



NATURAL RESOURCES
MANAGEMENT PROGRAM

**Recommendations for Achieving
Community Based Conservation
Tondano Watershed, Northern Sulawesi**
**Report on a Rapid Rural Appraisal
of Six Villages**

17 January, 2001



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Executive Summary

The purpose of this report is twofold. First, the report describes the results of a survey conducted of six villages November-December 2000 in the Tondano Watershed, Northern Sulawesi. Second, the report presents recommendations that will help to achieve Community Based Conservation (CBC) in the watershed.

The report attempts to present the data from the six villages visited in a way that is useful for policy makers and villagers alike. In depth interviews of more than 200 people were conducted and therefore many differing views were voiced. This report summarizes the most common sentiments of villagers, contextualizes them in the recent political, economic, social and environmental events affecting the watershed, makes note of specific outlying viewpoints, and then bases all recommendations for further action on the part of government and non-governmental organizations, villagers and private sector, investors and foreign donors, upon this contextualized information. Further, the recommendations are informed by the Field Survey Team Leader's experience living in farming villages in the region, communications with government officials and other interested parties. The findings therefore reflect the views of a broad sweep of the population from influential members of the villages to average farmers, from government officials to laypeople, from investors to priests. Because the survey was not sectoral and asked questions to do with all aspects of village life, livelihoods and histories, the recommendations in this report are both broad in scope and aim to strike at the core of what we believe will effectively change environmental management in the Lake Tondano watershed. Recommendations reflect findings at the level of village and local governance, environmental conditions, agricultural and fishing practices, information networks, markets and marketing, awareness of environmental linkages, cultural values, management of funds, small businesses and cooperatives and economic concerns.

The findings that lie central to this survey are the foundation upon which the recommendations are built. The findings that bear particular import are as follows:

1. Lake Tondano was described as the center of Minahasan culture, and the act of eating fish from the lake was tightly linked to what it meant to be Minahasan. This is useful for understanding potential means by which to motivate villagers and officials alike to protect the watershed. It also pointed to the desire of people affected by the lake to work together.

Cultural motivation effective. Management body should be created.

2. Villagers for the most part did not understand the effect of their activities upon other resource users or watershed health more generally. Specifically, villagers did not know about the connection between mercury and health risks; the connection between fertilizer use and water hyacinth growth. Fish farming was considered to be linked to water hyacinths, but they did not know why. Detergent was not considered to have any negative effect on the lake. Upstream activities were thought to affect, but only minimally if at all, the people downstream. The decreasing depth of the lake, after increases in water hyacinths, was the most frequently cited problem by villagers near the lake. Trash was considered undesirable.

Awareness raising activities needed. Spatial plans effective.

3. Farmers initially claim they are limited by lack of capital, but on further discussion reveal that while they have at times had capital, it is usually wasted through poor financial and business skills, opportunities for rent-seeking, lack of information on the market and therefore wasted investments, among other issues.

Village-level training and information networks needed.

4. Increased input costs, decreased availability of fish or fertility of land, among others have been decreasing profits in farming, resulting in farmers stopping farming. This has been exacerbated by changes in land ownership and emigration (rather than mechanization for example) and the numbers of farmers appear to be decreasing. They need alternatives, need *training* in activities useful in other arenas, or in farming activities that will be profitable and environmentally sound.

Funding to work groups.

5. Villagers felt that there was a severe lack of government capacity to manage the environment and activities affecting those directly living off the land. They also felt that the government must increase its transparency in its activities.

Government capacity building needed.

6. There is still a lack of information on direct causes of the decrease in depth of the lake. Two factors this study points to as needing research are firewood collecting and tree felling specifically within forested upland areas and the protected area at the top of the watershed.

Research.

The only thing that farmers claimed would make a difference to their decisions was the bottom line of input costs versus income. This forces us to acknowledge that farmers will not switch to environmentally friendly activities – even if it is better for the later generations – if it means that they will lose profits in the short term. It also makes us realize that the non-economic, like the government programs, information from friends, inertia, power relations, land contestations, all may play as important a role but they are harder to understand, take longer time to understand and require research. These non-economic are perhaps more important than the economic statement of wanting a profitable bottom line. This argues for the very importance of highly participatory activities that will allow the environmentally friendly activities to be fitting with the rationales, both economic and non-economic, with the village context.

The recommendations center around two prime factors:

- Increasing the responsibility and accountability of villagers to themselves in a way that under prior governments they could not do. They could not make their own decisions in the way the *Badan Perwakilan Desa* are now expected to. The recommendations support and help this transition and foster the development of villagers taking responsibility for their own environmental management.
- Increasing the ability of the government to act transparently, to facilitate the participation of villagers and other stakeholders, and to increase their ability to respond to the needs of their constituents (bottom-up) rather the mandate directives from above.

The summary of the key recommendations is as follows. To conduct/encourage:

1. Research
 - a. Encourage PEMDA to request information regarding appropriate technologies, the effective inclusion of such technologies in farmers repertoire
 - b. PEMDA seek research assistance in finding information on firewood use and tree felling activities in protected areas.
2. Villager Training
 - a. PEMDA should initiate training in the areas of environmental management, information sharing and monitoring. Train facilitators in the villages as well as village leaders who, with support from PEMDA, can spread information regarding:
 - i. Appropriate Technology (AT) that will reduce erosion and chemical use in agriculture

- ii. Financial management for villagers trying to form cooperatives, small businesses and manage their own household finances
 - iii. Making proposals to government and non-governmental bodies for projects at the village level that will lead to CBC
 - iv. Marketing information so that farmers can switch to environmentally friendly production without losing income
 - v. Information sharing for villagers so they can learn about the new laws and regulations, especially the role of BPD and the village rights, and how to translate the environmental and livelihood challenges they face into sustainable community action programs
 - vi. Monitor the projects and programs that the BPD itself initiates in the villages, and those initiated by outside actors with BPD approval

- 3. Government Capacity Building
 - a. Help local government to improve
 - i. Transparency
 - ii. Their ability to work with the communities and involve the latter in participatory ways
 - b. PEMDA allocate more resources to achieving such goals and improving communication across the various government bodies

- 4. Funding
 - a. PEMDA provide block grants to village work groups who are acting to promote CBC
 - b. PEMDA conduct a quickly-done land certification program

- 5. Management
 - a. Develop village spatial plans with the active participation of local communities
 - i. Villages conduct community mapping and spatial plans
 - b. Develop a multi-sectoral management board for the watershed (academics, officials, private sector such as developers or PLN, NGOs, and villagers) to
 - i. Address cross sectoral issues such as water use for electricity and subsequent damage of cropland in downstream areas;
 - ii. Address cross-area issues such as mining in one area and impact of pollution or erosion from this mining in a second area;
 - iii. Increase information sharing to increase efficiency;

- iv. Increase awareness of actors in different sectors of the demands upon the watershed and the impact of each group's activities on other sectors; and
- v. Provide information to BPDs in the watershed about activities and changes in environmental condition at the watershed level.

6. Awareness Raising and Information Networks

- a. PEMDA Minahasa should set up networks of information sharing among the facilitators and village leaders with the goal of sharing information across villages on successes and challenges in environmental management at the village level
- b. Through the church
 - i. PEMDA Minahasa should cooperate with priests to prepare booklets of information on environmental management for local communities
 - ii. PEMDA Minahasa should encourage the churches to provide financial assistance for village projects
 - iii. BPDs should encourage the priests in the villages collaborate with the villagers to enact sound environmental management fitting for each
 - iv. Establish a network between the facilitators and priests so the priests can maintain a knowledge of challenges the villagers are facing and can know where they can help

Introduction

Purpose of this report

The purpose of this report is twofold. First, the report describes the results of a survey conducted November-December, 2000 in the Tondano Watershed, Northern Sulawesi. Second, the report presents recommendations that will help to achieve Community Based Conservation (CBC) in the watershed.

The report attempts to present the data from the six villages visited in a way that is useful for policy makers and villagers alike. In depth interviews of more than 200 people were conducted and therefore many differing views were voiced. This report summarizes the most common sentiments of villagers, contextualizes them in the recent political, economic, social and environmental events affecting the watershed, makes note of specific outlying viewpoints, and then bases all recommendations for further action on the part of government and non-governmental organizations, villagers and private sector, investors and foreign donors, upon this contextualized information. Further, the recommendations are informed by the Field Survey Team Leader's experience living in farming villages in the region, communications with government officials and other interested parties. The findings therefore reflect the views of a broad sweep of the population from influential members of the villages to average farmers, from government officials to laypeople, from investors to priests. Because the survey was not sectoral and asked questions to do with all aspects of village life, livelihoods and histories, the recommendations in this report are both broad in scope and aim to strike at the core of what we believe will effectively change environmental management in the Lake Tondano watershed. Recommendations reflect findings at the level of village and local governance, environmental conditions, agricultural and fishing practices, information networks, markets and marketing, awareness of environmental linkages, cultural values, management of funds, small businesses and cooperatives and economic concerns.

This survey was conducted in six villages representative of the different land use regimes, physical location within the watershed and social factors. The goals of the activities of NRM-EPIQ in the Tondano Watershed are as follows.

NRM-EPIQ works with local government, private sector, non-governmental organizations (NGOs) to provide technical support and some material assistance to:

1. Assist in protecting the environmental health of the watershed

2. Assist in increasing standards of living of the communities in the watershed
3. Develop new ways of making a living for people living in the watershed region that preserve the watershed's ecosystemic integrity
4. Assist in developing more effective governance at the village as well as *kabupaten* level

Prior to the survey, a threats analysis had been undertaken by the Natural Resources Working Group of Kabupaten Minahasa in cooperation with NRM-EPIQ. Their report, *Identification of threats to the Environment of the Tondano Watershed in North Sulawesi and Proposed Follow-up Activities through September 2001*, identified four primary threats to the ecosystem integrity of the Tondano Watershed. These were:

1. Contamination of the Tondano River with mercury with ensuing human and other biota health problems;
2. Increasing erosion levels around the slope areas and sedimentation levels in the waterways reducing productivity of the watershed;
3. Increasing solid waste volumes in the waterways in the watershed affecting lake and marine health and tourism;
4. Increasing levels of eutrophication in Lake Tondano threatening fish productivity, damaging electricity production and decreasing tourism potential.

Goals of the Survey

In conducting the survey, first we aimed to find out information that would help us to understand the *processes that lead to the condition of the watershed from the village level*. Important here is that we were not only taking a snapshot of conditions, but also trying to understand *why* the conditions came to be as they are. Secondly, we aimed to understand what activities at the village level would likely lead to CBC and assist in achieving the larger goals for protecting the watershed over the long term. Third, in order to work with the information already gathered under the threats analysis, we asked villagers about a) their activities that contributed to the worsening of the threats identified above and b) their activities that were affected by the conditions identified in the threats analysis. Given these three-fold goals, our objectives during the survey were to:

1. Determine why villagers feel the watershed is important.

2. Determine how the villagers perceive their livelihoods are affected by changes in the condition of the watershed, specifically, what are the key challenges to increasing the production levels and income levels.
3. Determine the perception of the villagers regarding the threats of increasing mercury contamination, increasing eutrophication levels, decreasing depth of the lake, increasing trash.
4. Determine solutions to achieving CBC in the Tondano Watershed given the village context of institutions, activities and governance. Learn what the villagers feel are the solutions.
5. Facilitate government Bappeda Tingkat II, Bappedalda Tingkat II, *Camats* and Hukum Tua in thinking about new ways to govern from bottom-up.

Description of physical location, cultural background, socio-economic issue and demographic changes

The watershed of the Tondano Lake and its associated tributaries covers an area of about 50,000 hectares on the northeast extremity of the island of Sulawesi. The highest point in the watershed is the peak of Mount Soputan (1825m), which is located about 40 kilometers from the mouth of the Tondano River at Manado.

The shores of Lake Tondano have supported human settlement since 4,500B.C. Tondano translated from the Tondanonese means “people of the lake”. Tondano is the name of the lake, the river and the town that is the capital of Kabupaten Minahasa.

The watershed supported a total population of 307,000 residents in 1997. The upper watershed is the heartland of the Minahasan culture and has a population of some 111,938. The lower watershed includes the provincial capital at Manado and lowland agriculture areas and had a population of 194,912 in 1997. The population growth rate of the upper watershed was only 0.4% per year during the last decade as there has been considerable out migration from this area. The lower watershed areas grew at a rate of 1.2% per year during the same period. Population densities in villages in the upper watershed were estimated to average 391/km² while those in rural villages in the lower watershed were significantly lower at 268/km².

Administratively the region lies within Kabupaten Minahasa and Kota Manado. There are a total of 15 sub-districts and 146 villages in the watershed. Basic Law of 22 of 1999 provides that

districts, municipalities and villages are autonomous administrative units with democratically elected councils, which are empowered to adopt and to provide for enforcement of policies and regulations.

Land use in the watershed in 1991 is presented in Table 1. Only about 5% of the total area of the watershed remains forested. The dominant land use type is tree crops, which occupy about 49% of the total area. Tree crops are maintained in a system of agro-forestry (*see Map-1*).

For purposes of the study the watershed was divided into two parts: the upper watershed, which includes all minor catchments flowing into Lake Tondano; and the lower watershed, which are those areas below Lake Tondano. Most of the forest is found in the lower watershed rather than the upper watershed.

Lake Tondano is a significant asset in the environment of the catchment with area of about 4,335 hectares or about 8% of the total area. The surface of the lake varies in elevation due to rainfall variation. The variation during the last 20years has been from 691.3 meters to 684 meters. During peal rainy seasons the waters of the lake inundate some of the surrounding paddy cultivation areas.

The Tondano watershed plays a central role in the economy of North Sulawesi. It is the agricultural production canter for the region and about 38,280 hectares or +74% of the total area of the catchment is devoted to various agricultural land uses. The Tondano River is used to generate a significant portion of the electric power used by the region. The catchment also provides the main source of drinking water for residents of the city of Manado. Lake Tondano is also center for local tourism.

Table 1. Land Use in Tondano Watershed

Type of Land Use	Upper Watershed		Lower Watershed		Total	
	Area ha.	%	Area ha.	%	Area ha.	%
Forest	630	2	2961	10	3591	7
Sago	0	0	12	-	12	-
Brush	2346	11	3	-	2349	5
Tree Crops	3213	15	21952	75	25166	49
Fields/Shifting Cultivation	5204	24	1500	5	6704	13
Wetland Rice	5030	23	1261	4	6291	12
Dryland Rice	26	-	93	-	119	-
Villages/Towns	1076	5	1563	6	2639	5
Lake Tondano	4335	20	0	-	4334	8
Totals	21861	100	29347	100	51208	100

--- Photos (not included here)---

Photo 1. Karambas, or fish farming bamboo structures, on Lake Tondano. The processes of fish farming facilitate eutrophication by using organic fish food, trash build-up when customers or custodians throw trash directly in the lake, sedimentation when the fish guts, leftover food and pellets are thrown into the lake

Photo 2. In addition to erosion from mines, mercury used in washing gold ore flows into the rivers and lake presenting health risks downstream.

Photo 3. Clove agriculture contributes to erosion when farmers hoe underneath the trees to remove any other plants and loosen the soil.

Photo 4. Villages along the lakeshore, and especially the town of Tondano, contribute to trash build up in the drains and rivers making electricity generation difficult, reducing productivity of the waters and presenting health hazards

Methodology

Villages in the sample

The villages selected were:

1. Sumarayar, Kec. Langoan
2. Kaima, Kec. Remboken
3. Ranomerut, Kec. Eris
4. Kumelumbuai, Kec. Tomohon
5. Roong, Kec. Tondano
6. Sawangan, Kec. Airmadidi

Selection process and criteria for selection

Of the 146 villages, we conducted the survey in 6 (**Map-2**). The 6 villages were selected through a ten-day process of gathering summary information from key figures in 17 short listed villages. We came to visit the 17 villages through a three-step process. First, we ruled out working in any village where JICA and the Asian Development Bank had activities, as their goals are complementary to NRM-EPIQ's CBC goals. We therefore chose not to work in the 32 villages that were either part of ADB's or JICA's workplans. The second step was determining which

villages were large enough to have a readily measurable impact on the watershed, which perhaps had interesting activities or were located in strategic places to impact the environment of the watershed, like on a river leading to the lake. The third step was determining a mix of potential sample villages that displayed a distribution across the following criteria of location and land use activity:

1. Upper watershed, tree crops
2. Wet-rice and fish farming
3. Vegetables or mixed corn, tomatoes, chili (palawija)
4. Lower watershed, tree crops

Using these criteria, we short-listed to the villages of:

Roong, Kec. Tondano; Wengkol, Kec. Tondano; Tolour, Kec. Tondano; Eris, Kec. Eris; Ranomerut, Kec. Eris; Pinebetengan, Kec. Tompaso; Wineteban, Kec. Langoan; Sumarayar, Kec. Langoan; Tontimomor, Kec. Kakas; Kaima, Kec. Remboken; Paleloan, Kec. Remboken; Tounсарu, Kec. Tondano; Tataaran, Kec. Tondano; Kumelembuai, Kec. Tomohon; Sawangan, Kec. Airmadidi; Tanggari, Kec. Airmadidi; and Suluan, Kec. Tomohon.

Each of the villages was visited and interviews with persons who knew about village activities and history such as the village head, secretary, priest, work group head or member, important persons in the village of about 3 hours were conducted. At the interviews were two or three NRM-EPIQ representatives, and most of the time our NGO partner, LP2S had one or more representatives present, and by Bappeda staff. At the end of the 17 village reconnaissance survey, we discussed the differences and similarities we saw in the villages, reviewed the goals of the project and of the survey and with those goals in mind, we made a list of five villages we wanted to propose to Bappeda, the Kabupaten Task Force and NRM-EPIQ.

-- Map not included --

Criteria used in this selection were:

1. Condition of the environment around the village, now and five years ago
 - a. Reasons for change in the condition
 - b. Land ownership, land management
 - c. Land use
 - d. Effect of certain activities on the lake

- i. Erosion
 - ii. Eutrophication
 - iii. Solid waste
 - iv. Mercury
- e. Impact of the worsening condition of the watershed on the villager's livelihoods and health
- 2. Role of the villagers in forming or working within institutions that could positively impact environmental conditions.
 - a. Government activities
 - b. Church activities
 - c. Social activities/other
- 3. Demographic changes that might affect their involvement in environmental concerns
- 4. Gender roles
- 5. Role of the government or non-governmental organizations in activities that might affect villagers' livelihoods or the environment.

Process of collecting data in the selected villages

The data were collected in each village over a period of two and half days. We had an opening session in the villages to which key persons were invited to attend. This generally was about 25 to 30 people. After explaining the purpose of our activities, we selected people to be included in the groups for interviews on the subsequent two days. The groups were:

- Group 1: Men leaders in the village, especially from different farming or other work groups
- Group 2: Women leaders in the village, especially from different farming or other work groups
- Group 3: Village government
- Group 4: Religious leaders
- Group 5: Mixed Men and Women Farmers, who are not in positions of authority in the village, land owners and workers mix.
- Group 6: Mixed Youth group (male and female)

Description of question area in survey

In the course o interviews with the different groups in the village, we asked questions that addresses the following issues:

1. Perceived changes in the environmental conditions in the village and the livelihood patterns of the people in the villages, especially in the past five years;
2. Land use, demographic patterns of who does what work;
3. Costs of inputs, prices for crops and goods produced, profits;
4. Land ownership and distribution;
5. Perception of the villagers regarding different activities that we felt threatened the watershed, that is, to do with Mercury Contamination, Eutrophication, Erosion, and Trash;
6. Activities of different governmental bodies in the villages, experiences of villagers with government projects, hopes for the future;
7. Role of religious institutions in the villages; and
8. Examples of when groups have formed from the bottom up in the village and what have the overcome, why were they successful or unsuccessful.

Results from Survey

In this section, we present the results from this survey in the form of three tables with accompanying explanations. In each section there is a note with suggested activities to address redress present patterns that degrade the watershed environment or negatively affect the livelihood of farmers.

Perceived Importance of the Watershed: Commentary

This table describes why villagers and the NRM/LP2S/Bappeda field team thought the watershed was important. Interestingly, there is a larger overlap with both NRM and villagers underscoring the importance of electricity generation, as a water source for themselves and for Manado, and as a location where they were able to create their livelihoods, whether through agriculture, fisheries or other sources. It is useful to note, however, that on initial questioning as to why the watershed is important to them, the villagers far from the lake felt that it wasn't useful, that is, they felt the importance of the watershed was limited to the lake's services. This is important in terms of motivating people and conducting awareness raising campaigns such that villagers are aware of how components of the watershed are linked. Villages on the lakeside tended to speak about the usefulness of the lake for water both for drinking as well as for bathing, whereas villagers further away only mentioned drinking. The generation of a livelihood was often directly translated by the villagers into education of their children. They could see therefore a direct link between how much rice they produce, for instance, and their children's educational possibilities.

→ *Initiate awareness raising campaigns to help villagers understand their role in the watershed, both positive and negative*

The differences between the NRM/LP2S/Bappeda and the village groups were intriguing. Most interesting was that on several occasions, the lake was described as the center of Minahasan culture, and the act of eating fish from the lake was tightly linked to what it meant to be Minahasan. This has not come up as a central point in stimulating communities to act in a way to preserve the lake, say as the way in which the slogan, ‘We are all family’ is used constantly for social placation during this time of social instability. It could be used in the future work as a central motivating point. “*Lestarikan torang pe danau supaya torang pe anak-cucu juga bisa makang ikan danau di pinggir danau.*” People speak with sadness about the way the lake has become unclean, and speak with smiles of the times when fish were big and you could swim in the lake and drink the sweet water.

→ *Make a management body to make sure that all users can benefit from the watershed's services*

The second primary difference was that the villagers noted how much they use the watershed to provide firewood both for their cooking needs, especially the traditionally cooked foods like *ikan bulu*, and for producing sugar. The third prime difference is that while the villagers recognized the potential for tourism, they did not value that as highly as the NRM/LP2S/Bappeda team did.

As notes above, particularly for villages far from the lake, some villagers did not feel they really relied upon the watershed until they were asked more directly if they relied upon the land or water. This is a question of a low level of awareness of how the watershed works. Tied to this is the fact that most villagers, while they knew for instance that fertilizers are chemicals and therefore could have negative impacts on the biota in the lake and rivers, they did not know the next steps of impact of their activities. Most of the villagers could simply say, using the example of fertilizer, they are chemical, therefore bad as they can effect health. Few knew other impacts, but those few in each village might be particularly useful in spreading the knowledge.

Table 3 presented below presents a Summary of Perceived Importance of the Watershed.

Table 3. Perceived Importance of the Watershed

Bappeda-NRM	Sumarayar	Kaima	Ranomerut	Roong	Kumelumbuai	Sawangan
Source of income for farmers through farming activities in the watershed land	→	→	→ income for education of children	→	→	→
Source of electricity generation	→	→ which allows us to increase the working hours in the day	→	→	→	→
Source of income for farmers through fishing and other harvesting activities (grasses, snails) in lake	The lake and rivers as source of fish	→	→ and fish farming	The lake and rivers as source of fish	→	→
Water source for Manado and areas in the watershed both for agricultural production and human consumption (drinking, bathing and washing)	Water source for those around the lake and Manado	Area for bathing, water for washing, and source for the poor for drinking water.	Water source for Manado	Water source for those around the lake and Manado	Not mentioned (NM)	Water source for Manado
Touristic value/ Esthetic value	Beauty of the lake	Fun bathing in the lake	NM	NM	Beauty of lake, tourism; Cultural relationship between being Minahasan and relating to the lake	NM
Other	Source of firewood	→ Trees in the watershed protecting the lake	→	→	→	→

Threats Villagers Believe Undermine their Livelihoods: Commentary

This table explains what the different villages feel are the key challenges to increasing the production levels and income levels. The key issues are increased input costs, lack of government capacity, lack of personal capacity to manage small businesses or cooperatives and decreased availability of fish or fertility of land.

Farming challenges

Primarily, villagers speak about the increases in prices of inputs and the lack of availability of capital, which they blame on the government and on them not having their land registered. Some of the villagers felt that marketing information and knowing about marketing channels would improve their ability to gain more from their production. Some of their produce rots due to lack of smooth transportation to market.

→*Training of village leaders and facilitators*

→*Funding to work groups*

Governance Failures

The critical issue is that villager's trust of local government doesn't seem to have increased in the transition from the Order Baru to the reform era. From interviews and observation (for example PUSKUD and the KUD system) the reason for this continued distrust is that the majority of the officials at the local level are the same people. From the perspective of the villagers, the manipulation of funds apparently continues. Whether this is true or not, it is what is perceived. Therefore, to restore trust local government should

1. Promote community participation in development activities
2. Facilitate rather than direct development activities
3. Provide more authority to the villagers (which could be by making available grants to communities) and
4. Practice good governance

The overwhelming conclusion from the interviews with the villagers was that they no longer trust the government. This is a complex issue. It seems that while the villagers don't trust the government, they do still feel that they need to have legitimation of a project or activity by the government in order to implement it. Government in that case can be the *Hukum Tua* or the *Camat*, but it is not needed to be higher than that. The lack of trust means that, as one farmer said, "if the government calls us to work on a project maybe a quarter to a half of the village might show up, but if the church calls us, then about three-quarters of the people will come."

→Funding to work groups

→Including priests in management board and distributing information through the church

It is important to note that the villagers distrusted all levels of government, including village heads in certain cases (when they were appointed or when they had had a history of stealing from the village).

Below I list some of the complaints of the villagers. It is important to note that the system is at fault rather than specific individuals. And the good news is that system is changing and we have the opportunity now to improve on past failings. The below should be read in a light that seeks to find ways to improve the future by avoiding the failings of the past. It is critical to remember that these are perspectives. These are not facts checked by this survey. What this serves to tell is that the villagers feel there is lack of participation and lack of transparency. Therefore, while Bappeda and other government bodies may already be trying to be participatory and transparent, the villagers do not feel that. This means there is room for improvement in participation and transparency and there is room for increased communication of Pemda's activities with the villagers.

The key areas are

1. Lack of capacity or inclination to plan with community participation
2. Lack of transparent management practices for development activities

All of the areas where the villagers consider governance should be improved fit within these two issues. Therefore, efforts to improve governance should

1. Increase the capacity of government officials to work with communities
2. Increase the transparency of management of development activities affecting the villages

Villagers state they do not trust the extension workers because a) they have not come to help them as frequently as the villagers need. Some have never benefited from extension service. b) They just use up the villagers' money through transportation money and such. The villagers do not trust Bappeda because: a) they conduct projects that are not fitting for a village context and do not make the effort to investigate the needs of the villagers first or consult with them (failed replanting activities, closed major drains around rice fields); b) certain officials are involved in projects simply to channel funds into their own pockets, and might work to achieve this in collaboration with village heads or *Camats*; c) they promise something and do not fulfill their promises (check dams not completed).

PEMDA more broadly was also not trusted, not just through extension services, but also through operations like KUT and PUSKUD. The story of the *Dana Penyertaan Modal* (DPM) remaining in the hands of PUSKUD and not returning to the farmers (as of December 2000) is the example farmers most frequently cited as reason for distrust in PEMDA.

For these reasons, the farmers are alienated from the three important areas that in the past have supported them, or were meant to support them: the extension service for plantations and for agriculture, the KUT system and the KUDs. This means now, farmers are much more affected by fluctuations in market prices for their goods and for inputs and are generally not equipped to know how to deal with market fluctuations and market information.

→*Government capacity building needed*

Similarly, village government is sometimes not trusted by the villagers themselves. This only occurred in the sample villages when the *Hukum Tua* was appointed from the outside, which led to the *Hukum Tua* not really being involved in village activities, or where the Bupati was involved in halting the appointment of a village chief perhaps for his own purposes, or in one case engaging in corrupt practices with village funds. Otherwise the village heads were highly respected.

Environmental Problems

The primary environmental challenges villagers cite to their livelihoods are associated with water (either too much or too little both with different causes), colonist exotic plant species limiting the potential to harvest (whether *alang-alang* or water hyacinths), pests; land becoming less fertile; erosion.

Water from the River Tondano sometimes floods the rice fields and villages due either to the closing of the PLN gates, which blocks water pushing it into the upstream rice fields where the River Tondano exits Lake Tondano, or when the opening of the gates which gushes into the downstream rice fields too fast and erodes substantial areas of land. According to upstream inhabitants, the water damage has substantially increased since the mid 90s. Pipes in some of the villages have been broken for years causing flooding when there are heavy rains, which damages cropland and in some cases carried human waste into the village. Water for agriculture, some villagers note, has decreased as PAM for village water consumption has increased. Throughout the upper watershed, villagers note that some springs have dried up entirely and most have decreased their flow level. This of course decreases the productivity of the farmers.

Exotic plant species, especially water hyacinths, are listed as the most important environmental challenge for villagers near to the lake, perhaps as they are the most visible change in recent years. The water hyacinths are a recent phenomenon in the Lake. The effect for the villagers has been increased difficulty in catching fish and moving around the lake.

One important point is that most farmers noted that the land is becoming less fertile. It is difficult to assess whether this is nostalgia for the good old times, or is an influence from the marketing of fertilizers, but it is clear that more fertilizers are used than ten years ago.

→*More research on appropriate technology*

Other environmental challenges included landslides closing off their village so they can't get their goods to market and pests on the vegetables

→*More basic research on the causes of change, like felling of trees*

Low Level of Skills in Management

A few interviewers noted that their lack of knowledge of the environment and ways in which they could effectively use environmental services limited their productivity and their ability to increase their livelihood levels.

→*Training sessions needed on financial management skills and proposal writing*

Other

While most villagers were surprisingly aware of the first stages of their effect on the environment, i.e., that chemicals such as fertilizers have a negative effect, but don't know why or what happens next, there was a lot they did not connect as having an environmental impact. Some other interesting changes of late are that farmers have been selling off their land, in some cases because of flooding making their land unproductive, to investors and large landowners. This has increased the class of sharecroppers in Minahasa. It has also decreased the absolute number of farmers. The future effect on generation of capital, of attachment to a cultural center (place-based identity) may be radical. In addition, there is of course the emigration of the young to the city, Manado and also to Jakarta, in search of the modern and of higher education. The result is that many of the young do not know how to farm any more. This varies from place to place and from type of agriculture. For instance, Sawangan in the lower watershed has a large proportion of its sharecroppers for coconut growing from outside of the area, whereas in Sumarayar, even university students come home on weekends to help their parents on the farm. The numbers of fishermen too have decreased. All of these changes have not been caused by increases in mechanization as is usually assumed to be the cause of decrease in number of

farmers. While mechanization has increased, the driving factors seem to be changes in land ownership and emigration of the youth out of rural areas.

Table 4 presented below presents a Summary of the Threats Villagers Believe Undermine their Livelihoods.

Perception of Villagers regarding Threats to the Watershed: Commentary

This table explains how villagers in the six villages perceive the threats of increasing mercury contamination, increasing eutrophication levels, decreasing depth of the lake, increasing trash.

Perhaps the most important comment that villagers uttered again and again was that they are interested *only in the bottom line of input costs against net gain*. They were only interested in continuing or starting activities that provide them with a profit large enough to pay for their household and more. This is a complex and important issue.

It is important for several reasons.

1. It allows us to argue that as long as the farmers are making a profit, they will be malleable and may switch to other types of activities that might be more environmentally friendly.
2. It forces us to realize that those environmentally friendly technologies **MUST** provide the farmers with a profit to the same degree or greater than their former activity.
3. It forces us to acknowledge that farmers will not switch to environmentally friendly activities – even if it is better for the later generations – if it means that they will lose profits in the short term.

It is complex because

1. it often hides details of how and why villagers might make such decisions and under what context.
2. which sometimes artificially allows planners to argue that a certain technology should be used by the farmers simply because it provides the farmers with increased profit while in fact the farmers will not switch to that technology because of other reasons hidden by the statement that they only want profit (like cultural biases, information channels and such).
3. These points lead me to argue that we must have high levels of participation (at no cost to the farmer) in the initiation of activities. It is through the participation of the villagers that the other reasons as to why they act in a certain way that are non-economic in rational can be factored into the planning. Usually these non-economic rationales are incredibly obvious to the villagers and completely unknown to the outsider.

Table 4. Threats Villagers Believe Undermine their Livelihoods, by Village.

Bappeda-NRM	Sumarayar	Kaima	Ranomerut	Roong	Kumelumbuai	Sawangan
Farming challenges						
a) Increasing prices of inputs; b) Inconsistent access to marketing channels; c) Inconsistent information about markets; d) Difficulty accessing capital; e) Lack of land registration	a) → d) → e) → f) lack of facilities to take crop through next stages of production	a) → d) → e) →	a) → b) → d) → e) →	d) → e) →	a) → b) → for vegetables c) → d) → e) → f) transportation to market and from field to village difficult	a) → d) → e) →
Governance Failures						
a) Rent seeking rather than development goals prioritized; b) Poor communication about improved farming techniques; c) failure to communicate sufficiently with communities about projects and include them in planning	a) lack of trust of extension services; b) lack of trust of Bappeda as they do not complete a project and implement only to gain personal financial bonuses c) Lack of trust because of PUSKUD not returning DPM	a) → b) → c) lack of trust in selection of village chief because of involvement of Bupati	a) → b) → c) lack of trust of PEMDA because of renegeing on KUT and check dam promises and fail to include villagers in planning and implementation; e) lack of trust of village government (accusation of corruption)	a) → b) → c) lack of trust in village government because the chief is appointed and not from village; d) lack of trust in PEMDA because they do not consult with village before starting a project (road which blocks drain around paddy fields meaning 150ha cannot be used); e) lack of sense that the government is trying to support them (bridge broken for years)	a) → b) lack of trust of Bappeda as they do not complete a project and implement only to gain personal financial bonuses; c) Lack of information on how to improve techniques, extension not frequent	a) → b) → c) Lack of support from government, youth group organized a reforestation program but government did not provide seedlings; d) Lack of trust of KUD, KUT to provide money or to be consistent in buying e) Lack of governance ability/experience to control the actions of people/gov that have adverse affect on villagers' livelihoods
Environmental Problems						
Decreasing soil depths and soil fertility	a) Fewer fish to catch, increased prices b) PAM piping water to houses has decreased the water for agriculture c) gutters broken so the rice fields are flooded	a) → b) inconsistencies of electricity decrease work hours in the evening, limiting our income c) water for agriculture	a) → b) Water lilies make it hard to find the fish, to get access to the lake, and waste our time c) land use limited as colonized by alang-alang	a) → b) flooding into rice fields, village and releasing fish from nets in lake	a) Landslides closing off their village so they can't get their goods to market b) Pests on the vegetables c) Land becoming less fertile, in part due to	a) Age of the coconut trees, they are decreasing their productivity b) erosion of riverbed leading to erosion of rice fields on edge of river as river speed increases

Bappeda-NRM	Sumarayar	Kaima	Ranomerut	Roong	Kumelumbuai	Sawangan
	and crops ruined with heavy rains		d) Market to other Christian areas, like Moluku and Ambon limited now, therefore limiting their ability to sell religious handicrafts		erosion d) Water shortages in the drier season making agriculture more difficult	c) erosion of rice field from opening of flood gates for electricity generation
Low level of skills in management, diversity of abilities, ability to access information						
a) Low skill level in small business management diversity; b) Lack of information about appropriate technology or business ideas	a) → b) →	a) → b) →	No mention of concern (NM)	NM	NM	NM
Other						
		Lack of awareness about their effect on the environment and on other people (e.g., the snails thrown in the lake where kids then cut their feet).	a) Increased expense of wood for the expanding furniture business, b) Decreases in number of fishermen and that knowledge lost	Buying up of land by people outside of the village such that the majority of the farmers are now not working their own land, or indeed not working		a) Moving away of the young generation, they don't know how to do farming now b) Ha. of rice field wasting due to erratic water availability

The non-economic, like the government programs, information from friends, inertia, power relations, land contestations, all may play as important a role but they are harder to understand, take longer time to understand and require research. These non-economic are perhaps more important than the economic statement of wanting a profitable bottom line. For instance, in interviews, a farmer will say the bottom line of profit is the only important factor. I next ask why has he not moved into farming of a different type of crop that yields higher profits. The answer is always non-economic, usually something to do with his own history, like the inheritance of land, or his confidence in his own knowledge of growing that one crop only. This argues for the very importance of highly participatory activities that will allow the environmentally friendly activities to be fitting with the rationales, both economic and non-economic, with the village context.

If, however, we are able to learn from what the villagers say, need and want, and we are able to elicit participation in the best possible sense from them, then we can achieve sustainable development. Sustainable development rests on the above issue. If we are able to suggest activities that are environmentally friendly AND provide a profit to the farmer AND that fit within the non-economic context of the farmers then we will have activities that will sustain the farmers in the long term and sustain the resource for the generations to come.

On a note of background, villagers frequently noted that while they see these changes going on, they are quite optimistic. People while saying they were suffering, life was harder, they also said we are not suffering because we have alternatives. They can turn to another kind of crop, or another activity, they claim. This has been true in the lifetime of the villagers, and also in the history of agricultural production in Minahasa, whether under the Dutch or after independence. Further, the issue at stake during Permesta was control over copra trade. This was heavily influenced by individuals who are from the *kecamatan*s in this study, meaning that in their lifetime, these people as a community have known that they can lose control over a crop that provided them with vast wealth, and then move to another crop that once again provided them with vast wealth, cloves. And, while both of those crops were under the control of the government, farmers have reason to be even more optimistic as now their potential next star crop is not going to be under the same kind of governmental control.

→In all the below, awareness raising campaigns, research, training for monitoring and environmental management are needed.

Mercury

Not surprisingly, most villagers did not know about the activities of different *tromols* around them, nor about the effect of mercury on health. Most did not mention mercury or gold mining as a problem. In fact it was seen as something good as young men especially found work, sometimes with good remuneration. In one case it was shocking to learn that the *Camat* actually told a village at a meeting that they should not worry about the *tromols* directly upstream from them as it was not clear that mercury had any negative health effects. There is substantial room for awareness raising in this arena, especially among BPD members who will be in the position to control such activities.

Eutrophication

Farmers on the whole knew little about the connection between fertilizer use and water hyacinth growth. Some could make the connection during the interview, but would not consider using less fertilizer in order to decrease eutrophication. The only thing that farmers claimed would make a difference to their decisions was the bottom line of input costs versus income. They could change for different reasons, whether it was because of information from a friend, a marketer, the government, prices, transportation of goods, but it all had to have the potential of leading to increased profit or shortening work time so more of their productive time could go into working on other income generating activities.

The water hyacinths were considered damaging because they limited the movement of fishers. This might disproportionately affect women as they tend to collect fish and snails from the edge of the lake, the area most affected by the water hyacinths. Most villagers felt that water hyacinths only started becoming a problem at the same time as when fish farming over the lake began to be practiced more widely, about 1993.

Pollution from fish pellets was recognized by all villagers near the lake, but they associated it with decreasing depth of the lake, rather than with eutrophication. Detergent was not considered to have any negative effect on the lake. Effluent from humans or other animals that ran to the lake or river was considered damaging to health of people nearby, but consideration of the effect on eutrophication and feeding back to affect their ability to catch fish was not realized. Almost all villages felt that fertilizers, pesticides, effluent and detergent that flow into the drains around the lake do not affect downstream users in any health related way, or indeed in any substantial way, as they are too far away. Furthermore, detergent and effluent were not considered to present

problems as there was so little that went directly into the drains or rivers that fed the lake, or directly to the lake. More research is needed here.

Water Level

The decreasing depth of the lake, after increases in water hyacinths, was the most frequently cited problem by villagers near the lake. Those further away either said they didn't feel they knew what the problems in the watershed were, leaving room for awareness raising efforts, or said erosion was a problem. People claimed that the decrease in depth of the lake was caused by trash, felling of trees on hills, snail shells, human and animal waste, all leading to increased difficulty in catching fish because of shallow water.

Most respondents also said they thought the decrease in the depth of the lake was caused by erosion from clove farming, from felling trees for firewood and other purposes, and from wet rice cultivation. It may be in fact that the increased price of cloves now is good for the environment in the watershed in that old and dying clove trees are the ones targeted for firewood and have been chopped down at will, often not even by the owners of the land. Now that the prices have risen, farmers may not be tending to those trees rather than felling them. If the clove farmers can then be targeted so they use environmentally sound practices, like not hoeing the ground underneath the trees, then clove farming might actually be good for the watershed.

Trash

Non-biodegradable trash, chemicals, human and animal waste were felt all to cause the lake to become dirty and therefore not able to be used for bathing, drinking water, and washing. Most people around the lake also noted that this led to a decrease in the beauty of the lake. They felt however that most of the waste was biodegradable except in the cases of trash from Tondano and from Langoan which were both associated with the markets and the higher population density of people who do not necessarily live in those towns and therefore to do manage their own trash. People in the villages were variably rigorous about burning trash.

Other

Other environmental threats people interviewed mentioned included: a) flooding of land caused by poor drainage systems and PLN plans; the government's inability to manage the lake and the people around it to keep the lake healthy and useful; c) soils becoming less fertile; d) unable to

control the actions of other people that are selfish regarding damaging the environment and other people's livelihoods.

→ *Awareness raising activities needed. Spatial plans can be effective in helping villagers understand their role in watershed management, their effect on the watershed, and increase their ability to become accountable for their own actions..*

One key point throughout the interviews, most surveyed said they saw no way they could change their activities to help the environment, and mostly didn't see any way they could improve their own livelihood levels. This invites training activities at quite an intensive level with potentially large effect. The villagers overwhelmingly were ready to contribute their own time and labor to work on activities that would improve their own livelihoods or the environment.

Table 5 presented below presents a Summary of the Perceptions of Villagers Regarding Threats to the Watershed.

Recommendations

Commentary

The following two tables suggest activities that address the challenges to rural people's livelihoods, the integrity of the watershed's ecosystem, and that try to turn activities that currently might have a negative effect on the watershed to ones that will have a positive effect. To be effective, these suggestions aim to:

1. fit with how villagers said they most easily can work. This includes working on
 - a. activities for which they are consulted and that fits with their knowledge of their environment and their locale,
 - b. activities that are fitting with their work loads, livelihood interests and daily activities, and,
 - c. activities in which they are certain that others are also sharing the burden.
2. fit with what villagers explained they will respond to,
 - a. that is, not KUT, KUD nor extension now
 - b. but rather the church, village level government, information from marketers or friends
 - c. activities that are legitimated by the government

3. what we believe to be the threats to the ecosystem of the watershed, as listed above and
4. what the villagers have told us of the changes in the watershed as they have used it over the past years.

The suggestions fit in two areas:

1. Increase livelihood potential with the goal of protecting the environment
2. Natural resource governance at the village and government level

Summary of the key recommendations are as follows. They are to conduct/encourage:

1. Research
 - a. Encourage PEMDA to request information regarding appropriate technologies, the effective inclusion of such technologies in farmers repertoire
 - b. PEMDA seek research assistance in finding information on firewood use and tree felling activities in protected areas.
2. Villager Training
 - a. PEMDA should initiate training in the areas of environmental management, information sharing and monitoring. Train facilitators in the villages as well as village leaders who, with support from PEMDA, can spread information regarding:
 - i. Appropriate Technology (AT) that will reduce erosion and chemical use in agriculture
 - ii. Financial management for villagers trying to form cooperatives, small businesses and manage their own household finances
 - iii. Making proposals to government and non-governmental bodies for projects at the village level that will lead to CBC
 - iv. Marketing information so that farmers can switch to environmentally friendly production without losing income
 - v. Information sharing for villagers so they can learn about the new laws and regulations, especially the role of BPD and the village rights, and how to translate the environmental and livelihood challenges they face into sustainable community action programs
 - vi. Monitor the projects and programs that the BPD itself initiates in the villages, and those initiated by outside actors with BPD approval

3. Government Capacity Building
 - a. Help local government to improve
 - i. Transparency
 - ii. Their ability to work with the communities and involve the latter in participatory ways
 - b. PEMDA allocate more resources to achieving such goals and improving communication across the various government bodies
4. Funding
 - a. PEMDA provide block grants to village work groups who are acting to promote CBC
 - b. PEMDA conduct a quickly-done land certification program
5. Management
 - a. Develop village spatial plans with the active participation of local communities
 - i. Villages conduct community mapping and spatial plans
 - b. Develop a multi-sectoral management board for the watershed (academics, officials, private sector such as developers or PLN, NGOs, and villagers) to
 - i. address cross sectoral issues such as water use for electricity and subsequent damage of cropland in downstream areas;
 - ii. address cross-area issues such as mining in one area and impact of pollution or erosion from this mining in a second area;
 - iii. increase information sharing to increase efficiency;
 - iv. increase awareness of actors in different sectors of the demands upon the watershed and the impact of each group's activities on other sectors; and
 - v. provide information to BPDs in the watershed about activities and changes in environmental condition at the watershed level.
6. Awareness Raising and Information Networks
 - a. PEMDA Minahasa should set up networks of information sharing among the facilitators and village leaders with the goal of sharing information across villages on successes and challenges in environmental management at the village level
 - b. Through the church
 - i. PEMDA Minahasa should cooperate with priests to prepare booklets of information on environmental management for local communities

- ii. PEMDA Minahasa should encourage the churches to provide financial assistance for village projects
 - iii. BPDs should encourage the priests in the villages collaborate with the villagers to enact sound environmental management fitting for each
 - iv. Establish a network between the facilitators and priests so the priests can maintain a knowledge of challenges the villagers are facing and can know where they can help
- c. Public awareness campaigns addressing wide-ranging environmentally damaging affects of watershed users. Radio and newspaper advertizing will be most effective.

Proposed Activities: Increase livelihood potential with the goal of protecting the environment: Table 6.

Proposed Activities: Natural Resource Governance at Village and Government Level: Table 7.

Table 5. Perception of Villagers regarding Threats to the Watershed

Bappeda-NRM	Sumarayar	Kaima	Ranomerut	Roong	Kumelumbuai	Sawangan
Mercury						
Poisoning from <i>tromol</i> activities within watershed causing health problems in population	Tromol activities putting pollution into the lake which might affect health	NM	NM	NM	NM	Upstream tromol activities, but uncertain as to whether it causes health problems*
<i>Eutrophication</i>						
Increased eutrophication caused by fertilizers, pellets for fish farming, soaps, animal and human waste all draining to lake leading to increased vegetation growth	a) Fertilizers and pesticides are chemical and therefore can damage the health of farmers, but we haven't really seen any effect of it on our health b) The chemicals cannot reach from our village to the lake	a) Fertilizers, pesticides, human and animal waste cause the lake to become contaminated b) Fecal waste is food for lake vegetation c) Harmful health effects of these chemicals probably not substantial	All these inputs can be food for growth of vegetation (one respondent)	a) Chemicals from upstream do not affect the people or agriculture downstream as they are too far away b) We don't know impact of chemicals	a) Even though chemicals can kill, our chemical input is too far upstream to have impact downstream b) →	a) Chemicals upstream are too far from us to have impact on us b) → And no evidence the chemicals have a negative effect
Water level						
Decrease in water level of lake caused by sedimentation from hillsides (especially clove farming), development of buildings along lakeside and perhaps wet rice farming**	Shallowness of the lake, caused by erosion, digging for sand, throwing of organic refuse from agriculture into the lake and rivers, and trash.	a) Trees being felled, wet rice fields next to lake, & building developments on the lakeside cause erosion, making the lake more shallow b) Pellets for karambas and throwing snail shells grown for fish farming in the lake cause decr in depth	a) Increased shallowness caused by erosion from clove growing and from cutting down the forest trees	a) →	a) → And vegetable agriculture b) Lake becoming shallow due to the water hyacinths roots falling to the bottom, and due to trash	a) Shallowness caused by erosion in the areas that have been opened and then left, b) Erosion in areas that are for cloves. c) Erosion of wet rice land when the water gates are opened by PLN and when there is heavy rain

Bappeda-NRM	Sumarayar	Kaima	Ranomerut	Roong	Kumelumbuai	Sawangan
Trash						
Non-degradable waste from the villages and towns whose waterways feed into the lake cause blockages in PLN turbines and water production problems, adds to potential health problems when toxic, and adds to decrease in lake depth	The trash and bloody water from the Langoan market into rice fields and then into the lake	a) Dirty lake edge from trash as well as from human and animal waste, which means we can't bathe there, and for the poor this is not easy. b) Trash also affects the PLN turbines c) Trash contributes to shallowness of lake	Trash closes up the drains and it also makes the view not pretty, though it doesn't carry an effect other than causing local floods	NM	NM	NM
Other						
	a) Water hyacinths because they limit the places for fish can go, limit the places the fishers can go to find fish b) Heat of the earth causing the water flowing into the lake to decrease, springs drying up b) Beauty decreasing	a) → b) People's actions not thinking about other people, not having to be responsible, lack of knowledge about the environment and management of livelihood practices.	a) → b) Springs are drying up	a) → b) Flooding in the wet rice fields ruins the landscape c) The government's inability to actual implement programs or deal with specific emergency cases that affect environmental conditions	a) → b) We are too far from lake and river to really be affected by changes, and we are too far away to really affect the environment of the lake and river. c) Availability and consistency of water from springs used for their homes and their fields is decreasing	a) → b) The on and off management of water in the lower watershed from PLN ruins the landscape

* Camat said that it was not known whether mercury had a negative impact on health

** Leading to less water available for electricity generation in short term, and long term, to a drying of the lake and all the income and environment benefit associated with it

Table 6. Proposed Activities: Increase Livelihood Potential with the Goal of Protecting the Environment

Expected Result	Objective	Activity	Implementation
Reduce eutrophication of lake	Reduce fertilizer use in wet rice fields, vegetable, and other crops, perhaps switch to integrated pest management	<ul style="list-style-type: none"> Employ Appropriate Technology (AT) packages 	<ul style="list-style-type: none"> PEMDA Minahasa should approach agricultural research agencies (such as Lit Bang Pertanian, BioTrop and UNSRAT) to request information on appropriate technologies (for fertilizer and erosion reduction, tree planting, trash collection, water hyacinth use, among others) and cooperate with them in conducting farming systems research within the Tondano watershed to learn what appropriate technologies will work most effectively in the various agroecosystems, what will be received by the farmers, how the farmers can switch to using that technology without jeopardizing their livelihood levels. PEMDA Minahasa should train village leaders/facilitators to better manage the environment in their villages. Training should cover appropriate technology, learning how to find marketing information, learning how to write proposals for environmental activities, accounting and management skills, and legal issues relating to environmental management. PEMDA Minahasa should provide funding support to villages to support the activities of the facilitators in distributing information and training others in the village. PEMDA Minahasa should provide block grants direct to work groups (not village heads nor BPD, but <i>kelompok tani</i>, for example) who have completed the training for financial management with a facilitator, and who are acting in environmentally sustainable ways, which could mean through using AT or other means that reduce erosion or eutrophication or trashing of the DAS, such as tree planting, reducing fertilizers or collecting trash. PEMDA Minahasa should carry out a land certification program that will enable farmers to use their certificate as a guarantee to gaining access to capital. PEMDA Minahasa should seek assistance to conduct research on firewood collection and tree felling in forested areas, including protected forest. This assistance could be from Department of Forestry, CIFOR, FAO or Ford Foundation, among others. This information should be provided to the BPDs and other village bodies, the management board for the watershed, the KTF and other interested parties. PEMDA should seek assistance to conduct awareness raising campaigns on TV and newspaper targeting women for decreasing detergent use, men for decreasing fertilizer use and using appropriate technology in agriculture, BPD members regarding importance of the environment, youth for entrepreneurial-environmentally friendly activities, all people regarding mercury hazards, information on management board for all members of public.
Reduce erosion flow into lake and river and enable farmers to maintain soil productivity	<ul style="list-style-type: none"> Employ erosion reducing techniques in steep slope farming, both vegetable and clove Increase tree planting in areas surrounding lake Conduct research on the level and frequency of firewood collection and the amount of tree felling in the forested areas in the watershed 	<ul style="list-style-type: none"> Improve marketing channels, develop markets and encourage small businesses for products that help to conserve the watershed Register land for all rural inhabitants 	
Improve water circulation in lake and improved fish habitats	Use water hyacinths in composting/fertilizer and/or to make goods for sale, like frames, bags, mats		
Reduce non-biodegradable waste going into lake and rivers	Establish trash collection and disposal system		

Table 7. Proposed Activities: Natural Resource Governance at Village and Government Level

Expected Result	Objective	Activity	Implementation
<ul style="list-style-type: none"> • Improve the management of the watershed for all users (equity) • Improve the conservation of the resources within the watershed (efficiency) 	<p><i>Village:</i></p> <ul style="list-style-type: none"> • Increase trust of villagers in government officials and activities • Increase the ability of villagers to think creatively and critically about what they need, what they can do, how they can rely upon the government to serve their needs, and how they need to be accountable for their own activities regarding environmental management • Increase the sense among rural inhabitants that their needs are valued, and that government is there to help them 	<ul style="list-style-type: none"> • Develop village spatial plans with the active participation of local communities • Information sharing for villagers so they can learn about the new laws and regulations, especially the role of BPD and the village rights, and how to translate the environmental and livelihood challenges they face into sustainable community action programs • Monitor the projects and programs that the BPD itself initiates in the villages, and those initiated by outside actors with BPD approval 	<ul style="list-style-type: none"> • Villages should be assisted to complete community mapping and spatial plans. This should be done in concert with the following suggestion. • <i>Training:</i> PEMDA Minahasa should seek assistance to train village leaders and facilitators in the new laws and regulations and how the BPD can use these regulations and laws for sound environmental management • <i>Training:</i> PEMDA Minahasa should provide training to facilitators and village leaders on how to monitor and evaluate projects implemented in the villages. • <i>Information sharing:</i> PEMDA Minahasa should set up networks of information sharing among the facilitators and village leaders with the goal of sharing information across villages on successes and challenges in environmental management at the village level
	<p><i>Church:</i></p> <ul style="list-style-type: none"> • Increase the capacity of the church to help villagers manage the environment 	<ul style="list-style-type: none"> • Priests provide information to the congregation to support local initiatives to improve environmental management • Church allocates funds to activities for the environmental improvement of the village 	<ul style="list-style-type: none"> • PEMDA Minahasa should cooperate with priests to prepare booklets of information on environmental management for local communities • Priests and Sinode members should be included in the management board of the Tondano watershed • Establish a network between the facilitators and priests so the priests can maintain a knowledge of challenges the villagers are facing and can know where they can help • PEMDA Minahasa should encourage the churches to provide financial assistance for village projects • BPDs should encourage the priests in the villages collaborate with the villagers to enact sound environmental management fitting for each village

Expected Result	Objective	Activity	Implementation
	<p><i>Government:</i></p> <ul style="list-style-type: none"> • Helps rural inhabitants and government officials learn how to communicate better, to learn to be accountable. • Promote bottom-up governance so they will be more fitting with conditions in the villages. This will increase the efficiency and effectiveness of projects 	<ul style="list-style-type: none"> • Develop a multi-sectoral management board for the watershed • Government learns to respond to the needs its constituents and to build systems in its own bureaucracy that rewards work of officials who learn how to serve the community • Consultation of government with villagers for projects and involve villagers in shaping all project plans 	<ul style="list-style-type: none"> • PEMDA Minahasa should work to establish a management board for the Tondano watershed. The board should be multi-sectoral: academics, officials, private sector such as developers or PLN, NGOs, and villagers. The body will function to a) address cross sectoral issues such as water use for electricity and subsequent damage of cropland in downstream areas; b) address cross-area issues such as mining in one area and impact of pollution or erosion from this mining in a second area; c) increase information sharing to increase efficiency; d) increase awareness of actors in different sectors of the demands upon the watershed and the impact of each group's activities on other sectors; e) provide information to BPDs in the watershed about activities and changes in environmental condition at the watershed level. The body should serve to address issues that are across more than one jurisdiction, that is Minahasa and Manado. The head, therefore, should be someone who serves at the provincial level, such as the Governor. • Any projects that are ongoing, that is, that were initiated before the inception of BPD, should become more transparent. PEMDA Minahasa should provide full access to plans and activities to the management board as well as the BPDs of villages affected by the activities. The BPDs should actively seek out information on ongoing PEMDA projects in their area. • Bappeda should allocate additional budget resources to support community consultations and coordination meetings at the local level to improve communication across different government agencies