programs

Another community capacity enhancing program conducted by WIIP at its mentored siteswas the provision of information and capacity raising on the care of mangrove plants. This program taught techniques for planting and tending mangroves to the point that they would really be able to survive in the wild. To ensure that this ran smoothly, information was shared with experts on this topic, including WIIP staff, and with Babah Akong, who received the Kalpataru Award for environmental conservation (planting mangrove on the coast of Desa Reroroja). Other programs that have begun are the development of ecotourism and a fishing-pond in Kelurahan Sawah Luhur. The aim of these is to increase local incomes.

5. Conclusions and Recommendations

5.1 Conclusions

5.1.1 Kelurahan Sawah Luhur

- There are five types of natural resources in Kelurahan Sawah Luhur, which are Cagar Alam Pulau DuaNature Reserve (CAPD), fish ponds, rivers, dry ricefields, and the sea.
- The biggest potential threats are from abrasion, tidal floods (*banjir rhob*), and water pollution. Abrasion and *rhob* floods are a serious threat to the nature reserve and to fish ponds. Nowadays, the drying up of water sources is the threat that most often hits Sawah Luhur, especially when there is an extended dry season.
- Various disasters in Sawah Luhur have various impacts. Drought has the biggest impact because it is related to water resources. Several facilities and infrastructures are also impacted, including agricultural land, agricultural crops, work opportunity, fishery harvests, etc.
- The Sawah Luhur community in general have an economic prosperity level ranging from low to average. This is characterised by low monthly incomes, perishable to semi-permanent housing materials, low educational level, etc.
- Vulnerability and disaster risk in Kelurahan Sawah Luhur are related more to physical and environmental vulnerability. The main vulnerability concerns water resources and their facilities, like irrigation channels and water sources. The next vulnerability that needs to be addressed is the condition of the mangrove forests.
- Vulnerabilities related to people's way of life are concerned more with socio-cultural and economic issues, such as limited work opportunity, low incomes, education, etc.
- An early warning system (EWS) does already exist in Desa Sawah Luhur but makes use of simple methods. The local people usually get this information from the mass media (electronic, newspapers, radio), announcements in public places (mosque, church, etc.), weather forecasts, and the beating of the *kentongan* alarm. The *kentongan*is beaten in times of dire emergency. The community are familiar with EWS for predictable disasters but an EWS has not yet been established for unpredictable disasters.
- The local government's role in reducing disaster risk has begun to be directed towards preventive measures, such as conservation of Pulau Dua Nature Reserve, and planting mangroves through sylvofishery.Local government has also given help to the community after disasters, by distributing aid, providing emergency shelters and evacuation equipment.
- Both public and privately owned facilities and infrastructures are easily accessible in times of disaster. Attention needs to be paid to information on who is responsible for these in order to facilitate accessto them when they are needed.

5.1.2 Desa Reroroja

- The ecosystem in Desa Reroroja comprises several different classes of land cover: human settlement, mangrove forest, mixed plantation,cultivation (paddyfields and dry fields), bush, river, hill forest (mixed forest),and grasslands.

- Between 1960 and 1970, the coast was still fully covered by mangrove forest and hill forest. There were plenty of clean water springs.The mangrove forest began to decline after the tsunami struck in 1962. The damage became increasingly serious after 1998 (reformation era). This was caused by abrasion, as a result of which the sea approached increasingly closer to the road and human settlement. The remaining mangrove consisted of just small colonies, apart from the mangrove forest pioneered by Babah Akong.

- The spot map of Desa Reroroja shows the existence of many types of threats. These include fire, drought, water shortage, illegal logging, storm, flood, abrasion and fish bombing. Disaster history shows that Desa Reroroja has already suffered a range of disasters, including fire, earthquake and tsunami, abrasion, drought, tornado, flood, flash flood, and an anthrax epidemic. There are also seasonal disasters that hit the village almost every year, which areflood, drought, abrasion and forest fire.

- The disaster with the biggest potential for destruction in Desa Reroroja is earthquake and tsunami, even though it only happened once, in 1992. Its impact was catastrophic.Its effects included the loss of human lives, animals, infrastructure, work opportunity, agricultural crops and fishery production.

- Seasonal disasters having a serious impact on the village are flood, tornado and abrasion. These impact on physical infrastructure, work opportunity, food supply from crops, etc.

- Water quality analysis indicated that the water sources in Desa Reroroja are of poor quality because their TDS and salinity exceed the maximum limit. Water with high TDS and salinity is not recommended for human consumption. However, if the value is near the limit, it could be filtered through several layers of cloth, or a thick cloth.

- Analysis showed that most villagers have received only a primary school education. Only a few had continued to a higher level such as senior highschool.Economic factors and lack of interest in schooling were the main reasons why the level of education in Desa Rerorojawas still quite low. Most of the villagers' main livelihoods are from farming, whether in paddyfields, dry fields or plantations. Their level of prosperity is still categorised as low to average.

- Vulnerability and disaster risks in Desa Reroroja are more often related to environmental and physical health issues, particularly concerning infrastructure, agricultural land, sea, and mangrove forest.The pattern of shifting cultivation and abandoning the land after a certain period of time without rehabilitating it gives rise to high vulnerability in the forest and hill areas. These practices can have fatal consequences when the rainy season arrives.The mangrove reforestation program needs to be stepped up,in view of the rapid rate at which Desa Reroroja's coast is being eaten away by the sea. In addition, the sea and coral reef ecosystem in the waters off Desa Reroroja's coast are also highly vulnerable to fish bombing by individuals using unwise methods to harvest natural resources.Another physical vulnerability in the village is the sanitation infrastructure and the limited availability of toilets and bathrooms, thus making the community highly vulnerable to disease.

- Other vulnerabilities of concern in Desa Reroroja are socio-economic. Almost all the villagers have the same livelihood, farming. Agricultural activities are highly dependent on nature and the weather. Lack of livelihood diversity results from low educational level and low quality of human resources. If the seasons become increasingly uncertain, starvation can occur as a result of food shortages and lack of money. The community's attitudes and motivation towards caring for the environment are vulnerable to disturbance or deterioration as a result of various problems such as economic problems, infrastructure, bureaucracy and institutional problems.

- An early warning system (EWS) has been set up in Desa Reroroja through cooperation between PMI and government. This EWS activity is known as "SIBAT". Nevertheless, an analysis of respondents' perceptions showed that a large proportion of them knew nothing about any warning system in their village. They had never received any warning of an imminent disaster. Only a few had ever received such warnings, such as through mass media (electronic, newspaper, radio) and announcements in public places (mosque, church). If disaster or hazard occurred, some respondents still used traditional warning methods like beating the *kentongan* alarm or other items that produced sound, and reading weather forecasts.

- The government's role in dealing with the impact of disasters that often occur has been mostly directed at post-disaster evacuation. Local government action has included the distribution of aid (food, medications, blankets, etc.), provision of emergency shelter and of evacuation equipment. Preventive action has been very limited and has only recently begun to receive attention. This has been done through cooperation with other agencies such as local and international NGOs. One such action has been to rescue the coastal ecosystem and plant mangroves to prevent abrasion and guard against tsunami.

- Access to and control of the Desa Reroroja community's assets in times of disaster has been relatively easy, both for private assets and public. However, it is necessary to make an inventory of who owns or is responsible for each asset, so that they can easily be used in times of emergency and disaster.

5.1.3 Desa Done

- Desa Done was established in 2003 as a result of the growth of Desa Magepanda. It has a topography consisting of hills and a relatively narrow plain. This plain is devoted to irrigated paddyfields. Most of these are near the Lowotere river, are semi-irrigated and alternate rice with maize and mung beans.

- The spot map for Desa Done shows that the frequent disasters are flood, tornado, river abrasion, landslide, illegal logging and forest fire.Big floods usually occur during January-February. It is estimated that every year these disasters claim the lives of livestock (±5 cattle/year). As many as two inhabitants were reported to have died in floods during the last few years. The flood peak lasts for 2-4 days.

- Water quality analysis in Desa Done indicated that the water from the springs was fit for human consumption, because the parameters tested met the standards (were below the upper limit recommended).

- A disaster that never occurs in Desa Done is abrasion, because this area is not directly next to the sea.Disasters that do frequently occur in Desa Done are floods and landslides. However, in the last few years, tornados have also become frequent there. Other disasters that have occurred in Desa Done are starvation and failed harvest as a result of extended dry season, as well as earthquake and tsunami.

- Landslides and floods usually occur when the rainy season arrives. Heavy rainfall causes the water discharge of rivers to increase, so the rivers overflow onto the surrounding agricultural land. As a result, the rice crops may be destroyed and the harvests fail.This in turn leads to starvation as supplies of the staple food fall or may be non-existent.Landslides are caused by labile soil conditions and damage to hill forest as a result of illegal logging and uncontrolled cutting of forest by the community.

- The disasters that have occurred in Desa Done mostly impact on agricultural land and crops.This damage to fields and crops then leads to starvation and outbreaks of disease.In addition, there is also a decline in work opportunities and family incomes.

- In general, theDesa Done community have a low level of education, most having only attended primary school. Their primary source of income is farming, including paddyfields, dry fields and plantation. The average monthly income is less than Rp.500,000. Most of the homes are non-permanent or semi-permanent structures and have a toilet and bathroom. For a source of lighting, most people use oil lamps because mains electricity from PLN has not yet reached this village. The villagers' level of prosperity ranges from low to average.

- A highly potential vulnerability in Desa Done is the drying up of water sources derived from springs. This is caused by the felling of forest and trees around the springs. As a result, the village is likely to suffer from failed harvests and water shortages if this situation is allowed to continue.

- Another vulnerability in Desa Done is the low motivation in the community to conserve the environment if there were no binding rules, such as *adat* laws. Attitudes of indifference and poor disaster response are one reason for this. Regarding socio-cultural and economic issues, their incomes are vulnerable as a result of the low diversity of livelihoods. This leads to unemployment and makes it difficult for the quality of human resources to develop. Therefore, greater livelihood diversity is vital to reducing this vulnerability.

- The early warning system (EWS) in Desa Done is not well organised, so a large proportion of the community know nothing about it.They would respond well and participate actively in an EWS if they knew about it and understood it. A small proportion of the community have begun to know about early warning through a variety of channels like mass media (television, radio, newspaper) and weather forecasts.

- Local government action to address disasters has been limited to post-disaster evacuation. Such action has included the provision of emergency shelters, distribution of aid, and the provision of evacuation equipment. There has been no government action of a preventative type, nor any development of an EWS in Desa Done, so it is essential for government, community and relevant agencies to work together to do this.

- As regards community capacity in terms of access to and control of Desa Done's assets, the various facilities in the village can be easily used by the community in times of disaster. However, it is necessary to make an inventory of who owns or is responsible for each asset, so that they can easily be used when needed.

5.1.4 Desa Darat Pantai

- Desa Darat Pantai resulted from the expansion of Desa Darat Gunung and was officially established in 1999. The topography of Darat Pantai consists of gentle slopes (shore) and hills. The slopes extend along the northern part of the village and are almost entirely covered by mangrove forest, which is around 4km thick. The hilly area is in the southern part of the village that borders directly onto Desa Darat Gunung. These topographical conditions make the village highly vulnerable to flood and abrasion but less vulnerable to landslide.
- The spot map for Desa Darat Pantaishows that the frequent disasters are abrasion, flood, tornado, and threats to community health. The area that often experiences disasters is Dusun Napong Gelang, so this area needs to be given high priority for disaster management. This dusun very frequently suffers from abrasion and floods.
- Before 1991, Desa Darat Pantai possessed large areas of forest(mangrove and highland plateau forest). In 1992 there was an earthquake and tsunami which destroyed a large part of the village's mangrove forest. Its regrowth between 1992 and the present has shown a positive trend.
- Water quality analysis in Desa Darat Pantai indicated that almost all the water at the sampling stations is of poor quality because its TDS and salinity are quite high.However, difficulty in obtaining water sources forces the community to consume poor quality water. To overcome this problem, the water should be filtered repeatedly before it is used, in order to reduce its TDS and salinity levels.
- A frequent disaster is flooding. Floods occur when the rainy season arrives. They are caused by water coming down from the hills as a result of the degradation of hill forest in Desa Darat Gunung.
- Other disasters that have occurred in Desa Darat Pantai are earthquake and tsunami (1992), cycloneLena, landslide, and tornado. The biggest disaster ever to occur in the village was the earthquake and tsunami. Cyclone Lena and tornados caused damage to the community's plantations, uprooting their trees. This type of disaster sometimes attacks during the harvest season, causing severe losses to farmers. Landslides are frequent in Dusun Napong Gelang's hills. They result from the degradation of the forest which causes the soil to become labile and unable to retain water when the rainy season arrives.
- The main impact of disasters in Desa Darat Pantai has been on agricultural land and crops.Damage to infrastructure and loss of work are also unavoidable results of such events.
- Generally, most of the inhabitants are of Suku Krowe and Tanah Ai ethnicity, these ethnic groups being indigenous to Kabupaten Sikka. Migrants from Bajo and Buton ethnic groups tend to live mainly in Dusun Napon Gelang and live along the beach because their daily activity is fishing at sea. Their educational level is mostly only as far as primary school. The villagers' main livelihood is farming. The prosperity level of the Desa Darat Pantai community is still quite low, as shown by their economic status and housing. The average monthly income is below Rp.500,000, while their homes are generally non-permanent constructions on stilts. Not everybody yet enjoys electricity as the infrastructure is still limited. Clean water supply is also difficult in Desa Darat Pantai because the water from most of the wells constructed tastes salty or brackish.

- Vulnerability and disaster risk in Desa Darat Pantai are related more to human health, physical conditions and environment. These vulnerabilities concern water resources, land degradation due to burning and logging without replanting, infrastructures in particular lighting and transportation facilities, as well as hygiene as a result of poor sanitation. In addition, there are still many homes vulnerable to abrasion, particularly those along the beach in Dusun Napong Gelang.

- Socio-cultural and economic vulnerability covers educational vulnerability caused by the high dropout rate among school children, lack of funds for education, and attitudes of laziness and indifference. Another vulnerability detected in the village is the eroding away of traditional *adat* principles in the community's way of life.

- The early warning system (EWS) in Desa Darat Pantai does not yet run well, although a lot of the people do know about its function and purpose. The village's EWS needs greater attention from various parties, especially the local government and community. It is hoped that they will work together to reduce disaster risk. The villagers only know of EWS warningsabout disasters that can be predicted by weather forecasts, mass media(television, radio, newspapers). The existing warning system is still traditional and ineffective. Cell phones have begun to be used to send information between villages when there is a disaster.Other matters that need attention are the construction and improvement of evacuation routes, emergency shelters, EWS coordination between dusuns, and better cooperation between local government, community and other relevant agencies.

- The government's role in disaster impact reduction does not yet include preventative measures. The government has conducted evacuation, provided evacuation equipment, provided emergency shelter, and distributed aid.

- As regards community capacity in terms of access to and control of Desa Darat Pantai's assets, the various facilities in the village can be easily used by the community in times of disaster. However, it is necessary to make an inventory of who owns or is responsible for each asset, so that they can easily be used when needed.

5.1.5 Desa Talibura

- In 1962 Desa Talibura was called Desa Gaya Baru. Then in 1974, the name changed to Desa Lumbung. In 1980, it changed again to Desa Taliburaand has kept this name until the present. In 1998, Desa Talibura split into two villages: Desa Talibura and Desa Nangahale. Then in 1998, Desa Talibura grew further and was divided into Desa Talibura and Desa Ilin Medo.

- Field survey and spatial analysis show that Desa Talibura has a steep topography. Only16.2% of it has a slope of 0-8%. From the point of view of disaster, such topography is highly vulnerable to disasters, especially landslides.

- The spot map for Desa Talibura shows a variety of disasters in this village, including fire, drought, insufficient water sources, illegal logging, storm, flood, abrasion and fish bombing.Fires are frequent in dryland forest and grasslands, especially when the dry season comes, when air temperatures are high and rain does not fall.

- Before 1991 Desa Talibura possessed large areas of forest (mangrove and highland plateau forest). In 1992 there was an earthquake and tsunami which destroyed a large part of the village's mangrove forest.

- Water quality analysis in Desa Talibura indicated that the water at the stations used for consumptionis of poor quality because of its high TDS level. However, because water sources are difficult to find, this water is still used. Therefore, to reduce its TDS and salinity, the water should be filtered repeatedly through a thick cloth before it is used.

- Disasters that have occurred in Desa Talibura include flood, abrasion, earthquake and tsunami, forest fires, landslides, and tornados.

- The most frequent disaster, which occurs almost every year, is floods. During recent years, abrasion has often occurred in Desa Talibura after the village's mangrove forests began to be degraded. The biggest disaster ever to have hit Desa Talibura was the earthquake and tsunami in 1992. Forest fires and landslides occur in the hill forest of Dusun Tanah Merah and Habihodot. The fires are usually caused by people who deliberately burn forest to clear land for dryland agriculture in the run up to the rainy season.

- The disasters that have occurred in Desa Talibura have impacted mostly on agricultural land and crops, fishery yields, infrastructures, human-beings,and job opportunities. Agricultural land and crops are, of course, most badly affected when seasonal disasters hit the village. These seasonal disasters include flood, tornado, landslide, and drought.All the impacts will, in the end, affect livelihoods, thus disrupting the local economy.

- The Desa Taliburacommunity live under more developed conditions compared to the other villages.This can be seen from an analysis of respondents' responses, which shows that many of them have completed junior or senior highschool.The community's main source of incomein Desa Talibura is from farming, both wetland rice, estate crops, and dry field crops. Their level of prosperity is higher than that of the other villages as shown by their economic status, educational level, and type of housing. Monthly incomesaverage 1-2 million rupiah and their homes are mostly semi-permanent or permanent buildings.As regards lighting, most of the people in Desa Talibura already use mains electricityfrom PLN. Their clean water comes from several different sources, comprising wells, *pamsimas* installation, and springs.

- Vulnerability and disaster risk in Desa Talibura are related mostly to human health, physical conditions and environment. The mangrove forest and dwellings along the coast are the area most highly vulnerable to disaster. In addition, community health is also an importantpart of vulnerability in this village. The various diseases that attack the community in the rainy season and dry season make the people highly vulnerable to illnesses, especially malaria, acute respiratory tract infections, and skin diseases.

- Socio-cultural and economic vulnerabilities in Desa Talibura include motivational vulnerability regarding conservation of the environment, particularly the mangrove forest, educational vulnerability caused by dropping out of school, laziness and lack of funds, and vulnerability related to livelihoods and incomes, which are seriously threatened by the lack of livelihood diversity.

- An early warning system (EWS) has been formed in Desa Talibura through cooperation between local government and the Indonesian Red Cross (PMI). This is known as SIBAT. However, a large section of the community does not yet know about the activities or function of this EWS, so do not realise that such a system exists in their village.If a predictable disaster is approaching, they usually get this information from weather forecasts, mass media, and announcements in crowded places. The EWS already created is still in need of coordination so that it can reach all levels of the community. In addition, the community would like to receive "socialisation" and be involved in this activity so that the system can run well and disaster impact can be reduced.

- Local government has undertaken disaster evacuation, provided emergency shelters, and distributed aid when disaster has struck. However, few measures have been taken to prevent disaster, so various cooperative activities are needed to do this. One that has begun is the planting of mangroves and the planting of trees around springs and in forest areas.

- Assets that can be used by the Desa Talibura community in times of disaster are easy to access. However, to make it easier to use them, it is necessary to make an inventory of who owns or is responsible for each asset, both private and public.

5.1.6 Desa Nangahale

- Desa Nangahale was established in 1999as a result of the expansion of Desa Talibura. This process began in 1997 and was realised in 1999. Initially, Desa Nangahale was a place of refuge for the inhabitants of Pulau Babi who were victims of the earthquake and tsunami in 1992.

- The topography of Desa Nangahale consists of hills and a relatively large area of flat land along the coast. Desa Nangahale's coastline is around 4km long and runs parallel to the main road. According to a direct survey in the field and a spatial analysis, almost half of Desa Nangahale has a flat topography, with 49.6 % of the total area having a slope of only 0-8%. Such a topography is not vulnerable to disasters such as landslides, but is vulnerable to flooding and abrasion.

- The ecosystem in most of Desa Nangahale is cultivation (76.9%). This is dominated by the plantations of the company PT. Diosis Agung Ende (PT. DIAG), which holds the concession for management of this land primarily as coconut plantation.Coconut plantations were first planted in 1932 during the Dutch colonial period with a total concession area of around 2000 ha. Due to population growth and national policy, part of this concession area has been converted to other uses, including housing.

- The spot map for Desa Nangahale shows that threats to this village include fish bombing, storm, illegal logging and abrasion.

- Before 1991, Desa Nangahale possessed fairly large areas of forest (mangrove and highland plateau forest) and a very large area of coconut plantation managed by PT DIAG. After the earthquake and tsunami in 1992, the area of mangrove forest has dwindled. Much of the

damage was done by the tsunami. Since 1998 (reformation era) abrasion has been approaching the road and people's homes. The remaining mangrove forest consists only of small colonies and in some places there is no longer any mangrove at all.

- Water quality analysis in Desa Nangahale indicated that the wells dug by the community do not have good quality water. It can still be used for purposes such as washing, watering plants, etc., but is not recommended for human consumption because of its brackish taste. In addition, its salinity and TDS levels are high, which can endanger people's health (particularly the kidneys)if consumed over a long period of time.

- The disaster history of Desa Nangahale shows that a number of different disasters have occurred in this village. These are extended dry seasons, floods, earthquake and tsunami, abrasion, forest fires, and tornados.The most frequent of these during the last 39 years have been floods and abrasion.

- Floods occur in the rainy season. Days of continuous heavy rain cause rivers to overflow. As a result, the rice crops, usually planted near the rivers, are damaged. Sometimes the floodwaters reach settlements and inundate the area around people's homes. This leads to epidemics of diseases such as diarrhoea, itching and malaria.

- Abrasion occurs almost every year and has been caused by the destruction of Nangahale'scoastal mangrove ecosystem. This destruction is due to the community's unwise management of the mangrove forest. Moreover, they also have little awareness of the need conserve it. Currently, Nangahale's shores are almost devoid of mangrove and have become a place for mooring boats and for salt huts. Also, homes constructed along the shore's edge are highly vulnerable to the impact of abrasion.

- The disasters that have occurred in Desa Nangahale have generally impacted mostly on agricultural land and crops, infrastructure, and job opportunities. These impacts will, in the end, affect people's lives and safety because they are related to the economy, financial sources, and the availability of food and money.

- A large proportion of the village's inhabitants adhere to Islam, particularly those living in Dusun Namandoi and Nangahale. The community's educational level is low as most have only been to primary school. Prosperity levels vary considerably in Desa Nangahale, ranging from low through average to wealthy. Many of the respondents had monthly incomes of less than 1 million rupiah. Most of the homes inNangahaleare semi permanentorpermanentbuildings and some already have their own private bathroom and toilet.

- Vulnerabilities and disaster risks known in Desa Nangahale are related more to health, physical conditions and environment. Vulnerability of land, infrastructure, forest, water sources, health and environmental sanitation are the vulnerability issues that threaten the inhabitants of Desa Nangahale.

- Economic vulnerability in the village is high, particularly as related to job opportunities and incomes.The socio-cultural vulnerabilities most often experienced by the community are related more to the fading away of the good practices based on traditional *adat* customs of their ancestors, as a result of the changing times.

- A SIBAT early warning system(EWS)managed by PMI has been set up in the village. According to information from members of the community, this EWS does not yet function as hopedbecause the disaster information is often late and SIBAT only operates when a disaster has already happened. They undertake evacuation, services and provision of emergency shelter in cooperation with the local government.Moreover, a large section of the community have never received any information that a disaster was going to strike. A few of them usually know of disaster warning signs from weather reports, mass media, electronic and other types of communication.

- Assets that can be used by the Desa Nangahale community if there is a disaster are usually easy to access, except for agricultural land, as permission must first be obtained from PT. DIAG, who controls most of the agricultural land in the village.

5.1.7 Desa Kotabaru

- The topography of Desa Kotabaru is relatively flat. According to the field survey and spatial analysis, the centre of life in Desa Kota Baru is in the flat area, with the exception of Dusun 3. Of the total area,20% is completely flatand 26% very steep. As regards disasters, the flat topography is highly vulnerable to floods and tsunami.

- Most of Desa Kotabaru is a grassland ecosystem (62.3%). This is utilised by the community for livestock farming.In addition, agricultural land is used for coconut, cashew and cacao plantations. From the rocky and vegetated hill region, the community collect wild honey.The mangrove ecosystem in the village covers 85.98 ha. Most of this is in good condition and is more than 10 yearsold. In some places, the mangrove forest needs rehabilitation in order to overcome the threat of abrasion.

- The spot map for Desa Kotabarushows that threats to this village include fire, illegal logging, storm, flood, abrasion, tornado and fish bombing.

- Between 1960 and 1970, Desa Kotabaru was still covered by mangrove forest and hill forest. The forest vegetation has gradually decreased in response to population growth and the clearing of land for agriculture. Felling of trees in the hills and around springs has been going on since long ago. The local people know of the laws on banning the cutting of trees in protection forest and on the management of the buffer zone along river banks, but some of them do not yet obey these laws.Mangrove forest management needs to be supported by *adat* rules in order to maintain and increase the existing mangrove communities, which are currently shrinking.Most of the mangrove destruction has been done since the 1992 earthquake and tsunami. Since 1998 (reformation era) abrasion has been approaching the road and people's homes.

- Water quality analysis in Desa Kotabaru indicated that the sources of water consumed by the community are not of good quality. Water from the wellsdug by the inhabitants tastes brackish because its salinity and TDS levels are relatively high.

- The disaster history of Desa Kotabaru shows that a number of different disasters have occurred in this village, including flood, drought, earthquake and tsunami, anthrax epidemic, and tornado. The most catastrophic of these and the one having the worst impact was the earthquake and tsunami in 1992. Part of the village infrastructure and coastal mangrove forest was destroyed. This damage to the mangrove was further exacerbated by human

activity; peoplecut down the mangrove trees to make it easier for them to moor their fishing boats. The impact now felt as a result of this mangrove loss is abrasion and the receding of Desa Kotabaru's coastline.

- Drought and forest fires occur almost every year. Drought resulting from extended dry seasons can cause harvests to fail on a massive scale. This severely reduces the food supply in Desa Kotabaru. Land and forest fires occur during the dry season and in the lead up to the rainy season. People burn the land to clear it for farming. The impact of this is damage to the surrounding ecosystems, smoke and air pollution, plus the sparking off of wildfires that spread out of control.
- Floods have occurred several times in Desa Kotabaru, especially when rainfall intensity is very high and rivers are thus unable to cope with the increased discharge.Floods usually occur in the watershed area, threatening the fields and rice crops growing there.
- Tornados have struck during recent years and severely threatened homes and estate crops such as coconut, coffee, cashew, etc. Another disaster to have occurred in Desa Kotabaru is an anthrax epidemic. This spread due to negligence and ignorance on the part of the community regarding the danger of eating the flesh of dead livestock. As a result of this outbreak, people suffered ulcerous lesions but nobody died. The only deaths were among livestock.
- The disasters that have occurred in Desa Kotabaru have generally impacted mostly on agricultural land and crops, infrastructure, and job opportunities. These impacts are felt by the community when disasters have crippled their economy. As a result, they are threatened with loss of livelihood and maybe even food shortages leading to starvation.
- In general, the Desa Kotabaru community have a low level of education, most having only completed primary school. Their primary source of income is farming. The average monthly income of respondents was less than Rp.500,000. Most of the homes are non-permanent structures characterised by earthen floors, bamboo walls, and roofs made from zinc or straw. water comes from wells that rely on rain. Most villagers' level of prosperity isaverage to low.
- Vulnerability and disaster risk in Desa Kotabaru are related more to human health, physical conditions and environment.The vulnerabilities most frequently experienced by the community are to do with land, village infrastructure, forest, water resources and public health.Othersare incomes, job opportunity, educational level, and the community's motivation as regards protecting the environment and reducing disaster risk.
- Most of the villagers do not know about an early warning system (EWS), either its purpose nor its activities. Some do know about it, however, getting the information from a range of sources such as electronic media, mass media, weather forecasts, etc. Their ignorance is due mostly to difficulty in accessing information from mass media or electronic media, low awareness of the importance of having an EWS in the village, and the fact that no EWS has yet been officially set up in the Desa Kotabaru area. If an EWS is formed in the village, they would fully support its activities in order to reduce disaster impact.
- Government action related to EWS in Desa Kotabaru is still limited to the provision of help after a disaster has happened, and little has been done to prevent disasters from occurring. However, a number of preventative measures to reduce disasters and their impacts have now been started through cooperation between various agencies such as local and international NGOs.
- Assets that can be used by the Desa Kotabaru community in times of disaster are relatively easy to access. However, to make it easier to use them when disaster strikes, it is necessary to make an inventory of who owns or is responsible for each asset.

5.1.8 Desa Tou Timur

- Desa Tou Timur has a topography consisting of hills and a relatively narrow area of flat land. According the field survey and spatial analysis, a large proportion of Desa Tou Timur has a steep to very steep topography. Of the total area, 31.7 % is very steep and 25.2% is steep. Most of the flat area is in the north of Wolowatu (north of Danau Bowu lake) extending to the coast. This area is used for paddyfields and dry fields. It is highly vulnerable to disasters in the form of floods in the rainy season.

- The spot map for Desa Tou Timur shows that the disasters most likely to happen include drought, fire, abrasion, illegal logging and fish bombing. There has also been an outbreak of anthrax. Specifically for Danau Bowu lake, the threat to the ecosystem is shallowing of the lake.This needs urgent attention because most of the water sources in Dusun Wolowatu are fed by water seeping from the lake. Shallowing will cause the volume of water stored in the lake to decrease.

- Before 1992, Desa Tou Timur was still covered by mangrove and hill forest. The vegetation around Danau Bowu lake was also in good condition.Forest vegetation has gradually been disappearing as the population has increased and more and more land is cleared for agriculture. In 1992 there was an earthquake and tsunami. The mangrove forest in Desa Tou Timur decreased further. Abrasion began and much of the hill forest became grassland or critical land.

- Water quality analysis in Desa Tou Timur indicated that the quality of the water is still quite good, including that in Danau Bowu lake. Nevertheless, if it is to be consumed for drinking or cooking, the water should first be filtered to improve its quality and safety.

- Vulnerability analysis for Desa Tou Timur was performed only in Dusun Wolotou,where Danau Bowu is located. This was because the rehabilitation and disaster risk reduction activities were focused on the communities in the vicinity of Danau Bowu lake andthe coast of Dusun Wolotou.

- The disaster history of Desa Tou Timur shows that the following disasters have occurred in this village: fire, drought, abrasion, earthquake and tsunami, anthrax epidemic, flash floods, and tornado (typhoon). Those that happen every year are fire, drought, flood and abrasion,while tornados have only started to occur during the last few years when weather and seasons became uncertain.

- Fires usually strike land and grasslands. Theyoccur in the dry season, and are frequent during the run up to the rainy season, when farmers burn the land for dryfield agriculture.

- Drought happens in the dry season. When Desa Tou Timur is struck by drought, its water sourcesdry up. These include wells and rivers, but Danau Bowu lake has never dried up. During the dry season, Danau Bowu lake only experiences a reduction in its volume.

- Floods and abrasion take place in the rainy season. Floods inundate agricultural lands, often damaging the crops and may even cause harvests to fail. Abrasion occurs along the shore, because the mangroves have become sparse and degraded. As a result, Dusun Wolotou's shore is being eaten away and is receding inland.In addition, the coastal ecosystem is disturbed and catches of wild shrimps and clams are becoming ever smaller.

- Another disaster to have occurred in Wolotou (Desa Tou Timur) was the 1992 earthquake and tsunami which devastated settlements near the coast. As a result, the inhabitants of that dusun moved to higher land, which is now called Dusun Wolotou.

- An outbreak of anthrax occurred as a result ofnegligence and ignorance on the part of the community regarding the danger of eating the flesh of dead livestock. Nobody died as a result of this outbreak, but several people from Dusun Wolotou were infected with anthrax and rushed to hospital.

- All the disasters that have occurred in Tou Timur, specifically in Dusun Wolotou, have damaged the village's infrastructure. No human deaths have ever been reported as a result of these disasters. The greatest losses have been to farmland and crops. Drought, fires and floods that happen every year seriously threaten the area's food supply. As a result of such food shortages, the community becomes vulnerable to starvation and disease.

- Most of the respondents from Dusun Wolotou who acted as resource persons came from the Suku Lio ethnic group. Their main leaders are called the Mosalaki and Riabewa. Their educational level is still quite low as most have only completed primary school, and they work mainly as farmers.Their level of prosperity is also quite low as many have monthly incomes that are insufficient to meet their expenditures. Their homes are mostly non-permanent structures with straw roofs, bamboo walls and earthen floors.

- Vulnerability and disaster risk inDesa Tou Timur are related more to health, physical conditions, and the village's environment. Vulnerability of land and crops is caused by infertile soil, difficulty in obtaining sources of water, and the dry climate. In addition, vulnerability of forest conservation is also a main focus of vulnerability in Desa Tou Timur. Community health vulnerability is closely related to environmental sanitation, health access, the people's knowledge and awareness about environmental hygiene.

- No EWS has yet been set up in Desa Tou Timur. The inhabitants also know nothing about it, either its meaning nor its purpose. However, they would respond well if directly involved in EWS activities in their village.

- Local government response to disaster is mostly limited to action taken after the disaster has occurred. Little has been done in the way of disaster prevention. However, a number of preventative measures are now under way to reduce disaster impact. These include the rehabilitation of coastal areas, Danau Bowu lake, reforestation of spring areas, development of facilities and infrastructure.

- Of the assets in the village, both private and public, most can be used in times of disaster.All assets were difficult to access in the case of the earthquake and tsunami in 1992. Use of land and fields as a refuge or escape must be approved by the Mosalaki because traditional *adat* customs and the power of the Mosalaki are still very strong.

5.1.9 Disaster Risk Reduction Plan

- Disaster risk reduction plans that have been or are in the process of being implemented at sites mentored by WIIP cover two main categories, which are the reduction of vulnerability and hazard, and the improvement of community capacity. Both categories are carried out together in order to create a village which is resilient to natural conditions and a community capable of withstanding change, especially climate change.

- Reduction of vulnerability and hazard at the assessment sites through implementation of activities including the following:

  - ❖ "Socialisation" at the PfR assessment sites."Socialisation" to be implemented from provincial level to village..
  - ❖ Coordination and strengthening of relations between WIIP's partners in the PfR project. Coordination to be done with both international and local partners.
  - ❖ Planting of mangroves, beach plants and other plants in various places, such as mangrove forest, seashore, and springs.
  - ❖ Advocacy and dialogue on various policies with the institutions concerned.
  - ❖ Research and scientific study, such as Green Belt research in Kelurahan Sawah Luhur, etc.

- Improvement of community capacity at the various assessment sites, through the implementation of activities including the following:

  - ❖ Formation of reforestation groups
  - ❖ Participatory Risk Analysis (PRA) activities
  - ❖ Environmental campaign
  - ❖ Training to improve the quality of human resources
  - ❖ Setting up of Bio-rights programs to raise the people's economic level

5.2 Recommendations

- The recommendations offered are based on the results of analysis in the field, both direct observation in the field and interviews with members of the community. In addition, these recommendations also refer to the results of priority analysis and environmental management scenario.

- Environmental management in each village should use the pattern of cooperation between government and community.Third parties such as local and international NGOs and the private sector should also be involved if they contribute to the village's environmental management.In fact, the government can be the leader although environmental management decisions should be the result of consensus reached together by the various parties. As a result, all management elements can contribute their ideas when carrying out environmental management. Good environmental management can minimise the vulnerabilities and risks that threaten the village and its community, so that disaster impact can be reduced and prevented.

- The first priority for environmental management in Kelurahan Sawah Luhur is ecological assessment, in particular the problem of water resources. After that, improvements can start to be made to environmental quality, forest condition and air quality, after the problem of water sources has been overcome. The second management priority is social assessment. Community understanding and participation in reducing disaster risk have top priority in this. After that, people's incomes and educational level need to be improved. The third management priority is institutional assessment. Here, governanceneeds to be improved first. Then attention can be paid to improving human resources and the preparedness of village infrastructure.

- In Desa Reroroja, the environmental management priorities are first ecological assessment, second socio-economic assessment and third institutional assessment. Within ecological assessment, the priorities in order of importance arethe issues of water resources, forest condition, environmental quality, and air quality. Within socio-economic assessment, the main focus is people's incomes, which need to be improved urgently so that the issues of educational level and community participation in disaster risk reduction activities can be solved together.Within institutional assessment, human resources improvement has top priority.This followed by infrastructural readiness and then governance.

- Environmental management in Desa Done should put socio-economic issues first. After that come ecological and institutional assessment. Within socio-economic assessment, community understanding and participation in disaster risk reduction must be built up and improved. Next, the issues of education and incomes can be focused on. When the socio-economic issues have been overcome, ecological conditions in the village should then be resolved. Within ecological assessment, improvement of forest conditions and water resources together should be the main focus because these are closely related. Agricultural conditionsand the lives of the community who depend heavily on the forest and water sources are two issues that require extra attention.After that, environmental quality and air quality have third and fourth priority for ecological assessment in Desa Done. The last assessment priority in Desa Done is institutional assessment, with human resources improvement as the main focus. Infrastructure readiness and governance should also be improved quickly.

- In Desa Darat Pantai the environmental management priorities are first ecological assessment, second socio-economic assessment and third institutional assessment.In more detail, water resources are the most important issue to focus on within the ecological assessment. This is followed in turn by improvement to forest conditions, environment and then air quality.With socio-economic assessment, the issues of educational level and people's incomes need to be urgently addressed, so as to bring about community understanding and participation in disaster risk reduction. The community will be more focused on activities to save and conserve the environment without having to think too much about the other two issues. Within institutional assessment, human resources need to be improved first in order to createcommunity preparedness for facing the various changes happening now. After that, infrastructure readiness and local governance should be improved quickly to support all the management which is to be carried out.

- As regards environmental management priorities in Desa Talibura, ecological assessment should be put first. Within ecological assessment, the management priorities for improvement are first water resources, then environmental quality, air quality and finally forest conditions. The second environmental management priority for improvement is socio-economic assessment, which includes community incomes, educational level, and improving community understanding and participation in disaster impact reduction. These three socio-economic issues should be addressed in turn. The last management priority for improvement is institutional assessment. Within this, improvement of human resources is the first priority, followed by governance and then infrastructure readiness.

- In Desa Nangahale, the environmental management priorities for urgent improvement are, in order of importance, ecological, socio-economic and institutional assessment. The issue that should be focused on first is environmental quality. The density and poor quality of the housing area should be rapidly addressedso as to produce a healthy environment. Next, the second focus within ecological assessment should be on the issue of water resources.The difficulty in obtaining clean water, especially during the dry season, must be overcome quickly, to enable the community to withstand disaster. After this, the next focus for ecological assessment should be on forest and air conditions. As regards socio-economic assessment, low educational level leads to the problem of low community understanding and participation in disaster impact reduction activities in the village. Therefore, these two issues must be resolved in turn to realise the various environmental conservation programs in the village.Besides this, incomes are also another factor causing poor community participation in disaster impact reduction activities. Within institutional assessment, the priorities are first infrastructure readiness, particularly the roads in Dusun Lekong Gete and Utan Wair, next human resources improvement, and then local governance.

- In Desa Kotabaru, the environmental management priorities recommended for urgent improvement are, in order of importance, institutional assessment, then ecological and finally socio-economic assessment. More attention needs to be paid toimproving human resources and preparing infrastructure in the hope of making rapid improvement.Then, to support all of this, the community are anxious for improvements to be made in local governance, particularly as regards equal distribution of development. In ecological assessment, forest condition and water resources are the two main problems that should be resolved urgently. Many of the disasters that have occurred in the village have been caused mainly by the destruction of the village's forest and the difficulty in obtaining sources of water. The next problems in ecological assessment that need to be quickly addressed are

environmental quality and water quality. In socio-economic assessment, community understanding and participation in disaster impact reduction need to be built and improved to create a preparedness to cope with the various changes that are occurring.After that, the issues of incomes and educational level need to be focused on within socio-economic assessment to create a community that possesses a high capacity to cope with a range of disasters.

- Socio-economic assessment is the first priority for management that should be carried out in Desa Tou Timur. The villagers' socio-economic condition should be strengthened first in order to support the other assessments.Within socio-economic assessment, the community's understanding and participation in disaster impact reduction must be strengthened and improved to bring about all the activities related to disaster risk reduction. Next, focus should be placed on resolving the issues of incomes and educational level. The second assessment in the environmental management priorities in Desa Tou Timur is ecological assessment. In order of importance, this coversthe issues of environmental quality (particularly related to sanitation in the community), forest condition, water resources, and air quality. The third assessment is institutional assessment, which covers infrastructure readiness (especially transportation and educational facilities), human resources development, and governance.

- In almost all the assessment sites, water resources are an issue that should be resolved urgently. The water quality at most of the sites (except Desa Done) is not good enough for human consumption (drinking and cooking)or for daily needs (bathing, washing, etc.) Measures that could be taken include filtration or the treatment of water that is unfit for use.In addition, clean water sources like wells can be constructed at sites which, on the basis of further analysis which must be carried out first, are found to have sufficiently good quality water.Piped water installation or the construction of water storage tanks should be carried out urgently to anticipate water crisis, particularly in the dry season. These can be put into use when the rainy season arrives so that in the dry season the people will not lack clean water.

- Several areas have poor environmental conditions, like Kelurahan Sawah Luhur and Desa Nangahale where houses are crowded together. Work on this could start with the cleaning of water channels in the area of the settlement.The purpose of this is to deal with flooding in the rainy season.Besides this, trees and plants should be planted in the settlement area to make it green and create a more beautiful environment. More waste disposal places also need to be provided, considering that the population is quite dense so the rubbish they produce could make the environment dirty. At the sites which still lack proper sanitation facilities, public toilets should be constructed urgently, to try to prevent people from defecating just anywhere and thereby endangering health. The provision of public toilets, washing and bathing facilities would anticipate the problem of people who have so far found it difficult to construct a private toilet/bathroom in their own home.

- Air conditions in several of the crowded settlements like Desa Nangahale and Sawah Luhur require extra attention. The dust in their surroundings can be harmful to health. Therefore, the local government and community should engage in activities to make the area green, one of the main activities being to plant trees. Trees can be planted along the sides of the main road, while various plants can be planted in gardens around houses in order to improve air quality. At sites where air conditions are still good, like Desa Done, Kotabaru,

Reroroja, Darat Pantai, and Talibura, more attention should be paid to maintaining these good conditions. A ban on cutting down trees, while still carrying out 'greening' activities, are ways of maintaining good air quality. InDusun Wolotou in Desa Tou Timur, the local government and community should start to plant trees along the road into the dusun because of the large amount of dust in the air.

- The forests in several areas are being degraded, both in the hills and along the seashore (mangrove). Areas which still have fairly good coastal and mangrove forests are Desa Darat Pantai and Reroroja, while the condition of hill forestis still quite good in Desa Done. These villages should take steps to further improve the quality of their forests. Such actions include enforcing a ban on indiscriminate tree felling, a ban on careless burning of land and grass, and taking steps to plant more mangrove along the coast.

- The community's understanding of and participation in disaster impact reduction is a fairly serious issue in many of the villages. Their awareness of the need to protect the environment and participate actively in environmental activities such as planting mangroves and other trees, environmental campaigns, etc. are one reason why community capacity for coping with the range of disaster impactsis weak. Another cause of this problem is the dependence on economic incentives or rewards. Awareness the environment and its many benefitsneeds to be fostered early on so that the community will voluntarily protect their environment without relying on rewards or incentives that are only temporary.

- The issues of people's incomes, educational level and human resources development are problems that need to be addressed in efforts to improve community capacity at each of the assessment sites.These three problems are all inter-related so should be resolved together.Low educational level results in low quality human resources, so livelihoods and household incomes are limited. The provision of training in soft skills for those who are old enough is one way of reducing this problem.Also essential is the provision of capital along with mentoring and extension services on business management and various types of enterprise that have potential.The young people can be given guidance on the importance of education in creating better quality human beings. In addition, cooperation is needed between government and relevant agencies to invest and provide financial help for those who cannot afford to continue their education to a higher level.

- Governance is an important aspect and parameter in the implementation of disaster risk reduction and community capacity enhancement programs at the assessment sites. Improvements must be made quickly to work performance by government staff, to bureaucracy issues, and to the government's role in disaster risk reduction programs, so that past, current and future activities can be synchronised and run smoothly.

- Infrastructure readiness is an important investment in improving community capacity and decreasing disaster risk. Good facilities and infrastructure will help people's lives to run smoothly. Therefore, primary infrastructures like transportation, education, health, lighting, and communication must be rapidly improved in order to create healthy communities and good environments.

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ANNEXES

Annex 1. Attendance List *Focus Group Discussion* (FGD) Desa Reroroja

NO	NAME	POSITION	ADDRESS	GENDER
1	Fatima Jawa	Member	Koro	F
2	Emilia Mau	Member	Koro	F
3	Venentia Dolfia	Member	Mageloo	F
4	Maria Sanggo	Member	Koro	F
5	Teresia Jaru	Member	Koro	F
6	Laurensia Avelina	Member	Koro	F
7	Siti Nurhani	Member	Koro	F
8	Laurensia Tau	Member	Koro	F
9	Marta Afriana	Member	Koro	F
10	Agata Sa	Member	Koro	F
11	Maria Goreti	Member	Koro	F
12	Andreas Nong Sina	Member	Mageloo	M
13	Paul	Member	Mageloo	M
14	Nong Afrit	Member	Mageloo	M
15	Yohannes Dala	Member	Mageloo	M
16	Martinus Nong	Member	Mageloo	M
17	Yashinta Lawi	Member	Mageloo	F
18	Elisabet Amilin	Member	Mageloo	F
19	Nong Fanca	Member	Mageloo	M
20	Mikael Budiyanto	Member	Mageloo	M
21	Angelius Kalo	Deputy Chairperson	Koro	M
22	Victor E Rayon	Chairperson	Mageloo	M
23	Angelina Nona	Treasurer	Mageloo	F
24	Waigi	Member	Mageloo	M
25	Muslimah Leu N	Village Official	Koro	F
26	Areni	Member	Mageloo	F
27	Siprianus Seu	Member	Koro	M
28	Fransiskus Tana	Reroroja Village Secretary (*Sekdes*)	Duli	M
29	Benyamin Besu	Member	Woloboa	M
30	Petrus Simon	Member	Koro	M
31	Sisilia	Member	Koro	F
32	Waldina	Member	Koro	F
33	Yohanes L Boli	Member	Magelooo	M
34	Vinsensius Friyanto	Reroroja Village Head (Kadus)	Koro	M
35	Yasinta Nona Lewi	Member	Mageloo	F
36	Maria Gweldina	Member	Koro	F

Annex 2. Attendance List *Focus Group Discussion* (FGD) Desa Done

NO	NAME	POSITION	ADDRESS	GENDER
1	Rosamualda Rola	Done Village Head (*Kades*)	Dusun Ladubewa	F
2	Dominikus	Group Chairperson	Dusun Watuwa	M
3	Ragil Satriyo Gumilang	WIIP Assessment Team	Bogor	M
4	Aswin Rahadian	WIIP Assessment Team	Bogor	M
5	Tyas Ayu Lestari	WIIP Assessment Team	Bogor	M
6	Sisilia Sedha	Member	Dusun Watuwa	F
7	Theresia Bela	Member	Dusun Nggausa	F
8	Abdon Setu	Member	Dusun Nggausa	M
9	Petrus Bhoka	Member	Dusun Nggausa	M
10	Ade Irman S Dona	Member	Dusun Ladubewa	F
11	Krispina Mini	Group Treasurer	Dusun Ladubewa	F
12	Maria Hulir	Member	Dusun Detunggawa	F
13	Martina Dere	Monitoring	Dusun Detunggawa	F
14	Maria Ngawa	Member	Dusun Ladubewa	F
15	Susi Susanti Jaru	Member	Dusun Ladubewa	F
16	Leonard Baraz	Member	Dusun Ladubewa	M
17	Petrus Nanga	Monitoring	Dusun Ladubewa	M
18	Maria fatimas Sansi	Member	Dusun Ladubewa	F
19	Nikolas J Garu	Member	Dusun Ladubewa	M
20	Imei	Member	Dusun Ladubewa	F
21	Nika Lewe	Member	Dusun Ladubewa	M
22	Simon Sengi	Member	Dusun Watuwa	M
23	Bernabas Nabas	Member	Dusun Ladubewa	M
24	Selviana Pori	Member	Dusun Watuwa	F
25	Hendrikus Minggo	Member	Dusun Watuwa	M
26	Finsensius Riulu	Member	Dusun Watuwa	M
27	Petrus Daia	Member	Dusun Ladubewa	M
28	Philipus Peto	Member	Dusun Watuwa	M
29	Simon Petrus Sari	Member	Dusun Ladubewa	M
30	Anggelinus Sebi	Member	Dusun Watuwa	M
31	Robertus Woda	Member	Dusun Detunggawa	M
32	Moa Bura	Member	Dusun Detunggawa	M
33	Kristina Peti	Member	Dusun Detunggawa	F
34	Yohanes Yonas	Member	Dusun Detunggawa	M
35	Paulus Sepu	Member	Dusun Detunggawa	M
36	Gervasius Paro	Member	Dusun Ladubewa	M
37	Mertinus Nggedhi	Member	Dusun Watuwa	M
38	Ardianus Tono	Member	Dusun Ladubewa	M
39	Markus Rengga	Group Deputy Chairperson	Dusun Detunggawa	M
40	Kanisius Garu	Secretary	Dusun Ladubewa	M
41	Gebriel Gali	Member		M
42	Petrus Nonga	Member	Dusun Ladubewa	M

Annex 3. Attendance List *Focus Group Discussion* (FGD) Desa Darat Pantai

NO	NAME	OCCUPATION	ADDRESS	GENDER
1	Damisius Nong	Farmer	Wair Pepen	M
2	Muh Ashari	Private sector employee	Blatat	M
3	Abdul Karang	Farmer	Napun Gelang	M
4	Alkabir	Farmer	Mageraneng	M
5	Eliseus	Farmer	Wairwua	M
6	Arnoldus Yansen	Farmer	Napun Gelang	M
7	Supu Asring	Farmer	Napun Gelang	M
8	Dominikus Domi	Farmer	Napun Gelang	M
9	Stevanus Hobius	Farmer	Napun Gelang	M
10	Yohanis Lawa	Farmer	Napun Gelang	M
11	Jemias Jedo	Farmer	Napun Gelang	M
12	Paulus Pulo	Farmer	Napun Gelang	M
13	Eko Budi P	PC WIIP	Maumere	M
14	Wahid	Fisherman	Napun Gelang	M
15	Maskur	Farmer	Napun Gelang	M
16	Mustamil	Dusun Head (*Kadus*)	Napun Gelang	M
17	Kalarina	Farmer	Wairwua	F
18	Maria Valentina	Farmer	Wairwua	F
19	Abu Haseng	Fisherman	Napun Gelang	M
20	Ya Vianei	Farmer	Napun Gelang	M
21	Donato Dua	Farmer	Wairwua	M
22	Johanis Jo	Farmer	Napun Gelang	M
23	Sudirman	Farmer	Napun Gelang	M
24	Rusli Ali	Farmer	Napun Gelang	M
25	Maanima	BPD Representative	Blatat	F
26	Fitra Laila	Farmer	Napun Gelang	F
27	Bindje	BPD Secretary	Blatat	M

Annex 4. Attendance List *Focus Group Discussion* (FGD) Desa Talibura

NO	NAME	POSITION	ADDRESS	GENDER
1	Sebastianus Beta	Head of BPD	Tanah Merah	M
2	Theresia Suwarty	Member	Kampong Baru	F
3	Elisabeth Dalomu	Member	Habihodot	F
4	Nikolaus Abdin	Member	Habihodot	M
5	Petrus Piatu	Member	Tanah Merah	M
6	Hamsa	Member	Talibura	M
7	Markus Ferdinande	Member	Habihodot	M
8	Y Honorius Juang	Group Secretary	Habihodot	M
9	Damianus Dapa	Group Treasurer	Talibura	M
10	Vere Dias M	Member	Talibura	M
11	Damianus Aviandus	Member	Kampung Baru	M
12	Hortensia Konselfina	Group Chairperson	Kampung Baru	F
13	Vinsensius	Village Secretary (*Sekdes*)	Talibura	M
14	Maria Gracia Dou	Village staff	Habihodot	F
15	Dominika Blawang	Member	Habihodot	F
16	Yohanes Jhonson	Member	Kampung Baru	M
17	Maria Fatima	Member	Kampung Baru	F
18	Anjelina Bade	Village staff	Talibura	F
19	F Noag Lapis	Village staff	Habihodot	M
20	Sevvilla Elliasitas	Member	Talibura	F

Annex 5. Attendance List *Focus Group Discussion* (FGD) Desa Nangahale

NO	NAME	POSITION	ADDRESS	GENDER
1	Happy Taka	Group Chairperson	Namandoi	M
2	Nikolas Nay Bela	Head of BPD	Lekong Gete	M
3	H. Abdul Fatah	BPD Secretary	Namandoi	M
4	Abdul Mutahil	Member	Namandoi	M
5	Thomas Tapang	Member	Lekong Gete	M
6	Thobias Tibang	Member	Utan Wair	M
7	Simon Sina Boly	Member	Utan Wair	M
8	Lorens Lepe Simon	Member	Lekong Gete	M
9	Kamaludin	Member	Namandoi	M
10	Yakobus Juang	Member	Lekong Gete	M
11	Ridwan	Policeman	Talibura	M
12	Gabriel Boli	Member	Nangahale	M
13	Saat	Member	Lekong Gete	M
14	Kristina Ketik	Member	Utan Wair	F
15	Anastasia Dua	Member	Utan Wair	F
16	Hasmida	Member	Nangahale	F
17	F Saveriana	Village Official	Lekong Gete	F
18	Ratna	Member	Namandoi	F
19	Nursam	Member	Namandoi	F

Annex 6. Attendance List *Focus Group Discussion* (FGD) Desa Kotabaru

NO	NAME	POSITION	ADDRESS	GENDER
1	Herman Wong	Village Head (*Kades*)	Dusun 1	M
2	Dionisius Dawa	Group Secretary	Dusun 1	M
3	Donates Ora	Member	Dusun 3	M
4	Jualisisus Tani	Member	Dusun 1	M
5	Sisilia Rae	Member	Dusun 3	F
6	Siti Kupang	Member	Dusun 3	F
7	Firmina Ero	Group Treasurer	Dusun 2	F
8	Virginia M Belan	Member	Dusun 3	F
9	Aloy Sius Seda	Member	Dusun 3	M
10	Daniel Seni	Planting Section	Dusun 1	M
11	Fabianus Sete	Planting Section	Dusun 3	M
12	Hilarious Seru	Member	Dusun 3	M
13	Yosep Wara	Member	Dusun 1	M
14	Ambros Bota	Member	Dusun 1	M
15	Anselmus	Member	Dusun 1	M
16	Petrus Wangge	Group Chairperson	Dusun 1	M
17	Sebastianus Loda	Head of Dusun 2	Dusun 1	M

Annex 7. Attendance List *Focus Group Discussion* (FGD) Desa Tou Timur

NO	NAME	POSITION	ADDRESS	GENDER
1	Ludgerus Mbete	Member	Tou Timur	M
2	Detus F Saka	Member	Tou Timur	M
3	Theresia Bade	Member	Tou Timur	F
4	Tobifajoni	Member	Tou Timur	F
5	Yuneta Ndoi	Secretary	Tou Timur	F
6	Agustina Sepe	Member	Tou Timur	F
7	Kristoforus Bhoka	Member	Tou Timur	M
8	Robertus Reka	Member	Tou Timur	M
9	Rofinus Somo	Member	Tou Timur	M
10	Yohakin Bihoka	Nursery Coordinator	Tou Timur	M
11	Rubentus Bhoka	Nursery Coordinator	Tou Timur	M
12	Rikandus Sendee	Treasurer	Tou Timur	M
13	Muhamad Noh	Member	Tou Timur	M
14	Elizabeth Nari	Member	Tou Timur	F
15	Yuliana Mare	Member	Tou Timur	F
16	Dominikus Martina	Member	Tou Timur	F
17	Mersiana Bha	Member	Tou Timur	F
18	Yustinai Ndoi	Member	Tou Timur	F
19	Agustina Tho	Member	Tou Timur	F
20	Rofinus Sega	Group Chairperson	Tou Timur	M

Annex 8. Questionnaire to be completed by Respondents

NO:

PERSONAL QUESTIONNAIRE FOR RESPONDENT

Desa(Village)/ Kelurahan	:
Kecamatan (Subdistrict)	:
Kabupaten(District)/ Town	:

INSTRUCTIONS:

1. Write each answer as appropriate for the type of question asked.
2. Tick (√) the choice(s) that you consider most appropriate.

A. Personal Details

No	Item	Answer
1	Name	
2	Gender	
3	Religion and ethnic group	
4	Age	
5	Marital Status	
6	Number of family dependents	
7	How long have you lived in this village....	
8	Educational level reached	
9	Occupation a. Primary b. Side job	
10	Income/month (give details of source)	
11	Expenditure/month (give details)	

No	Item	Answer
12	Participation in organisations a) Involvement in a formal/informal organisation b) Position in the organisation c) Length of time you have been part of this organisation d) Existence of organisation(s) having a program that involves the community in mangrove forest conservation e) What are these programs (refer to question d)?	
13	Home Ownership a) House Status, Number of bedrooms b) Type (Permanent, Semi Permanent, Non-permanent) c) Sanitation (Toilet and Bathroom) d) Source of Water e) Source of Energy (Fuel) f) Source of Electricity	
14	AssetsOwned a) Land b) Agricultural/ Fishery/ Animal husbandry Production c) Agricultural/ Fishery/ Animal husbandry Tools d) Number of buildings e) Vehicles f) Other Valuables g) Children's education h) Other	
15	Debts a) Source of Loan b) Size of Loan (Min & Max) c) Instalments d) Interest/ year e) Loan Regulations f) Service g) Reason for loan h) Distance to loan provider	

B. Early Warning of Disaster

1. Before a disaster occurred, did you receive any warning that a disaster was going to happen? (You may answer> 1)
   - ☐ Did not know
   - ☐ Weather forecast
   - ☐ *Kentongan*alarm
   - ☐ Announcement inChurch / Mosque
   - ☐ Mass media (newspaper,television,radio,BMG)
   - ☐ Other .....

2. What was your attitude when you knew there was an early warning ?
   - ☐ Ignored it (*Membiarkan*)
   - ☐ Same as usual (*Biasa saja*)
   - ☐ Responded well (*Merespon dengan baik*)

3. What did you do when you knew there was an early warning?
   (You may answer> 1)
   - ☐ Prepared food, clothing, clean water
   - ☐ Prepared first aid medicines (*obat-obatan ringan*)
   - ☐ Secured official documents
   - ☐ Did nothing
   - ☐ Other.....

C. Disaster Preparedness and Response

1. Has any member of your household/family ever been the victim of an accident? (You may answer> 1)

   - ☐ Never
   - ☐ Poisoning
   - ☐ Fire
   - ☐ Light injury
   - ☐ Traffic accident
   - ☐ Drowning
   - ☐ Other …….

2. When a family member or neighbour had an accident, what did you do at the time of the accident? (You may answer>1)

   - ☐ Took them to a medical facility (*Puskesmas / Poliklinik/Pustu*)
   - ☐ Took them to a traditional healer (*Dukun*)
   - ☐ Administered first aid
   - ☐ Paramedic
   - ☐ Other : .....

3. What disasters have ever happened in your home ? (You may answer>1)

   - ☐ Flood
   - ☐ Fire
   - ☐ Abrasion
   - ☐ Landslide

   Other .....

4. a. Before the disaster happened, did you take any anticipatory steps to secure/save livesand possessions?

      - ☐ Yes
      - ☐ Sometimes
      - ☐ Never

   b. If "Yes" or "Sometimes", what steps did you take?(You may answer>1)

      - ☐ Secure official documents (certificates, deeds, important letters, etc)
      - ☐ Raise the floor of the house
      - ☐ Prepare first aid medicines
      - ☐ Prepare clean water for drinking and cooking
      - ☐ Prepare foodstuffs, e.g.: instant noodles, spices, rice, etc.
      - ☐ Other .....
      - ☐ Evacuate to the house of a relative/neighbour in a safer place
      - ☐ Evacuate to an emergency shelter provided by local government/ Satlak PB.
      - ☐ Other : .....

5. At the time of the disaster : (You may answer> 1)

a. What did you do to save/move your family?

- ☐ Stayed at home
- ☐ Moved to higher ground outside
- ☐ Moved to house of family/neighbour in a safer place
- ☐ Moved to emergency shelter provided by local government / Satlak PB.
- ☐ Other : .....

b. How did you obtain drinking water during the disaster ?(You may answer > 1)

- ☐ Used the water I had prepared in advance
- ☐ Took water from river/well
- ☐ Took rainwater
- ☐ Took floodwater
- ☐ Purchased water
- ☐ Other :.....

c. Environmental problems that often occur at times of disaster:
(You may answer> 1)

Examples: waste disposal, conversion of forest to construct emergency shelter, sanitation problems

D. Government Role During Disaster

1. What has local government ever done to cope with the threat of disaster ?(You may answer > 1)

   - ☐ "Socialisation" (*Sosialisasi*)
   - ☐ Training
   - ☐ Simulation
   - ☐ Nothing
   - ☐ Other .....

2. What action has local government ever taken at the time of a disaster? (You may answer> 1)

   - ☐ Provided evacuation equipment
   - ☐ Provided emergency shelter
   - ☐ Distributed aid
   - ☐ Gave early warning
   - ☐ No action taken
   - ☐ Other .....

3. What actions has government taken after a disaster?(You may answer> 1)

   - ☐ Repaired damaged roads
   - ☐ Opened health services
   - ☐ Cleaned the environment
   - ☐ No action taken
   - ☐ Other .....

E. Management Priority Analysis

INSTRUCTIONS

In managing various resources, it is necessary to have a scale of priorities for management strategy. Complete the tables below by awarding a numerical score on the basis of actual conditions.

ECOLOGICAL	SCALE
CONDITION OF HYDROLOGY (WATER RESOURCES)	
CONDITION OF FOREST	
CONDITION OF AIR	
ENVIRONMENTAL QUALITY (IN THE AREA OF THEVILLAGE/*KELURAHAN*)	

SOCIO-ECONOMIC	SCALE
PEOPLE'S INCOMES	
WORK OPPORTUNITY/ WORK FIELD	
LEVEL OF EDUCATION	
COMMUNITY'S PARTICIPATION IN AND UNDERSTANDING OF DISASTER AND REDUCTION OF ITS IMPACT	

INSTITUTIONAL	SCALE
QUALITY OF MANAGEMENT IN LOCAL GOVERNMENT	
ROLE OF LOCAL INSTITUTIONS	
READINESS / CONDITION OF INFRASTRUCTURE	
HUMAN RESOURCES DEVELOPMENT	

SCALE	MEANING
1	Not important
3	Not very important
5	Moderately important
7	Important
9	Extremely important
2, 4, 6, 8	Intermediate values

F. Analysis of Management Scenarios

INSTRUCTIONS

To achieve the best scenario, fill in the columns below using the Saaty scale. Assign a score to the scenario that best enhances each attribute.

Scenario A = Management based on the Government.
Scenario B = Management based on collaboration, having the formof *Co-Management*of the conservation area and Government as the *leading sector*.
Scenario C = Management based on the privatisation of management by private enterprise responsible directly to the Government.

	ATTRIBUTE	SCENARIO		
		A	B	C
ECOLOGICAL	CONDITION OF FOREST			
	CONDITION OF HYDROLOGY			
	AIR QUALITY			
	QUALITY OF LIVING ENVIRONMENT (*LINGKUNGAN TEMPAT TINGGAL*)			

	ATTRIBUTE	SCENARIO		
		A	B	C
SOSIO-ECONOMIC	PEOPLE'S INCOMES			
	WORK OPPORTUNITY/ WORKFIELD			
	LEVEL OF EDUCATION			
	COMMUNITY PARTICIPATION AND UNDERSTANDING			

	ATTRIBUTE	SCENARIO		
		A	B	C
INSTITUTIONAL	MANAGEMENT QUALITY			
	ROLE OF LOCAL INSTITUTIONS			
	INFRASTRUCTURE READINESS			
	HUMAN RESOURCES DEVELOPMENT			

DIMENSION	SCALE
ECOLOGICAL	
SOCIO-ECONOMIC	
INSTITUTIONAL	

SCALE	MEANING
1	Not important
3	Not very important
5	Moderately important
7	Important
9	Extremely important
2, 4, 6, 8	Intermediate values

Annex 9. Questionnaire for Respondents in *Focus Group Discussion* (FGD)

NO:

FOCUS GROUP DISCUSSION (FGD) QUESTIONNAIRE

Desa(Village)/ Kelurahan	:
Kecamatan (Subdistrict)	:
Kabupaten(District)/ Town	:

A. Law and Organisations

1. How well prepared is the infrastructure in ecosystem conservation activities?

   a. Very good b. Good c. Not very good d. Poor e. Don't know

2. What facilities and infrastructure need attention?

   a. Roads b. Bridgesc. (Plant) nursery facilities d. (Plant) tending facilities

   Others (specify) .....

3. What form does policy on ecosystem conservation take in this village ?

   a. From government to community b. From community to government

   c. Don't know d. Other : .....

4. How much cooperation (coordination) is there with other relevant agencies in question No.3 above?

   a. Very good b. Good c. Mediocre (*Biasa saja*)d. Unclear e. Don't know

5. Has any form of guidance on ecosystem conservation been given in this village ?

   a. Yes b. No

   If "yes", please specify : .....

6. Have the results of current management ever helped you to prosper?

   a. Yes b. No c. Not yet

7. Is there a need for an ecosystem conservation policy or management pattern that differs from the present onein this village, for ecosystem conservation and community welfare?

   a. Yes, needed. b. No c. Don't know

8. What is your opinion of the quality at the planning stage of current ecosystem management in your village ?

   a. Very good b. Good c. Mediocre d. Unclear e. Don't know

9. What is your opinion of the quality of coordination of current ecosystem management in your village?

   a. Very good b. Good c. Mediocre d. Unclear e. Don't know

10. What is your opinion of the implementation of government policy in current ecosystem management in your village?

    a. Very good b. Good c. Mediocre d. Unclear e. Don't know

11. What is your opinion of the quality of the monitoring and evaluation of current ecosystem management in your village?

B. Understanding of the Uses & Functions of Ecosystems

1. Do you know the types of ecosystem that exist in your village and what their functions are? (During interview, ask respondent to mention at least 3 types of ecosystem and their functions) in order to assess their level of understanding, as follows:

   a. Understands very well b. Understands c. Has poor understanding
   d. Does not understand e. Does not know

2. In your opinion, what is the condition of the ecosystems in this village ?

   a. Very good b. Good c. Mediocre d. Degraded e. Badly degraded

3. In your opinion, are efforts required to manage the ecosystems in order to conserve them?

   a. Yes, what b. No, why

C. Community Participation in Ecosystem Management

1. Are you active in carrying out these efforts?

   a. Yes, I play a role b.No, I do not play a role c. Seldom

2. Have you ever taken care of the ecosystem of your own volition ?

   a. Very often b. Often c. Occasionally d. Never e. Don't know

3. Have you ever taken part in ecosystem management activities facilitated by a LSM/NGO ? What was the activity?

   a. Very often b. Often c. Not often d. Very rarely e. Never

INSTRUCTIONS:

1. Write each answer as appropriate for the type of question asked.

2. Tick (√) the choice(s) that you consider most appropriate.

Answer Choices:

a) Strongly agree = *Sangat Setuju (SS)*
b) Agree = *Setuju (S)*
c) Slightly disagree = *Kurang Setuju (KS)*
d) Disagree = *Tidak Setuju (TS)*
e) Strongly disagree = *Sangat Tidak Setuju (STS)*

A. INSTITUTIONAL DATA

1) Information on Institutions in the Village/ Kelurahan

No	Type of Institution	Name of Institution	Type of Service (Can be more than one type)	Effectiveness of Service(The greater the number of types of service, the higher the score)
1	LSM/ NGO			
2	Banks/ Financial Institutions			
3	Religious Institutions			
4	Extension Agencies a) Agriculture b) Fisheries c) Animal husbandry d) Forestry			
5	Government Institutions			
6	Education a) Open School (*Sekolah Terbuka*) b) Early Learning (*PAUD*) c) Primary school (*SD*) d) Junior Highschool (*SLTP*) e) Senior Highschool (*SLTA*) f) Higher Education			
7	Company/Private sector			
8	Early Warning System			
9	Climatology Station			
10	Traditional*Adat*Institutions			
11	Other			

2). Community's Perceptions of Various Institutions

No	Type of Institution	Questions																								
		Existence of institution in village					Various activities undertaken by institution in village					The institution's activities can increase prosperity and quality of human resources					The institution's activities can improve facilities and infrastructure					The existence of the institution can reduce risk and losses due to disaster (Only for traditional '*adat* ' institutions)				
		SS	S	KS	TS	STS	SS	S	KS	TS	STS	SS	S	KS	TS	STS	SS	S	KS	TS	STS	SS	S	KS	TS	STS
1	LSM/ NGO																									
2	Banks/ Financial Institutions																									
3	Religious Institutions																									
4	Extension Agencies a. Agriculture b. Fisheries c. Animal husbandry d. Forestry																									
5	Government Institutions																									
6	Education a. Open school (*Sekolah Terbuka*) b. Early Learning Primary school c. Junior highschool d. Senior highschool e. Higher Education																									
7	Company/ Private Sector																									
8	Early Warning System																									
9	Climatology Station																									
10	Traditional*Adat* Institutions																									

B. SOCIAL DATA

1) Availability of Public Facilities and Infrastructure

No	Type of Facility&Infrastructure							Number	Condition
	Education	Religious	Health	Transportation	Road	Economic	Other		
1									
2									
3									
4									
5									
6									

C. ECOLOGICAL DATA

1) Relationships between Various Entities in the Management and Use of Natural Resources

No	Type of Natural Resource	User			Function	Current Maintenance	Desired Maintenance Scenario			Details
		P	M	S			A	B	C	
1										
2										
3										
4										
5										

Key:

P = Government(***P****emerintah*)
M = Community(***M****asyarakat*)
S = Private Sector(***S****wasta*)
Scenario A = Maintenance by Government
Scenario B = Collaborative Maintenance by Government, Community and Private Sector, with Government as the Leading Sector
Scenario C = Maintenance by Private Sector (Based on Management Privatisation that is directly responsible to the community)

2) Information on Seasonal Calendar

Commodity	Name ofCommodity	Normal Conditions (± 15 Years Ago)					Present Conditions (Since Climate Change)					Main Reason for Change
		M	P	H	S	HP	M	P	H	S	HP	
Agricultural												
Cultivated Fishery												
CaptureFishery												
Animal husbandry												

Key:

M = Start planting (***M****ulai Tanam*) (Month)
P = Harvest (***P****anen*) (Month)
H = Obstacle(***H****ambatan*)
S = **S**olution
HP = Yield(***H****asil* ***P****anen*)

3) Seasonal Calendar for Livelihoods

No	Explanation	Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	**Fish Farmers.....** a) Stockpond with fry b) Rearing of fish/shrimps c) Harvest d) Preparation of pond land												
2	**Farmers .....** a) Planting b) Tending the plants c) Harvest d) Field preparation begins												
3	**Livestock farmers.....** a) Procure young livestock b) Livestock rearing c) Harvest d) Start preparations for new activity in the next cycle												
4	**Other enterprises** a) b) c) d)												

D. DATA ON DISASTERS

1) History and Analysis of Disaster Events during the Last 15 Years

Date of event	Type	Seasonal/ Occasional	Duration	Force	Extent	Direction of origin	Distance of settlement from disaster source	Location

2) Information on Seasonal Events and Disasters

No	Type of Event	Month												Remarks
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	Flood													
2	Drought													
3	Storm													
4	Fire													
5	Tsunami													
6	Landslide													
7	Earthquake													
8	Epidemic													
9	Farming													
10	Community Evacuation													
11	Schools Closed													
12	Health Problems													
13	Water Problems (Water Pollution)													
14	Sanitation Problems													
15	Transition from Dry Season to Rainy Season													
16	Other													

3) Disaster Impacts

Impact	Details of Each Disaster									Level			Solution	
	Flood	Landslide	Storm	Tsunami	Fire	Drought	Earthquake	Epidemic	Other	H	M	L	Government	Non-Government
Humans														
Infrastructure														
Work Field														
Education														
Health														
Migration by Inhabitants														
Religion														
Telecommunication														
Transportation														
Land														
Human Settlement														
Agriculture														
Fishery														
Animal Husbandry														
Other														

Key:

H = High
M = Medium
L = Low

P = Government (*Pemerintah*)
NP = Non-Government (*Non Pemerintah*)

No	Details	SS	S	KS	TS	STS
1	Relocation is needed for areas often hit by disaster.					
2	Guidance needs to be given on what to do during and after a disaster.					
3	The community's way of life changed after a disaster, particularly following climate change.					
4	Disaster caused the community to migrate to an area considered safer.					
5	Due to the occurrence of disasters, the community's level of vigilance has been increasing.					

4) Access to and Control of Specific Sources when Facing Disaster

Source of Ownership	Accessibility at Time of Disaster									Access available to others, or not
	Flood	Landslide	Fire	Storm	Tsunami	Drought	Earthquake	Epidemic	Other	
Family/ Private a. Land b. House c. Household Assets/ Furniture d. Other Valuables e. Vehicles f. Clothing g. Food Stocks h. Cash/Savings i. Fuel j. Others										
Public Facilities & Infrastructure a. Worship Facilities b. Roads c. Market d. Field e. Shops f. Hospital g. Village Hall/ Government Buildings h. Boats i. Village Transport j. Ambulance k. River/ Lake l. Pond m. Forest n. Grassland o. Water Sources p. Sanitation q. Other										

5) Disaster Risk and Vulnerability

Element	Score and Reason													Total
	Earthquake	Flood	Fire	Water Resources	Drought	Landslide	Food Shortage	Epidemic	Erosion	Air Pollution	Fall in Income	Education	Public Health	
Threat														
Vulnerability 1. Physical • Human Settlement • Agricultural Output • Fishery Output • Livestock Output • Infrastructure • Material Possessions • Agricultural Land • Fishery Land • Animal Husbandry Lan • Forest 2. Socio-Cultural • Population Density • Migration by Inhabitan • Cultural Change • Humans 3. Economic • People's Incomes • Work Opportunity • People's Purchasing Power 4. Institutions • Activities already implemented by institutions • Existence of institutior														

Element	Score and Reason													Total
	Earthquake	Flood	Fire	Water Resources	Drought	Landslide	Food Shortage	Epidemic	Erosion	Air Pollution	Fall in Income	Education	Public Health	
Capacities a. Food b. Water c. Sanitation d. Emergency Huts e. First Aid f. Evacuation Route g. Early Warning **h. Other**														

Key:

Score for Disaster Type:

5 = Very High
4 = High
3 = Moderate
2 = Low
1 = Very Low

)** ***Note:**During the field survey, not all of the above questions were answered, mainly due to limitations in community resources and time.**

Annex 10. Daily Fieldwork Timesheet

DAILY FIELDWORK TIMESHEET

Desa/Village :

Kecamatan/Sub-district :

Kabupaten/District :

WATER QUALITY TEST

Station	Parameter (Please state unit of measurement)							Remarks
	pH	mV	DO	Temperature	Conductivity	Salinity	TDS	

SURVEY ACTIVITY

No	Activity	Remarks	Time
1	Interview*Key Informants*		
2	FGD		
3	Interview the general public		
4	Survey of village's Economic Potential		
5	Documentation of Facilities and Infrastructure		

NOTE:
(Personal Questionnaire, FGD Questionnaire

Annex 11. FGD in Kelurahan Sawah Luhur




Annex 12. FGD in Desa Reroroja

Annex 13. FGD in Desa Done




Annex 14. FGD in Desa Talibura

Annex 15. FGD in Desa Nangahale

Annex 16. FGD in Desa Kotabaru

Annex 17. PfR Coordination Meeting between WIIP and Partners

No	Agenda	Time and Place	WIIP Representative	Main Issues	Output
Regular PfR Coordination meeting in various places etc.					
1	PfR coordination meeting	Jogjakarta 11 January 2012	Yus Rusila Noor	❖Contingency planning ❖Advocacy strategy ❖Success stories ❖Best practices ❖Lessons learnt ❖Issue of Cordaid status	Minutes of meeting
2	PfR finance meeting	NLRC Jakarta 13 January 2012	Lusiana Nuris	• Sharing challenges and lesson learns on handling finance issues of PfR from each partners from PA 2011 and discussed Join Activity	Minutes of meeting
3	PfR coordination meeting	NLRC Jakarta 16 February 2012	Yus Rusila Noor & Nyoman	• Discuss structure in place and availability of staff/budget to join in emergency response activities, preparation 5th SSCBDA etc.	Minutes of meeting
4	PfR coordination meeting	NLRC Jakarta 8 March 2012	Yus Rusila Noor & Nyoman	• Update and share about floods in Nangahale, discussion on CDKN, SSCBDA and Dash boards-HKV	Minutes of meeting
5	PfR coordination meeting	NLRC Jakarta 7 April 2012	Yus Rusila Noor & Nyoman	• Budgets, annual plans, Discuss and agree on baseline, Planning next quarter	Minutes of meeting
6	PfR coordination meeting	Kupang 23 May 2012 (back to back with SSCBDA workshop)	Yus Rusila Noor & Nyoman	• Follow up on SSCBDA	Minutes of meeting
7	PfR coordination meeting	07 June 2012	Yus Rusila Noor	• Review of Last Coordination Meeting, Update per Agency partner, Feedback on Joint Field Visit and other SSCBDA points for follow-up, Games Development, Advocacy Strategy and Learning Agenda, AMCDRR, Review of roles/Responsibilities and line of communication	Minutes of meeting

No	Agenda	Time and Place	WIIP Representative	Main Issues	Output
8	PfR partners meeting	Kupang and Maumere, 9 – 12 July 2012	Yus Rusila Noor	• Kick-start development of games under RCRC/CDKN, HKV session, Review of last month's MoM, AMCDRR, PfR Progress Report	Minutes of meeting
9	PfR Indonesia coordination meeting	Jakarta, 28 September 2012	Yus Rusila Noor	• Review and approval of July Coordination MoM, • Update on progress of tasks identified in July Coordination meeting, Update on activities per PfR partner, Update on Advocacy Strategy and Learning Agenda, AMCDR, etc.	Minutes of meeting
10	CT PfR Indonesia meeting	Jakarta, 18 October 2012	Yus Rusila Noor	• Review last meeting minutes, Update from partner covering July-October 2012, Field meeting result, Advocacy and Learning agenda, AMCDR, Planning for coming joint activity in December 2012	Minutes of meeting
11	PfR partners meetingand*arisan*	Karina, 20 October 2012	Eko, Dewi, Bertho, Kus, Didik	• Progress report from each partner	Minutes of meeting
12	Coordination with Assistant II	Ass II Office, 29 October 2012	Eko	• *Silaturahmi*social introduction	Minutes of meeting
13	PfR partners meetingand *arisan*	WIIP Office, 26 November 2012	Eko, Dewi, Bertho, Kus, Didik	• Progress report by partners	Minutes of meeting
14	PfR partners meetingand *arisan*	Caritas Office Bishopric Maumere, 13 December 2012	Eko, Dewi, Bertho, Kus, Didik	• Progress activity	Minutes of meeting

Annex 18. Workshop Activities already Performed by WIIP and PfR Partners

No	Workshop Agenda	Time and Place	WIIP Representative	Main Issue	Output
Joint PfR Workshop					
1	Partners for Resilience, WI Internal Strategizing Workshop	Puri, India, 17 – 20 April 2012	• Yus Rusila Noor	• To address the most important challenges and key opportunities of WI within PfR Alliance	Minutes / meeting report
2	South-South Citizenry Based Development Sub-Academy 5 (SSCBDA)	Kupang (NTT), 20 – 23 May 2012	• Yus Rusila Noor • Nyoman Suryadiputra	• SSCBDA makes space for exchange between communities and civil society organizations experience; academics, knowledge centers' research and learning and authorities strategies and regulations; international practitioners from Asia and Europe will exchange global perspectives, strategies and experience	Minutes / meeting report
3	Partners for Resilience Workshop on Climate-Smart Minimum Standards	Kupang, Indonesia, 24 May 2012	• Yus Rusila Noor • Nyoman Suryadiputra	• minimum standards will clarify what adaptation policy makers and planners in the fields of disaster risk reduction, climate change and development may expect from local actors	Minutes of meeting
4	Workshop on Strategic Review in Climate Risks Management organized by PMI Jakarta	Wisma Bidakara RS Harapan Kita, Slipi Jakarta, 25 June 2012	• Yus Rusila Noor • Ita Sualia	• Discussion on climate risks from Ecosystem & Environmental view points	WIIP made a presentation on EMR-DRR-CCA issues

No	Workshop Agenda	Time and Place	WIIP Representative	Main Issue	Output
5	PfR Workshop on Linking and Learning (Attended by all PfR partners)	Banten Bay, Serang 25 – 27 September 2012	• Nyoman Suryadiputra • Yus Rusila Noor • Anggi ta Kalista • Ferry Hasudungan • Urip Triyanto • Kusnadi • Didik	• To enable linking and learning sharing process for PfR Partners, direct communication among PfR Partners at various levels on matters related to integrated DRR/CCA/EMR issues, site visit to PfR learning site etc.	Reports of workshop and PowerPoint materials
6	International Seminar on Mangrove: Conservation and Community Empowerment	Purwokerto, 5 – 6 October 2012	• Nyoman Suryadiputra (as Invited Speaker)	• To share experience in managing coastal areas from climate perspective	PowerPoint Materials
7	Asian Ministerial Conference on Disaster Risk Reduction (AMCDRR)	Jogja Expo Centre, Jogjakarta, 22 – 25 October 2012	• Yus Rusila Noor	• *Asian Ministerial Conference on Disaster Risk Reduction. Consisted of: pre-conference, plenary session, market place, field and cultural visits, film festival, media training and consultation mechanism*	Minutes of meeting
8	Management Workshop Sustainable Conservation of Mangrove Ecosystem, organized by PHKA MoF	Bogor, 7-8 December 2012	• Yus Rusila Noor	• To strengthen the sustainable management of mangrove ecosystems and its coordination, • The need for involvement of other stakeholders involved in the Mangrove Management activities, such as the Agency of Meteorology, Climatology and Geophysics (BMKG), National Disaster Management Agency (BNPB), the	Minutes of meeting & Declaration statement

No	Workshop Agenda	Time and Place	WIIP Representative	Main Issue	Output
				Indonesian Red Cross (PMI) and the National Population and Family Planning Board (BKKBN), given the magnitude of function of mangroves in disaster mitigation	
9	Workshop ECO Flores	Labuan Bajo, 26-29 September 2012	• Bertho	• Environmental (PRB, API)	Minutes of meeting
10	Day workshop onDisaster Risk Reduction (*Pengurangan Resiko Bencana*)	Caritas Maumere, 19 October 2012	• Eko • Dewi • Bertho • Kus • Didik	• Disaster Risk Reduction	Minutes of meeting
11	Seminar on Disaster Management Planning (*Penyusunan Rencana Penanggulangan Bencana*)from BNPB and BPBD Sikka	Hotel Pelita Maumere, 27 November 2012	• Eko	• Disaster Risk Reduction	Minutes of meeting
12	Follow-up Public Discussion on Disaster Management Planning (*Penyusunan RPB*)from BNPB and BPBD Sikka	Hotel Pelita Maumere, 11 December 2012	• Eko	• Disaster Risk Reduction	Minutes of meeting
13	National Seminar "*20 tahun Refleksi Gempa dan Antispasinya*"(20 years reflection on earthquake and its anticipation) by Universitas Nusa Nipa Maumere	Hotel Sylvia Maumere, 12 December 2012	• Eko • Kus • Didik	• Disaster Risk Reduction	Minutes of meeting

Annex 19. Environmental Campaign Activities Performed by WIIP as Part of PFR

No	Training Agenda	Time and Place	WIIP Representative	Main Issues	Output
1	Environmental campaign (film)	SMKN 4 Kota Baru, 13 October 2012	• Eko • Didik • Kus • Bertho • Dewi	DRR (*PRB/API*)	Report
2	Environmental campaign for schoolchildren (Painting competition judge)	Magepanda, 17 October 2012	• Eko	*Desaku Hijau*(My village is green)	-
3	Environmental campaign: Painting competition and information dissemination (*penyuluhan*)	SDK Darat Pantai, 27 October 2012	• Eko • Kus • Didik • Bertho • Dewi	DRR	Report
4	Environmental campaign for schoolchildren and painting competition	SD Done, 30-31 October 2012	• Eko • Didik • Dewi	DRR	Report
5	Environmental campaign for schoolchildren and painting competition	SD Talibura, 14 November 2012	• Eko • Kus • Dewi • Didik • Bertho	DRR (*PRB/PER*)	Report
6	Mangrove planting with the Mayor (*Bupati*) of Ende	Kota Baru, 15 December 2012	• Eko • Kus • Dewi • Bertho • Didik	DRR	Report

Annex 20. Training Activities Performed by WIIP to Improve Human Resources Quality at PfR Sites

No	Training Agenda	Time and Place	WIIP Representative	Main Issue	Output
1	*Ecosystem management: techniques for mangrove restoration and rehabilitation* (*Manajemen Ekosistem Restorasi dan Teknik Rehabilitasi Mangrove*) in Sikka (District level)	1 – 2 March 2012 at Gading Beach with field activity in Desa Reroroja	• Organized by WIIP, attended by 62 participants from local Government, extension workers, local NGOs, CBOs, Village staff, local community representative, students, nature lovers	• To provide better understanding on the roles of healthy ecosystems in relation to DRR and CCA and techniques on ecosystem rehabilitation	• Training report integrated in Quarterly report for Jan – March 2012 prepared by Eko
2	Ecosystem Management Restoration and Mangrove Rehabilitation Technique (*Manajemen Ekosistem Restorasi dan Teknik Rehabilitasi Mangrove*) in Ende (district level)	24 March2012 FIRDaus Training and Development Center Desa Nanganesa Ende	• Organized by WIIP with 61 participants from local Government, extension workers, local NGOs, CBOs, Village staff, local community representative, students, nature lovers	• To provide better understanding on the roles of healthy ecosystems in relation to DRR and CCA and techniques on ecosystem rehabilitation	• Training report integrated in Quarterly report for Jan – March 2012 prepared by Eko
3	Ecosystem Management Restoration and Mangrove Rehabilitation Technique (*Manajemen Ekosistem Restorasi dan Teknik Rehabilitasi Mangrove*) in several villages in Sikka & Ende (village level):	20, 21, 22, 27, 28 March 2012 in all villages where BioRights are being implemented	• Organized by WIIP, participated by all members of community groups participating under BioRights initiative	• To provide better understanding on the roles of healthy ecosystems in relation to DRR and CCA and techniques on ecosystem rehabilitation	• Training report integrated in Quarterly report for Jan – March 2012 prepared by Eko

No	Training Agenda	Time and Place	WIIP Representative	Main Issue	Output
4	Administrative training	29 March 2012 in PAU Bedzaidah- Sikka	• Organized by WIIP, attended by 20 participants representing community groups involved in BioRights initiative	• Training aimed to enhance community groups ability in making work plan, reporting and letters	• Training report integrated in Quarterly report for Jan – March 2012 prepared by Eko
5	Community based DRR Training	Reroroja, 15-17 October 2012	• Participated by Eko, Didik, Dewi, Bertho, Kus		
6	Training on the Management and Restoration of Coastal Ecosystem in the Context of Climate Change Mitigation – Adaptation and Disaster Risk Reduction	Serang, 12–13 December 2012	• Organized by WIIP, attended by Yus Rusila Noor and others	• To introduce and improve participants' skill and knowledge on the role of coastal wetland • ecosystems in support of disaster risk reduction and climate change mitigation - • adaptation, enhance the ability of participants on the participatory ecosystem mapping and on restoration techniques	• Training report, brochures etc.