Community-based Sustainable Forest Management in Ampreng Village, Minahasa, North Sulawesi, Indonesia: Gender, Rehabilitation, and Livelihood

by

Elsje Pauline Manginsela
Spring 2008

Area of Concentration (AOC) Paper
Submitted in Partial Fulfillment of the Requirement of Master of Urban and Regional Planning
University of Hawai'i at Manoa
Honolulu

Community-based Sustainable Forest Management in Ampreng Village, Minahasa, North Sulawesi, Indonesia: Gender, Rehabilitation, and Livelihood

by

Elsje Pauline Manginsela
Spring 2008

Area of Concentration (AOC) Paper
Submitted in Partial Fulfillment of the Requirement of Master of Urban and Regional Planning
University of Hawai'i at Manoa
Honolulu

Committee Members:
Dr. Luciano Minerbi, Chair
Dr. Dolores Foley
Dr. Kem Lowry

"And we know that God causes everything to work together for the good of those who love God and are called according to his purpose for them"

Executive summary

Indonesia has the third highest biodiversity of tropical forests in the world, after Brazil and the Democratic Republic of Congo. However, Indonesian forests experience the highest rate of deforestation, which occurs throughout Indonesia's entire forest area.

The Soputan Mountain Protection Forest is the largest (13,3440 hectares) protection forest in North Sulawesi Province. It is located in Minahasa district and has experienced the most extensive deforestation (2,803 hectares) compared to the other nine protection forests in the province. The deforestation impacts the upland of the watershed, causing flooding, erosion, a decline in water quality and water supply, and a reduction in the supply of food, fuel wood, and other basic needs of the community surrounding the forest.

The research site of the project, Ampreng Village, has the highest number of agricultural encroachments compared to other villages. It is located adjacent to the Soputan Mountain Protection Forest. The location of the Soputan Mountain Protection Forest and Ampreng Village in the upstream area of Tondano Lake Watershed is significant because what happens in that area can have huge impacts on the lowland areas, particularly Tondano lake and Manado city.

The research questions are:

1. How can the protected forest be rehabilitated based on the local community's knowledge and practices of forest conservation?
2. How can the community utilize the forest to fulfill their subsistence requirements and improve their economic status?
3. How can equitable opportunities to participate in decision-making related to the community-based forest management be distributed to community members, particularly the women?
4. What kind of community-based forest management project plan is suitable to rehabilitate the protected forest while improving community livelihood?
5. What kind of project evaluation plan for the project plan is suitable to assess the effectiveness of the program intervention?

In this research, I use the feminist political ecology perspective introduced by Roecheleau, et al. (1996) to identify three themes: "gendered knowledge", "gendered environmental rights and responsibilities", and "gendered organizations.

The study was carried out using secondary data information. The following information was collected: a profile of Ampreng Village consisting of population, labor force, agriculture and land tenure, education, and infrastructure; agricultural encroachment on forest land; stakeholders outside and inside the village; data for Gender Analysis, including roles, access, and control; a village transect walk; a timeline of the village history; and trend analysis.

My analyses of secondary data suggest the following:

1. There are differences and similarities between men and women in Ampreng Village in terms of possessing and practicing local knowledge of forest resources usage, conservation rules, and soil conservation techniques. Only the men are familiar with catching rats for food and also acknowledge and practice the conservation rules. Both men and women possess and practice local environmental knowledge regarding the usage and protection of plants, mainly trees, and water. However, information about tree usage is not disaggregated by gender. The men and women who possess and practice local environmental knowledge are on the decline. Local knowledge and practices could help design environmentally sustainable and economically rewarding farming systems for the village. Local knowledge could also help select appropriate trees for both subsistence and cash needs, avoid misuse or overexploitation of forest resources, and provide a basis for rules regarding the access to the forest and its resources.
2. There are differences and similarities between how men and women utilize forest resources. Men cut trees illegally, trap rats, collect medicinal plants, and process traditional beverages and brown sugar. Both men and women trespass the protection forest to cultivate cash crops. Not only men and women, but also the young, gather fuel wood and water. Forest resources are not utilized in a sustainable manner due to overexploitation, misuse, and over use of chemical fertilizer and pesticide. There are deforestation, the soil is damaged and polluted, and other forest product decline resulted by deforestation. Some men are looking for jobs outside the village. Sustainable forest use would eliminate overexploitation of forest resources and employ environmentally friendly farming techniques. Agroforestry would play a key role, providing basic needs and cash along with environmental services such as biodiversity maintenance, carbon storage, natural fertilizer, recreation, eco-tourism resources, a healthy watershed, reliable water supply, and reduction of natural hazards such as floods and landslides.
3. Women have an equal opportunity with men in decision making and management at the household level. However, women have fewer opportunities than men at the village level, the church, and environmental organizations in terms of becoming board members. Women can contribute to decision making by having a voice and right to select trees to plant for food, fuelwood, and medicinal use connected to their responsibilities that are related to basic family needs.
4. Based on the findings, user rights in the protection forest are necessary for Ampreng villagers. User right can provide villagers, through Forest Farmer Group, with the legality to cultivate in the forest while maintaining the forest's ecological health. Thus, I proposed the Community-based Sustainable Forest Management Gender Sensitive (CbSFMGS) Project under the Community Forestry Program (CFP). The project will provide the villagers, through Forest Farmer Group (FFG), with user rights; have the chance to receive funding, assistance; and facilitation from the central government. The project will also address the issues of poverty, deforestation, and gender inequity. It is based on both traditional knowledge and practices in the village and appropriate modern knowledge and practices from outside the village. The management plan project should address the lack of information on local knowledge and use of forest resources with regard to gender. The project will also address illegal

logging through the establishment of a policing system and implement an agro-forestry system to address poverty and deforestation by meeting the basic needs of villagers, increasing household income, and improving land cover by increasing the number of perennial permanent trees. To address unsustainable farming practices, environmentally friendly farming activities will be applied. Other ways that the suitable management project can increase household income are the farming of products with high return and the establishment of environmentally friendly home industries or eco-enterprises. The effectiveness of the eco-enterprise strategy to increase household income with conservation should meet suitable conditions and has the least cost of implementation. Other sources of income can be realized through the creation of nurseries of local or indigenous species which will create job opportunities. The project also provides men and women an equal opportunity to be members and to serve as board members in the FFG, addressing gender inequity. Therefore, women have equal opportunity as men to have financial and facilities assistance from the government to rehabilitate the forest and increase their income.

5. The evaluation plan for the project focuses on forest rehabilitation, income generation, and gender equity. Forest rehabilitation concerns the number of permanent perennial trees with a high canopy. The income generation indicator is the annual household income derived from forest-related activities. The gender equity indicator is the percentage of women members, percentage of women board members, number of permanent perennial trees with high canopy, and annual household income derived from the forest.

This study found that there is a need for further research. The further research regarding gender and forest, particularly on perception, knowledge, and practices related to forest change. Further research findings can contribute to improved community forestry development policy. The theoretical framework for further research is based mainly on gender theory and political ecology theory which helps in the understanding of how local men and women's perception and knowledge can be used to make decisions regarding forest use, which is affected by political, socio-economic, and environmental factors. The methods of fieldwork will include open-ended interviews and observation of the community and forest.

The CbSFMGS Project under CFP is recommended urgently for land rehabilitation and livelihood for Ampreng Village community particularly encroachers. Since the Soputan Mountain Protection Forest is currently and illegally encroached by the village people for agricultural activity, it is necessary to take urgent actions to avoid its further expansion, recover forest function, and prevent further natural hazards.

Table of Content

List of Tables

List of Diagrams

List of Figures

INTRODUCTION

1.1 Background

Forests have essential macro and micro roles. At the macro level, forests prevent the acceleration of global warming by regulating carbon cycles (Chikahisa, Anzai, Hishinuma and Kudo, 2005) and provide timber for regional and national incomes. At the micro level, forests provide basic needs to their surrounding communities by providing sustenance and water, maintaining a hydrological cycle and preventing the occurrence of natural hazards.

In this study, I focus on the micro relationship between forests and the communities around it. In particular, I intend to explore women's and men's potential capabilities of being involved in forest management based on their knowledge and practices in forest and local institutions. The study goes further by designing a community-based forest management project plan and project evaluation plan to help Ampreng Village, located at the edge of the Soputan Mountain Protection Forest. The Soputan Mountain Protection Forest has the highest degree of destruction out of the nine protection forests in the province of North Sulawesi, Indonesia

Indonesia (Figure 1) has the third highest biodiversity of tropical forests in the world, after Brazil and the Democratic Republic of Congo (Forest Watch Indonesia, Global Forest Watch, World Resource Institute, 2002). Given this fact, Indonesian forests play a great role for absorbing emissions of carbon dioxide and reducing the greenhouse effect on the atmosphere. However, as the Food and Agriculture Organization (FAO) reports Indonesian forests also experience a highest rate of deforestation (Kompas, 25 September 2007) which is due to deforestation that occurred evenly over the entire forest area of Indonesia (Kompas, 25 January 2007). The problem has drawn international attention, even from the United States government (Kompas, 9 September 2007).

Figure 1. Map of Indonesia

Source: http://www.north-sulawesi.com/images/id-map.gif

Following global concerns, the Indonesian government at national, provincial, and district levels is attempting to cope with the deforestation problem. The government strongly supports forest rehabilitation through reforestation in the state-forest land, and through re-greening in private-forest land. For example, the governor of North Sulawesi Province encouraged all people to plant more trees in critical forestland (Suara Pembaruan Daily, 8 October 2007). The Mayor of Minahasa District promised to rehabilitate forest, watershed, and other areas to increase land cover using the funding from the central government through the Forest Rehabilitation Program (Komentar, 6 June 2007). Such endeavors indicate the government's high concerns about the critical conditions of forest degradation.

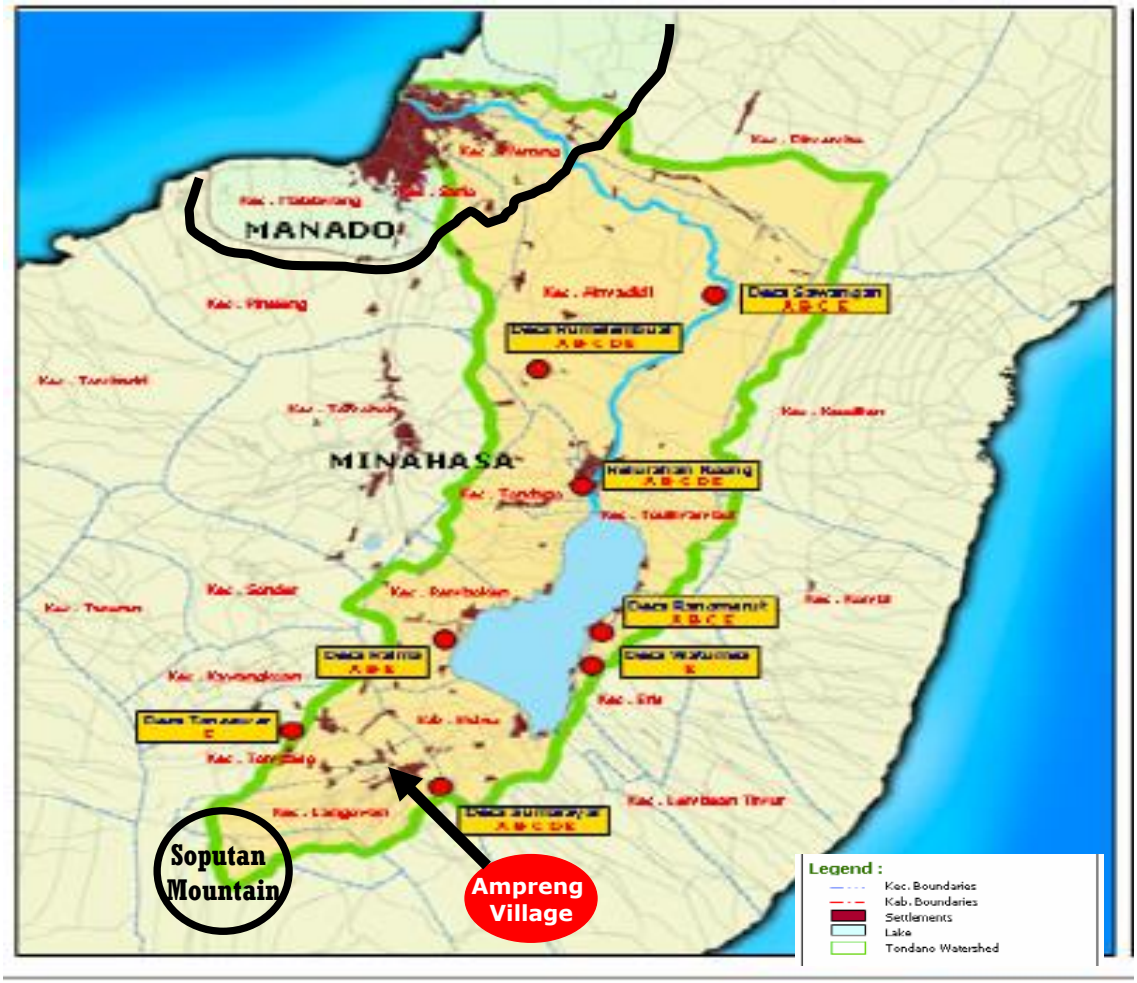
Many upland watershed forests in the world have been degraded more now than ever before (World Rainforest Movement or WRM, 2004), including the Soputan Mountain Protection Forest. Unfortunately, people of mountain forests have little influence over the policies and decisions affecting them. They live far from the centers of power and commerce that influence their lives and contribute to the deterioration of the mountains. In general, the voice of mountain peoples goes unheard. As a consequence, many mountain people live at a subsistence level as farmers, herders, traders, and day laborers, without power to protect themselves from those who exploit their mountain homes (WRM, 2004).

The peak of Mount Soputan is the highest point in the Tondano Lake watershed (Figure 2) and is located about 40 kilometers from the mouth of the Tondano River at Manado. The Soputan Mountain Protection Forest and Ampreng Village are located on the upper part of the Tondano Lake watershed area. The lower watershed area includes the provincial capital at Manado and the lowland agriculture areas. As of 2001, the region of Tondano Lake watershed lies administratively within Minahasa District and Manado City. There are a total of 15 sub-districts and 146 villages in the area (Japan International Cooperation Agency or JICA, 2001)

The Tondano Lake watershed plays a central role in the economy of North Sulawesi. It is the agricultural production center for the region and about 57,643 hectares or 74% of the total area of the catchments 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 catchments also provide the main source of drinking water for residents of the city of Manado. Lake Tondano is also the center for the local tourism and provides various types of fish, including local endemic fish called *payangka*. According to JICA-Tondano Lake Study Team, the watershed supported a total population of 338,243 residents in 2000 (JICA, 2001).

The upper watershed is the heartland of the Minahasan culture and has a population of 121,018. Its population growth rate averaged 0.4% per year during the last decade due mainly to considerable out migration from this area. The lower watershed includes the provincial capital at Manado and lowland agriculture areas. The area had a population of 217,225 in 2000. Its population grew at an average rate of 1.2% per year during the last decade. 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 (JICA, 2001).

Figure 2. Map of Tondano Lake Watershed



Source: Modification from Natural Resources Management (NRM)/EPIQ Report

In recent years, conservation and development practitioners, including the governments of many countries, have come to realize that they have to consider the negative social consequences of policymaking on the people living around the conservation area (Margoluis and Salafsky, 1998). Most conservation projects, such as forest protection, strive to incorporate local people into the management and conservation of natural resources. To maintain the conservation area is difficult and expensive; yet, it is impractical or even unethical to forbid local residents from having some access to the resources within the conservation area boundaries (Margoluis and Salafsky, 1998). In the Minahasa District case, the challenge to implement such a program lies in the inadequacy of forest patrol and lack of government funds to hire them (JICA, 2001; Komentar, 14 December 2006).

In 1995, the Indonesian government launched a Community Forestry Program (referred to as CFP) (*Program Hutan Kemasyarakatan* or HKm), as one type of community-based forest management (Lindayati, 2003). It is the process of providing opportunities for the local community to be incorporated in management of state forests (Indonesia Forest Act. 1999 and 2001). The aim of the government's CFP is particularly intended for protecting forests, especially their rehabilitation, and to increase the standard of living of the local communities. Rehabilitation and conservation of forest resources can be achieved through reforestation and legal enforcement, while community groups can get involved in direct management of the forest and in providing economic services to the members of the community (Lindayati, 2003).

According to Darori, the General Director of Rehabilitation and Social Forestry in the Indonesian Forestry Department, the new version of the CFP's still strives to rehabilitate forests and alleviate poverty, but gives higher priority to forests that have had serious degradation and have poor people living around the forest (Kompas, 28 September 2007). However, the previous and revised CFP has still not fully recognized the different potential roles and participation of women and men in dealing with forest rehabilitation.

Given these problems, this present research paper intends to propose a community-based sustainable forest management and evaluation design which is gender sensitive. This proposal is to fulfill the AOC paper requirement that will be further developed and extended into a Ph.D proposal.

1.2 Statement of Problem

The Soputan Mountain Protection Forest is one of nine protection forests in Minahasa District, where only 11% of the total forest area remains (Komentar News, August 6, 2002). Of these nine protection forest areas, four have been considered degraded with Soputan Mountain Protection Forest accounting for the widest degraded area among them. It is also found that most of the sub-districts in the Minahasa district surrounding the Soputan Mountain have been reported higher in the number of families living under the poverty line after the Asian financial crisis of 1997 (Minahasa Statistic Office, 2002). Owing to such conditions, the matters present a vicious cycle with the poverty increasing under economic system pressure, causing severe deforestation, which then causes more poverty making it hard to deal with the problems without comprehensively addressing both.

One of the causes of deforestation is agricultural encroachment. The forest degradation, especially in the upland watershed, severely impacts the availability of sufficient food, fuel wood, water sources, and other forest products. It also causes environmental destruction by flooding and erosion. I choose Ampreng Village as my study area because based on the Tondano Lake Study Team report (JICA, 2001), the highest number of agricultural encroachments was from Ampreng Village (Figure 3).

These phenomena consequently affect survival strategies and sources of income of the communities surrounding the forest. As gender is concerned, the problems have brought different impacts on women then on men, mostly within the poor families. Despite the

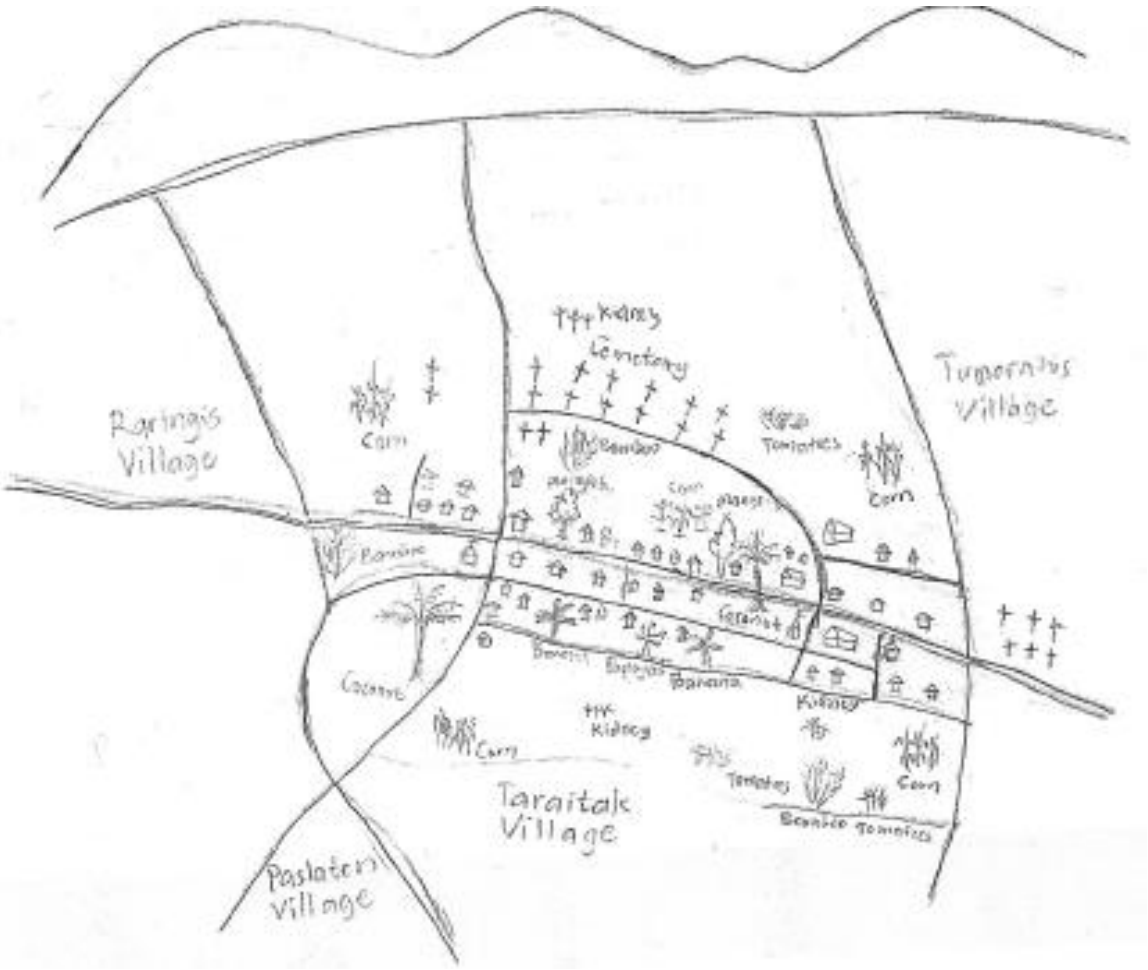
fact that within local communities both genders are very much dependent upon the forest resources for their lives, they differ with respect to the way they interact and utilize their knowledge and practices toward the problems. Such a perception can be expected to transpire due to their different roles and responsibilities to provide family needs or improve their quality of life. It seems likely that the problems caused by deforestation, to some extent, give women more burdens since they should not only take care of the family but also support the provision of the family's basic needs for subsistence.

Even though they bear this great responsibility, unfortunately, their roles in the issue of environment have not been recognized. They are more likely to be the marginalized party as far as environment is concerned. In support of this, Kartika (2002) suggests that women's roles in the environment are one of the continuing global issues in Indonesia. Women's participation in every stage of environmental development is very little although they possess a lot of potential in the development of natural resources and environment (*Kantor Menteri Negara Pemberdayaan Perempuan* RI dan UNFPA, 2000).

The consequences of forest degradation pose a greater degree of seriousness on a broader scale than the local community in the Ampreng Village. This is because the Soputan Mountain Protection Forest serves a crucial role in the conservation and maintenance of hydraulic cycles and bio-diversity. It follows that any disruptions toward this function not only disrupt water provision for the agricultural, industrial, and residential needs but also cause natural hazards, such as flooding and land slides. In light of the four strategic and critical roles of Tondano Lake as previously mentioned above and the location of Manado as the provincial capital city of North Sulawesi, the problems are too critical to be ignored.

Therefore, a suitable program as a solution to the problem is of great importance for this village to prevent more destruction of the protection forest, to help the community alleviate poverty, and to empower women and men to increase the quality of their livelihood. To do so, one of the considerations is how to involve the community around the affected area to deal with the problems because they have a potential function as major agents bringing changes.

Figure 3. Map of Ampreng Village



Source: JICA, 2001

1.3 Research Questions

The research is concerned with five main goals. First, it intends to seek some solutions to prevent further forest degradation in Soputan Mountain Protection Forest and to rehabilitate the forest by exploring the local community's knowledge of forest conservation. Second, it is concerned with the proper utilization of the forests to fulfill community needs in terms of subsistence and economic status. Third, the research will shed light on the importance of women's and men's roles in local institutional leadership in order to maximize participation in decision-making regarding community-based sustainable forest management. Fourth, the research will propose a community-based forest management project plan that will help alleviate poverty in the surrounding areas of Soputan Mountain Protection Forest. Finally, it will also propose a project evaluation plan that will help the community evaluate the effectiveness of the program and to improve it.

These goals are formulated in the following research questions:

1. How can the protected forest be rehabilitated based on the local community's knowledge and practices of forest conservation?
2. How can the community utilize the forest to fulfill their subsistence requirements and improve their economic status?
3. How can equitable opportunities to participate in decision-making related to the community-based forest management be distributed to community members, particularly the women?
4. What kind of community-based forest management project plan is suitable to rehabilitate the protected forest and to improve community livelihood?
5. What kind of project evaluation plan for the project plan is suitable to evaluate the effectiveness of the program intervention?

1.4 Significance of the Study

By designing a community-based forest management project plan and project evaluation plan, the research is significant not only for the local government but also for the local community surrounding the area. For the local government, the research would provide some insights into the local government's planning and the policies of forest rehabilitation. In particular, it would help them cope with the problem in accordance with the characteristics of the surrounding community. In doing so, any programs they envisage would be likely to be context-sensitive. As a result, it can be expected that a considerable degree of effective programs are likely to be warranted.

More importantly, at the very essence of the problem faced, the findings of this research would also benefit the community in the Ampreng Village to improve their standard of living by being actively involved in planning, implementing, monitoring, and evaluating the community-based forest management projects. In which case, the community might develop a stronger sense of belonging toward their own environment. Following this, they can be expected to be the main agents in conserving the forest for their own sake, as well as for the environment.

1.5 Outline of the AOC Paper

This research paper consists of seven chapters.

The first chapter is an introduction describing four sections:
1) Background
2) Statement of the problem
3) Objectives
4) Significance of the study

Chapter two presents the theoretical underpinnings of the study and the history of the CFP in Indonesia. Two main conceptualizations are drawn from these theories:
1) Community-based sustainable forest management and
2) Women, environment, and development.

Chapter three deals with methodology comprising two sections:
1) Analysis the available data,
2) Approach of the analysis

Chapter four discusses the findings.
Three main concerns are highlighted:
1) Exploring the community local knowledge and practices related to forest rehabilitation
2) Utilizing forest for the subsistence and economic status improvement, and
3) Identifying local community's capabilities, especially women's in local institutions and utilizing these potencies in community forest management.

Chapter five
On the basis of these three concerns in Chapter four, chapter five presents Community-based Sustainable Forest Management Gender Sensitive Project.

Chapter six
Chapter six describes the Evaluation Design Plan evaluate the effectiveness of Community-based Sustainable Forest Management Gender Sensitive Project proposed in Chapter five.

Chapter seven
Some conclusion and recommendations are presented in chapter seven.

2. LITERATURE REVIEW

2.1 Policy Regarding Community Forestry Program

2.1.1 Indonesian Forest Policy

Indonesian forests are differentiated on the basis of their status and function (Minister of Forestry Number 40 Year 1999). Based on status, the forests are classified into two kinds: (1) State forests and (2) Private forests. State forests belong to the Indonesian government and include customary forests located in the traditional jurisdiction areas while private forests belong to individuals or groups.

Based on function, forests are categorized into three types: (1) Protection forest; (2) Conservation forest; and (3) Production forest. The main function of Protection Forests are protecting life supporting systems, such as providing water supply, preventing floods, and controlling soil erosion and sea water intrusion, as well as maintaining soil fertility. Conservation forests primarily preserve the diversity of specific characteristics of flora and fauna and their ecosystems. Production forests have the main function of producing forest products especially timbers (Department of Forest and Estate, 1999).

With respect to Indonesia's community forestry policies, resource management began in the forests of Java then spread to the outer Java Islands. The two regions have developed forestry systems differently as a result of historical experiences, particularly since the colonial period. Scientific-based modern management has governed Java's forests since colonial times, forcibly replacing long-established indigenous resource use and tenure systems. In the outer islands, similar processes began, but not until after the New Order government was established in 1967 (Lindayati, 2000).

According to Lindayati (2000) the community participation in forest policies of the outer islands can be divided into three periods. During the first period (late 1960s to mid 1980's), the government enforced measures to eliminate local community forest use and access. Since that time, the majority of forests have become state forests. The state has the full legal rights to manage the forests that used to be managed by the local people. Therefore, there was a conflict between the government and the common or customary rights. During the second period (mid 1980s to 1997) the government eased *de jure* restrictions on community forest access through the enactment of social forestry policy. One type of social forestry program is the Community Forestry Program (referred to as CFP). The third period (1998 to present) is marked by substantial improvements in the legal forest access and the management rights of local people, to some degree reflecting the movement of democratization despite still being handled under the state management framework.

2.1.2 Social Forestry Programs

Social Forestry in Indonesia refers to all forestry programs that attempt to incorporate local community in the management of the forest or areas designated as forests according to the government's zoning. Various programs under the Social Forestry Program include: (1) Forest Village Community Guidance; (2) Community Forestry; (3) People's Forest; (4) Traditional Utilization Zones; and (5) Private Forestry. Out of these five programs, this study only focuses on the CFP.

2.1.3 The Community Forestry Program

The CFP in Indonesia was first passed in 1995 by Ministerial Decree No. 622/1995 under the administration of the Directorate General of Reforestation and Land Rehabilitation, Forest Ministry (Lindayati, 2003). Under this program, local communities through cooperative groups of people living within and near the forest obtain a community forest concession. The concession is valid for a period of 35 years; this concession involves the production forest, protection forest and conservation forest. A revised version of the community forest program was issued in 1998 by Decree No 677 /1998 (Nanang and Inoue, 2000). In 2001 a revised decree was passed by Decree Number 31, 2001, allowing district regents to issue communities to manage state forests.

The CFP is established inside a state forest area to attain forest rehabilitation and income generation (Indonesian Ministry of Forestry Decree No P. 37/Menhut-II/2007). Forest rehabilitation consists of two kinds of planting projects and three activities. Planting projects include *reboasasi* or reforestation, especially inside state forests, and re-greening of outside state forests or private forests. Forest rehabilitation activities comprise of tending, enrichment planting, and application of soil conservation. Tending and enrichment planting aim to maintain and improve the quality of planted areas with proper treatment. Soil conservation techniques are applied through vegetative and mechanical techniques, especially on critical and non-productive lands. Vegetative methods are conducted by planting plants while mechanical techniques for soil conservation include terrace ring, ridge-row, ridge contour, and check dam.

This CFP gives local people surrounding the protected state forest concession rights to manage the forest based on their needs, capabilities, and knowledge. The development of the CFP should be conducted in conjunction with capacity-building of local institutions through cooperative efforts.

Technical and management assistance will be provided by the government using services of NGOs, and universities, aside from the government extension agents. Since this program was implemented by the Indonesian government, there have been changes in terms of how the government agencies issued permissions and durations of concessions (Table 1). Due to decentralization in 1999, issuing permissions was handed down from the central government to local government in districts or on municipal levels. The average concession period was decreased from 35 to 25 years but is increased again to 35 years in draft 2007. The development of the CFP is described in Table 2.

Table 1. Policy regarding Community Forestry Program

Year	1995	1998	2001	2007
Type of Forest	Protection Forest and Production Forest	Protection Forest, Production Forest, and Conservation Forest	Protection Forest and Production Forest	Protection Forest and Production Forest
Type of harvesting	Non Timber Forest Product	Non Timber Forest Product	Non Timber Forest Product	Non Timber Forest Product
Issuing Permission	Forest Minister	Forest Minister	Local government (Municipality or District)	Forest Minister
Institution	Individual, Group, Cooperative	Cooperative	Cooperative	Cooperative
Size of plot	4 hectares per person	No information	No information	No information
Duration of concession	35 years	35 years	25 years - preparation phase: 5 years - permanent phase: 20 years	35 years

Source: Indonesian Forest Ministry Decree 1995, 1998, 2001 and 2007

The theories are drawn from two aspects: 1) Community-based sustainable forest management and 2) the relationship between women, environment, and development. These theories are treated to explore gender roles and relations to the forest resource use and conservation. Moreover, the theories are also referred to as the basis of the project of community-based sustainable forest management plan and project evaluation plan. Each is described in the following

2. Community-based Sustainable Forest Management

Community-based sustainable forest management is based on the concept of community-based forest management and sustainable development. Community-based forest management is a type of forest management conducted by local community to meet their needs and to maintain forest functions (WRM, 2002). The term of sustainable development refers to a process of change that ensures that the use of resources and the environment today does not restrict their use by future generations. Therefore, community-based sustainable forest management is a forest management approach where local communities who are forest dependent take responsibility for managing some or all aspects of the forests they rely on fulfill their present need and next generations need.

Since the 1980s, the concept of sustainable development has grown rapidly. The leaders who gathered at the Earth Summit in 1992 built upon the framework of Brundtland's *Our Common Future* report to create agreement and convention regarding critical environmental issues, which includes deforestation among others. A broad action strategy—"Agenda 21"—was also drafted to serve as the work plan for environment and development issues for the coming decades.

According to Brundtland, sustainable Development refers to actions that address the needs of the present generation as well as those of future generations (cited in Barton, 2000a). Moreover, Barton (2000b) states that sustainable development concerns the improvement of the quality of human life in social, economic, and environment aspects by taking into account the ecosystem and resource base.

This concept has three dimensions - environmental, economic, and social. At a practical level for forest management, Clark and Thaman (1993) argue that sustainable development in the Pacific Islands can be achieved through local or traditional agroforestry systems. A traditional agroforestry system has two functions: 1) to fulfill economic functions by providing basic needs of the community and 2) to provide environmental services such as biodiversity maintenance, carbon storage, and water cycling through water supply provision and prevent from the natural hazards (flooding, flash flooding, and sliding soil), provide eco-tourism or recreation, and soil fertilizer.

In addition, Swack (1990) suggests that to cope with economic problems, it is necessary to take into account social and cultural factors, not only the market itself. Therefore, he proposes Community Economic Development (CED) concept to fulfill community needs, encourage local ownership and control of community resources, and promote economic self-reliance. The spirit of CED is to overcome inequality and exploitation.

3. Women, Development, and Environment

In general, there are four main theories related to women, development and environment. It started from Women in Development (WID) in the early 1970's, followed by Women and Development (WAD) emerging in the late of 1970's, Gender and Development (GAD) in the early 1980's, and finally, Women, Environment and Development (WED).

WID, influenced by liberal feminists focused on the inclusion of women in development process based on the assumption that women, especially in the developing country, had been left out of the development process (Moser, 1993; Young, 1993). WAD, illuminated by neo-Marxist and dependence theories suggested, the importance of a change in the inequality structure due to subordination and oppression of women under a capitalist patriarchy system. Moreover, WAD scholar also recognized that poor men in developing countries were equally vulnerable to subordination and oppression within the world market economy (Saunders, 2002). However, WAD held the same position as WID, in that both focused on women's productive (paid work, self-employment, and subsistence production) roles and ignored their reproductive roles (such as domestic work, child care and care of the sick and elderly), which apparently created more burdens in both work load and time for women.

GAD theorists, closely aligned with socialist feminism, put women as agents of change and not victims of development. Moreover, GAD argued that reproductive needs were as important as economic needs. It also put gender as a higher status than class in defining access to the means of development (Young, 1993).

Under the WED perspectives, there are many approaches that are lumped together based on theories and practices. Some of them are ecofeminism, feminist environmentalism, socialist feminism, feminist post structuralism, environmentalism, and feminist political ecology (Rocheleau, Thomas Slayter, & Wangari, 1996; Schroeder, 1999).

I choose feminist political ecology as the underpinning of this study because this approach is relevant to the study in gender, sustainable development, and environment. Feminist Political Ecology (FPE) addressing women as a group and gender as a category proposes theory, policy, and practice as alternatives to sustainable development (Rocheleau, 2007). Also, it seeks to link local experience with global process of economic and environment change. Its approach links together the insight of feminist cultural ecology, political ecology, feminist geography, and feminist political economy. Roecheleau, et al. (1996: 300) state:

> Incorporating a feminist analysis within political ecology can illuminate the ways in which gender positions both men and women vis-à-vis institution that determine access to land, to other resources, to the wider economy. An ecological approach allows us to see environmental management, resources use, and technological change as a dynamic, interactive process […].

As explained by Roecheleau, et al. (1996), feminist political ecology identifies three themes in gender and environment case studies. The first theme "gendered knowledge" links survival effort of women and men in local communities. Women's multiple roles in reproduction, productive, trade, and consumption provide them a holistic perspective on the environment that guides them to practice their special environmental knowledge in order to maintain and protect the environment. The second theme, "gendered environmental right and responsibilities" is related to resource access, control and management. Men and women have different rights and responsibilities through different gender roles in the process of production and forest utilization. The third theme, "gendered environmental politics and grassroots activism" or gender organizations, stresses collective involvement on women for environmental problems. These themes accentuate different forms and reasons underlying women's and men's participating in environmental issues.

3. METHODOLOGY

The AOC paper is based on library research. The sources of data and information were obtained from Hamilton library of the University of Hawaii at Manoa, Indonesian government publications, the Internet, the Japan International Cooperation Agency report (JICA, 2001), and my previous research on Ampreng Village (Manginsela et al., 2002).

3.1 Analysis of Available Data

The main sources of secondary data below were derived from the data collection in two reports: JICA, 2001 and Manginsela, et al., 2002.

The secondary data consist of seven tools of data collection method:

1. Gender analysis
    - Gender knowledge
    - Access and control over resources profile
    - Activity profile
2. Profile of Ampreng Village
3. Profile of agricultural encroachment
4. Stakeholders
    - Outside the village
    - Inside the village - based on men's and women's organizational affiliations
5. Timeline of the local community and forest
6. Village transect walk
7. Trend analysis of farming and forestry

The seven tools of data collection method will be used to answer research questions number 1 to 5. Research question numbers 1 and 2 will be based on the data related to gender analysis, Profile of Ampreng village, and Profile of Agricultural Encroachment. Research question number 3 will be answered from the information about stakeholders. Research question number 4 will refer to the information found in the time line, transect village walk, and trend analysis for problem identifications. Research question number 5 will be dealt with based on the answers for question number 4.

1. Gender analysis

Information of gender analysis will be used to answer question numbers 1 and 2. Gender analysis includes gender knowledge, activity profile, and access and control profile. Gender knowledge identifies men's and women's knowledge regarding the forest. Activity profile assesses division of labor between women and men on reproductive, productive, and social activities. Based on the gender analysis, women's and men's rights of access and control of the forest will also be explored

2. The profile of Ampreng Village
The profile of the Ampreng village focuses on population, labor force, agriculture and land tenure, education, and infrastructure. Information from the Ampreng village profile will be used to answer question number 2.

3. The profile of agricultural encroachment
The profile of the agricultural encroachment focuses on age, agriculture and land tenure, and education. Information from the agricultural encroachment profile will be used to answer question number 2.

4. Stakeholders
Information about stakeholders will be used to answer question number 3. Stakeholders are primarily divided into those outside and inside the village in relation to the Soputan Mountain Protection Forest rehabilitation. Based on the information, women's and men's participation as members and decision makers in local institutions and organizations or groups will be identified.

5. Timeline of the local community and forest
The information from the timeline will be utilized to answer question number 4, especially for problem identifications. The timeline of the local community and forest in Ampreng Village informs a list of certain historical events or experiences within an historical period. The events or experiences chronicled in the timeline include forest resources decline, forest fires, and mountain eruptions. The timeline can provide opportunities for the community to prevent and anticipate certain events.

6. Village transect walk
The information of transect walk will be utilized to answer question research number 4, also especially for problem identifications. The village transect walk is an imaginary line drawn throughout the area. This line indicates the varying conditions in the entire area under consideration. The information includes the conditions and problems associated with forest, farming, and settlement**.** Therefore, this tool provides information to identify forest management problems. This method is important to link the problems identified with the space being studied. For instance, the village transect walk can diagrammatically show that degradation in the forest will cause flooding in lowland areas within the village.

7. Trend analysis of farming and forestry
The results from trend analysis will be used to answer question number 4, also particularly for problem identifications. Trend analysis indicates the changes that happened over a period of time. In this study, it is important to look at the trend of tree composition in the forest, fertilizer usage in the agricultural lands, and the decrease in the springs. This tool will provide data information on how the composition of forest trees have changed over time due to the introduction of new timber trees by the government, and also how organic fertilizers have been replaced by inorganic fertilizers.

3.2 Approach of the Analysis

The data derived from the secondary collection will be analyzed based on three elements encapsulated by Feminist Political Ecology theory: "gendered knowledge", "gendered environmental right and responsibilities", and "gendered organizations".

The results of the analysis will serve two purposes: 1) to answer the research questions 1 to 3; and 2) to serve as the basis of information for formulation of a prototype management project plan and project evaluation plan. The management project plan is a general plan consisting of management goal, objectives, and activities to be implemented to accomplish the goals. A prototype of a project plan will be formulated based on Margoluis and Salafsky' (1998) guideline. The measure of success project plan is a guide to design, manage, and monitor the project**.** The project plan is based on a conceptual model, constructed by combining the conceptual model of Margoluis and Salafsky (1998) and the EcoTipping Points of Marten (2007).

A conceptual model, according to Margoluis and Salafsky (1998), "is a diagram of a set of relationships between certain factors that are believed to impact or lead to a desired target condition". The model depicts an image of the project site or local situation, shows linkages among factors, as well as major direct and indirect threats, and shows direct and indirect ways to achieve the target condition. The model provides relevant factors and is sounded on solid data and information. In addition, the model can also be used to identify the key threats to the target condition that the project will address. Moreover, a good management project plan is parallel with its mission and that mission should help all stakeholders focus their efforts and select suitable institutions to work together. A successful management project plan requires precise and strong linkages between the goals and objectives, and between objectives and activities.

The EcoTipping Points is a concept developed by Marten (2007), which can lead to the transformation of a vicious system into a virtuous system. A vicious system is a feedback loop that becomes worse over time while a virtuous system is a system which reinforces itself by becoming better. The EcoTipping Points provide an explanation of: (1) how a negative tipping point can form a vicious cycle and can force environment decline; (2) in contrast, how a positive tipping point, usually embodied as improvement in environment technology, such as an agroforestry system, can change the vicious system to a virtuous system; and (3) how the new virtuous system reinforces itself by enriching and improving itself (Marten, 2007). There are three steps, according to Marten (2007), for building an EcoTipping Points diagram: Step 1. Compose the cause and effect chain of the environment problem; Step 2. Identify a negative tipping point that stimulates the vicious cycle; and Step 3. Discover a positive tipping point than can convert the vicious cycle to a virtuous cycle.

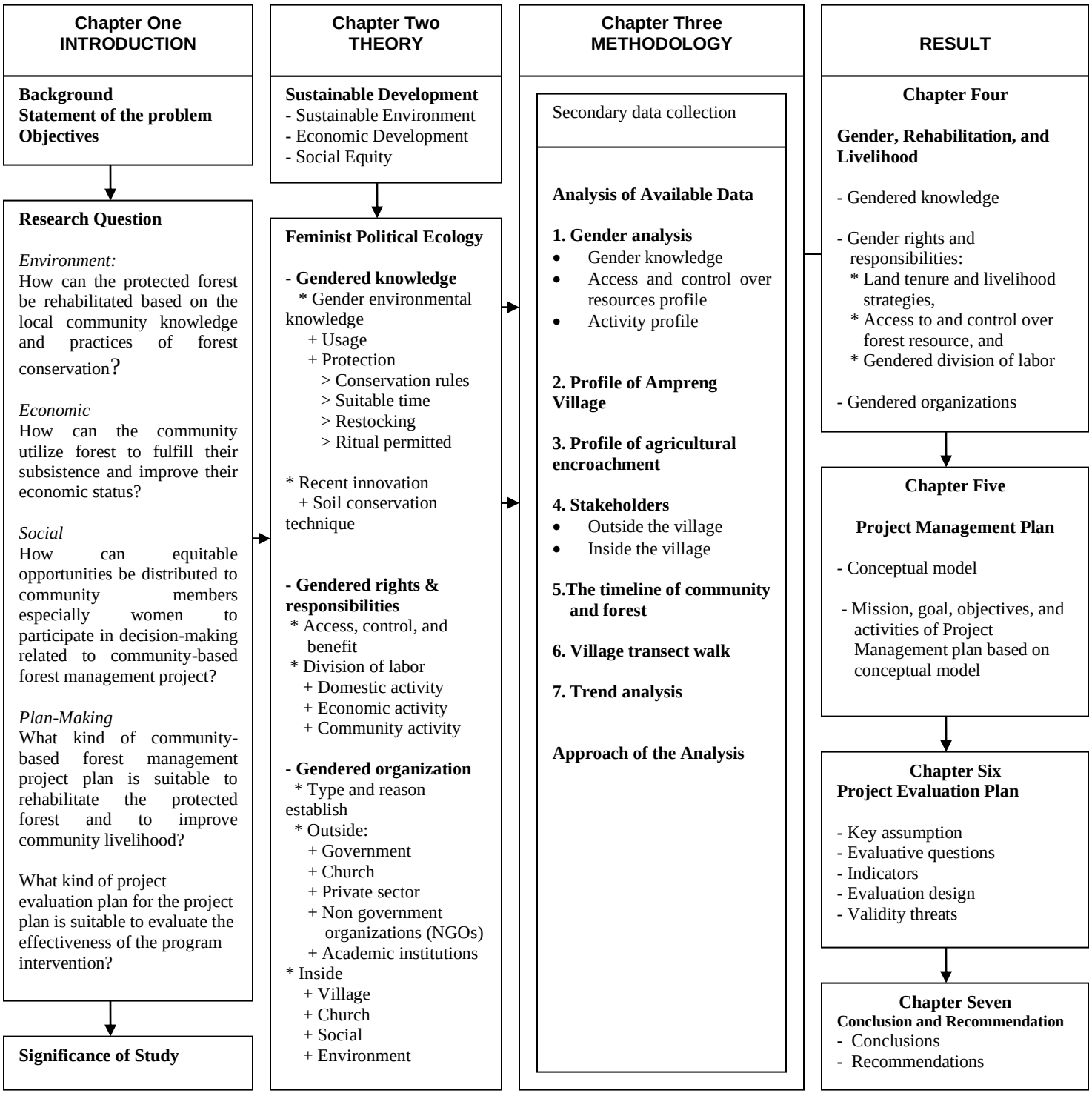
According to Salafsky, Nict et al. 1999, there are three conservation strategies: direct protection, economic substitute and enterprise-based conservation or eco-enterprises. This management project plan will use the eco-enterprise strategy, the lowest cost strategy among the three (Salafsky, Nict et al. 1999). To realize the effectiveness of this strategy, it is necessary to meet a suitable condition. The suitable condition relates to four

factors: enterprise, benefit, stakeholder, and other factors. *Enterprise* consists of potential profitability, market demand, infrastructure, local enterprise skills, complexity, and linkage. *Benefits* consist of cash benefits, non-cash benefits, timing, and distribution. *Stakeholder* consists of stakeholder group, leadership, resource access, enforceability, stakeholder homogeneity, conflict, threat source. Finally, *Other* consists of chaos and project alliance.

The Project evaluation plan will use Weiss' (1998) guideline. Weiss contends that to improve the effectiveness of the program, it is essential to design the most appropriate evaluation. A good design evaluation should be based on the understanding of the reasons for the study grounded on the underlying theory of the program. Therefore it is important to identify the appropriate key assumptions, key evaluative questions, indicators, and evaluation design and validity threats.

The processes can be depicted in the following Table 2. Summary of AOC Paper Process.

Table 2. Summary of AOC Paper Process



4. GENDER, REHABILITATION, LIVELIHOOD, AND ORGANIZATION

This section discusses gendered knowledge to answer research question number 1, gendered rights and responsibilities to answer research question number 2, as well as gendered organizations to answer research question number 3. Gendered knowledge is described from the perspectives of local environmental knowledge and some recent innovations in agriculture. Gendered rights and responsibilities include land tenure and livelihood strategies, access to and control over forest resources, and gender division of labors. In the case of gendered organizations, some local organizations existing in the village are described.

4.1 Gendered knowledge

Rocheleau (1996) states that gendered knowledge can be examined through local environmental knowledge and some recent innovations. Local environmental knowledge can be differentiated by gender, men and women, and by groups, rural herbalists and forest farmers. Recent innovations comprise of techniques to manage soil, land and water.

Local environmental knowledge embraces the knowledge about what trees people use and for what (Fortmann, 1996) as well as how to protect them (Rocheleau 1996). *Tree usage* includes knowledge about fruit to eat, firewood, medicine, browse, poles, household utensil, and fertilizer (Fortmann, 1996; Manginsela et al., 2002; Thaman and Clarke 1993; JICA, 2001).

Local environmental knowledge of tree usage is different by gender (Fortmann, 1996; FAO, 1997; Rocheleau, 1996). It was found that women could name 31 different uses of trees while men could name only eight (FAO, 1997). However, this difference in knowledge is invisible to forest development agencies. Therefore, it is necessary to conduct inventory information of local or indigenous tree usage based on the knowledge of both men and women. This knowledge put in practice can be of benefit to help reduce household expenses and fulfill cash demand of local community, in a broader scope also alleviating poverty. Therefore, the community can utilize the forest optimally for their basic sustenance so they do not have to cut down trees for sale in order to earn cash for food**.**

Local environmental knowledge related to tree protection entails the suitable time to cut or harvest, plant, weed the trees and crop (Manginsela et al., 2002), restock plants, (Minerbi, 1999; Manginsela et al., 2002), prohibit the cutting down trees (Minerbi, 1999; Manginsela et al., 2002), permit ritual and offerings (Minerbi, 1999; Manginsela et al., 2002).

Based on the analysis of the secondary data, the study reveals that men and women in Ampreng Village possess local environmental knowledge about forest resource usage and forest protection as well as innovations in techniques to manage soil, water and trees, and reforestation activities. In fact, they have a broader scope of knowledge that includes forest protection resources as a local agroforestry system. Agroforestry is a combination

of agriculture, trees, and/or animal husbandry. However, the information of forest resource usage is not differentiated based on gender and groups. It means the data did not indicate whether the source of the data is from men or women. As a result the data did not reveal whether there are differences between women and men as well as between group rural herbalists and forest farmers concerning their knowledge about trees or plants usage and differences.

In relation to forest resource usage in the Soputan Mountain Protection Forest, it is found that the local community's environmental knowledge includes that of food, fruits, forest vegetables, woods, fuel wood, crops, and medicinal trees. The knowledge about food includes cassava, taro, and banana while that of fruits include avocado, mango, guava, *jambu air*, papayas, *pakoba*, coffee, and palm sugar. The knowledge about vegetables includes *kamunti* and *pakis/sayur paku*. As for fuel wood, it also covers the types and use of fuel wood, such as *kaliandra, lamtoro,* bamboo, *dadap* - utilized for cooking and making traditional beverage, and brown sugar. In relation to woods, it includes *pines* and *cempaka* trees and for medicinal trees, it covers the *lawang, walak and wasuk*. For cash crops, it includes tomatoes, red beans, corn, red onion, leaf onion, chilly, pumpkins, scallion, Chinese cabbage, *gedi*, and cucumber. With regard to forest animals, it includes that of forest pigs, monkeys, snakes, birds, and rats.

The local knowledge regarding plants entails knowledge of the suitable time to plant, weed trees, crop, and cut the trees. Both men and women know that the suitable time to plant is around the new moon and the time to weed is during the middle or the full moon. They also maintain that the suitable time to cut trees is when there is no moon. In that time, it is believed that the wood has the high quality and is long-lasting because it cannot erode and becomes powder or sand. As forest resources are concerned, this traditional wisdom can help manage efficient use of forest resources because the villagers can maximize the tree usage. Following this, it will minimize the rate of the extinction of biodiversity, thus helping maintain the stabilization of the ecosystem.

However, according to forest farmers, this tradition mostly applies when the trees are used for domestic needs only. When the trees are for sale to generate immediate cash income, this traditional value of taking into account the suitable time to gain the high quality of trees is abandoned. Accordingly, the recognition and revitalization of suitable time to cut the trees are necessary in order to conserve the forest.

Another customary practice of cutting trees possessed by both genders is that they do not cut trees near springs and streams. Also, men and women have traditional local knowledge concerning the preservation of biodiversity through the perpetuation of restock tradition. It means they know that when they cut trees, they should plant trees more than the number they cut. If they cut one plant or tree, they should plant more than one. Another tradition possessed by men includes the use of leaf of *tayapu* and *kanonang* trees as soil fertilizer. This traditional wisdom of restock or replant to maintain resources and protection activities for streams also exists in Hawaiian culture (Minerbi, 1999).

Moreover, the ban of cutting big trees in the forest also exists in Ampreng Village and the practice is often associated with the belief that the trees are guarded by spiritual forest guardians (*dotu*). However, within the framework of Christianity thinking such a belief does not apply, so they cut the trees as they liked. To fix the misinterpretation, that it is all right to destroy the forest, that men from church groups put the efforts to conduct replanting activities in the forest.

Local knowledge related to the suitable time to cut trees not only applies to plants but also to forest animals, especially to trap rats commonly consumed as Minahasan traditional food. The knowledge includes the suitable time to trap the rats and the rituals to ask permission to the spiritual forest guard (*dotu*). It is known that the suitable time to trap the rats is almost any time except when there is full moon because during this time no rats can be trapped. Also, they believe that the rat trappers should ask permission first to spirit forest guards by providing offerings, such as rice and tobacco before they put the first trap.

In terms of gender, all the rat trappers are men, so the knowledge about the suitable time and rituals belongs to men. The knowledge about the suitable time and asking permission is a traditional belief to control the number of rats to prevent over exploitation and certain forest biodiversity from vanishing. This is because excessive exploitation beyond the capacity of reproduction will destroy certain biodiversity in the Soputan Mountain Protection Forest.

New techniques to manage soil, water, and plants in the Soputan Mountain protection forest are applied through land conservation techniques and crop rotation. The new techniques are known by both men and women. Land conservation is applied through ridge-row and ridge contour in order to preserve land nutrients. The decrease of land nutrients results from the decline of agricultural products.

Crop rotation is applied by not continuing planting the same crops, such as tomatoes for a long time; rather rotating with other crops, such as kidney beans or leaf onions. This method also controls pests and diseases. These new techniques of conserving the soil of the protection forestland, according to male farmers, are learned from their parents, both father and mother and from their male farmer friends.

Tree replanting activities, such as regreening in private forestland and reforestation in state forestland were conducted in the 1970's, 1980's, 1990's and in 2000 by the government, church, and private sectors. These activities in general are dominated by men.

On the basis of the above analysis of the knowledge possessed by both genders, there are at least three crucial steps to take in order to rehabilitate the forest. The first is to recognize the knowledge based on gender, the second is to identify it, and the third to make inventory lists of this knowledge. Such lists then need to be documented so the knowledge can serve as the basis of local agroforestry system in Ampreng Village and

can be passed down to the next generations. Otherwise, it might disappear because of the increasing degree of deforestation.

At the practical level, the documentation can also help distribute the knowledge to all community members of the village. The sharing of the knowledge is of great importance because not all community members apply the knowledge due to the pressure of the cash demand. The absence or the ignorance of the knowledge is likely to result in a greater risk of misusing forest resources and applying ineffective practice of forest utilization. Accordingly, by having all members obtain the information, the process of forest rehabilitation can be ensured and fostered.

Second, it is of great importance to revitalize the importance of the use of this knowledge and the knowledge itself. To refresh its importance, the knowledge can be accommodated in the sustainable forest management project rules applying to all members. In doing so, to some degree, it can impose some sort of obligations to adopt the right practice in utilizing the forest. To revitalize the knowledge itself, it is of great necessity to hold a forum among members allowing the exchange of useful information and to conduct talks providing upgrading knowledge about utilizing the forest.

Last, it is of great importance to identify the knowledge by gender. As the above data reveal, men and women have different knowledge in utilizing the forest. In a Community-based Gendered Sensitive Sustainable Forest Management plan, the knowledge can help men and women select the trees to plant based on their subsistence needs and cash demands. Thus, the likelihood of exploiting forest resources for subsistence needs and cash demands can be minimized. Eventually, the process of forest rehabilitation can be accelerated and benefited.

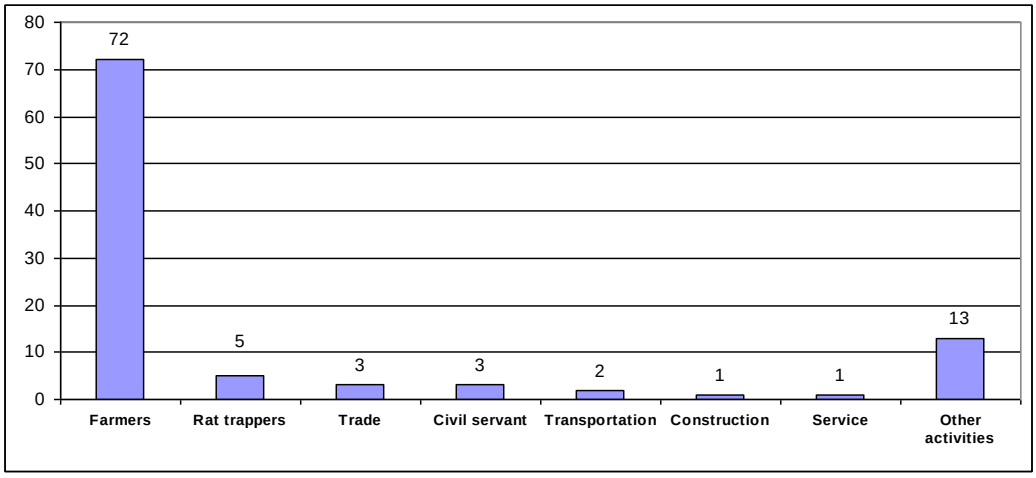
4.2 Gendered Rights and Responsibilities

Gendered rights and responsibilities are allied to land tenure and livelihood strategies, access to and control over forest resources, and gender division of labor (Rocheleau, 1996). Using the secondary data, the study finds that there are differences of land tenure and livelihood strategies between households, access to and control over forest resources of men and women within households, and gender division of labor within households in relation to the protection forest resource utilization in Ampreng Village. Each is discussed in the following pages.

4.2.1 Land Tenure and Livelihood Strategies between Households

Based on the Ampreng Village profile, the majority of the labor force are 72 % farmers, and the minority are 5 % rat trappers, 3 % in trade, 3 % in civil service, 2 % in transportation, 1 % in construction, 1 % in service, and 13 % involved in other activities (Diagram 1).

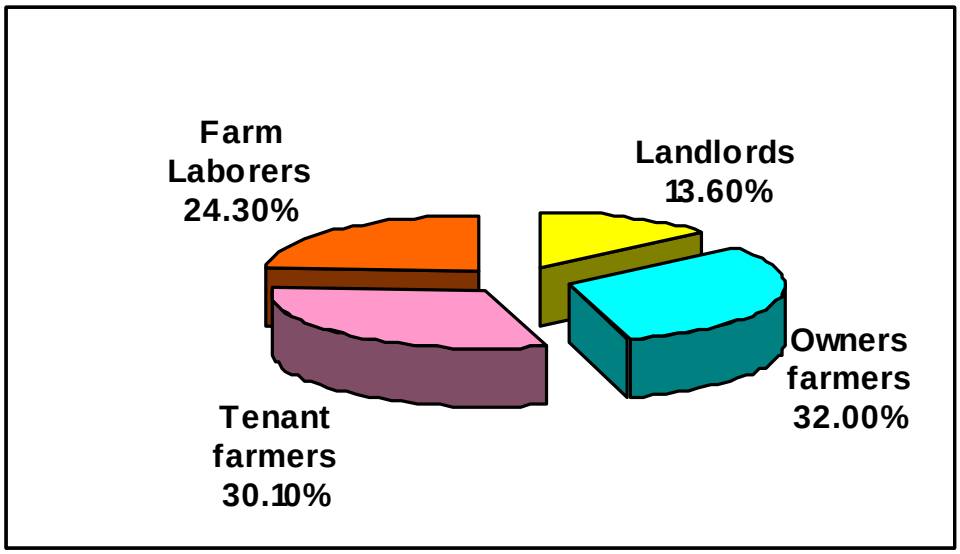
Diagram 1. Labor Force by Occupation in Ampreng Village



Source: Manginsela, Wahongan and Tulung, 2002

Based on the Ampreng Village profile, the status of the farmers in Ampreng is as follows: landlords 13.6 %, owner farmers 32 %, tenant farmers 30.1 %, and farm laborers 24.3 % (Diagram 2). This shows that more than a half (54. 4 %) of the farmers do not own any land. The average size of land per household is 0.5 ha, and no landowner has more than 5 ha.

Diagram 2. Status of Farmers in Ampreng Village



Source: Manginsela, et al., 2002

Landlords are agricultural land holders who are not involved in actual farming activities (JICA 2001). Most landlords in Ampreng are former owner farmers who are retired from farming. A few landlords have properties in other villages. Owner farmers are those who own and work on their farms, while tenant farmers are those who work on farms owned by landlords on the basis of the share product system. The tenant farming (*Tumoyo*) system is a local farming share system with the agricultural products being divided in half and shared by a tenant and landlord (JICA 2001).

Farm laborers are those who work only as daily workers in farms. Nearly a half of owner farmers and almost all tenant farmers often work as farm laborers because of the high cost of the crop. They choose this livelihood strategy to add to their income. Besides farm laborers, other strategies adopted are non-agricultural work, such as church workers, coachman horse and cow cart, or rat trappers.

Farm labors' work includes land preparation, planting, weeding, application of fertilizer and pesticide, harvesting, processing and transporting agriculture and forest products. Farmer labors have no land. They get daily wages from farm laboring and earn income from selling natural resources from the forest, such as bamboo, fuel wood, forest animals and herbs. These incomes are mainly to cover their daily expenses (JICA 2001).

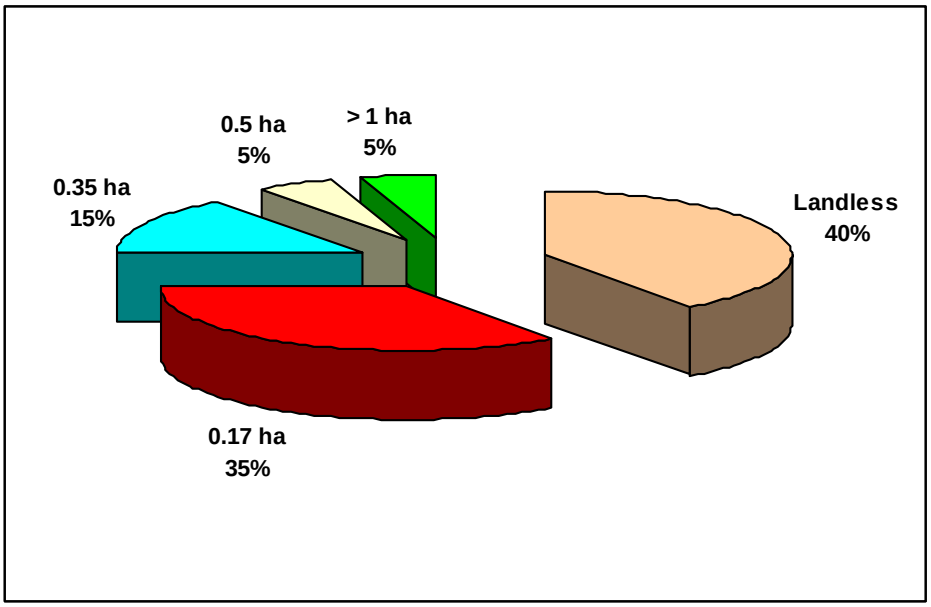
The people of Ampreng Village experience a severe shortage of agricultural land (JICA 2001). According to local leaders, approximately 30 % of agricultural land in Ampreng is owned by outsiders, limiting the availability of land for the Ampreng people. The majority of those landholders are from the neighboring village of Taraitak.

There are a few landlords who reside in Langowan town center, Raringis, and Tumaratas village. A lot of them have kinship with Ampreng people and purchase their land for investment purposes. Unfortunately, these purchased lands are often under-utilized or lie fallow. On the other hand, for Ampreng people, it is extremely difficult for them to purchase land in neighboring villages because of its increasing price over the last several years.

As a result, this shortage of farming land has forced some farmers to encroach the forest. The agricultural encroachers is almost 95%, with 40% being landless and 55% near-landless (Diagram 3). Their total average of land holding is 0.96 hectares consisting of 0.32 hectares *pasini* or individual owned land and 0.64 hectares protection forest land (JICA, 2001).

Moreover, the limited work opportunities in Ampreng village also led some farm laborers and tenant farmers to work in other villages, including rice fields in the sub-districts of Langowan and Kakas, and coconut fields in the Tonsea area in Kauditan District. They go to work in these areas on Monday and go home on Friday. As such, Ampreng becomes a labor supply village to its neighboring places.

Diagram 3. Land Holding of Agricultural Encroachment in Ampreng Village



Source: JICA, 2001

Concerning the occupation as rat trappers, there are three types of rat's hunting or collections: 1) collection by trap (*ba dodeso*), 2) collection through dog assistance (*mangawo*), and 3) collection through the use of air rifle (*ba tembak*). There are rat trappers from Ampreng village using dog assistance to catch the rats (*mangawo*) in Soputan Mountain Protection Forest. The trapper will go to the protection forest in the morning and go home in the afternoon with 20 rats, more or less. They will sell them to traders in the village. Yet in 2002 the number or rats decreased so many rat trappers went to Lolak and Kotabunan sub-districts in Bolaang Mongondow District to trap the rats. They went there on Monday and came home on Friday. They could catch 200 to 500 rats and sold them in Langowan district capital market.

Given these work situations, women in Ampreng Village are left with more responsibilities to manage their domestic and productive works. Unfortunately, such abilities to handle the work are often undervalued and invisible to outsiders, such as development agencies, to some degree signifying a gender inequity.

4.2.2 Access to and Control over Forest Resources within Households

The Soputan Mountain Protection Forest is a source of various forest products to fulfill and secure local community basic needs. Forest resources benefit local community, men and women in terms of reducing household expenses and adding their income (JICA, 2001).

The utilization of forest is practiced based on an agroforestry system. This system has a long time history and perpetuates from one generation to next generation in Ampreng Village. Agroforestry is a farming system consisting of trees, crops and/or animal husbandry. Since 1970, the government has started to introduce new types of trees, such as pines, changing the local agroforestry system.

Table 3 shows that women and men in Ampreng Village have access to forest resources in Soputan Mountain Protection Forest. According to key informants, for women access, to forest products is lower than men, except in seasonal cash crop and fuel wood, where both have an equal access and control. The access of women to seasonal cash crop is as managers or laborers in farming activities. Such roles are influenced by Minahasan culture following a traditional matriarchal social system (JICA, 2001). Therefore, all the children, regardless of their gender, have equal rights in terms of inheriting their parents' possessions when both of them have passed away. In seasonal cash crop production activities, women are important in planting, weeding and selling. The working loads, such as soil preparation and transporting products are usually done by men.

Table 3. Access, Control, and Utilize Forest Resources in Ampreng Village

Forest Resources	Access	Control	Utilize selling result
Fruit trees	W < M	W < M	M=W
Timber trees	W < M	W < M	W < M
Fuel Wood	W = M	W = M	W = M
Seasonal crop	W = M	W = M	W = M
Medicine plant	W < M	W < M	W = M
Forest vegetables	W < M	W < M	W = M
Wild animal	Men	Men	W = M
Honey	W < M	W < M	W = M
Spring	W < M	W < M	W = M

Source: Manginsela, et. al., 2002

It seems apparent that women and men have controls over forest resources in the protection forest. However, despite the fact that most of the forest resource controls are dominated by men, especially for rat trappers, selling the products and utilizing the money earned from this selling activity are based on the consensus between men (husbands) and women (wives). In Ampreng village, there is a tradition which positions wives as managers of their family income. Therefore, before they spend the money from forest products it is usually discussed by husband and wife.

There is a need for more information on how women and men access and control different space. According to Rocheleau (1996), women and men have different access

and control in different space (public space or private space). Other categories of space from FAO and UN (1989) are individual, communal, and reserved space. In the case of Soputan Mountain Protection Forest, it is a reserved space. However, people tend to treat it as a communal space.

4.2.3 Gendered division of labors within households and community

Gender responsibilities related to gender roles in household and community are reflected on the division of labors within households in reproductive, productive, and community activities.

1. Reproductive activities

As Table 4 shows, it seem obvious that women dominate domestic activities but in certain situations, men do not hesitate to cook, wash dishes, collect water and fuel wood, and take care of children. However, for laundry, bathing children, and health checking, women are likely to play a primary role, while housing repairing is done by men. In general, reproductive roles are characterized as the women domain.

However, as previously mentioned, some men look for jobs outside the Ampreng village as labor farmers or rat trappers, leaving wives or other women in the households with a greater work load.

Table 4. Reproductive Activities in Ampreng Village

Activities	Women	Men	Information
Cooking	√	√	**W > M**
Laundry	√		
Washing dishes	√	√	**W > M**
Cleaning the house			
Collecting fuel wood	√	√	**W > M**
Collecting water	√	√	**W > M**
Take care children:	√	√	**W > M**
- Bathing	√		
- Feeding	√	√	**W > M**
- Carry	√	√	**W > M**
- Put to bed	√	√	**W > M**
- Health checking	√		**W > M**
Housing repairing		√	

Source: Manginsela et. al. 2002

2. Productive activities

Table 5 demonstrates the division of labors between men and women in productive activities. In farming activities, women are mostly involved in seeding, planting, weeding, harvesting, and selling activities while men are involved in preparing land and transporting agricultural products. In animal husbandry, small animal husbandry is handled by women while big animal husbandry and traditional beverage processing is managed by men only.

Farming activities in the protection forest are conducted by people labeled as agricultural encroachers who cultivate season crops in the protection forest. They have started cultivating in the protection forest since 1947.

As labors, there are different wages for men and women in farming activity. Even though it seems similar that both of them get the wages US$ 2 a day for 8 hours, in fact male wages are higher than female. This is because men can have cigarettes worth 30 cents from those hiring them.

Table 5. Productive Activities in Ampreng Village

Activities	**Women**	**Men**	**Information**
1. Farming			
- Land preparation	√	√	W < M
- Seedling	√	√	W > M
- Planting	√	√	W > M
- Weeding	√	√	W > M
- Harvesting	√	√	W > M
- Transportation	√	√	W < M
- Selling	√	√	W > M
2. Big Animal Husbandry: Cow			
- Built stall		√	
- Collecting fodder		√	
- Feeding		√	
- Injection		√	
- Selling		√	
3. Small Animal husbandry: Chicken			
- Collecting fodder	√		
- Feeding	√	√	W > M
- Injection		√	
- Selling	√		
4. Processing traditional beverages (*saguer* and *cap tikus*)		√	

Source: JICA 2001 and Manginsela et. al. 2002

Besides laborers, women also play their roles as helpers for their husbands who own and manage the farm land inside the protection forest in all processes. However, some women also hold the status as managers handling their labors.

The division of labors in Ampreng village is shaped by Minahasan culture and Christian religious influences. Men and women share farm tasks under a more flexible ethos. It means the same opportunity for women and men to practice their capabilities in productive activities.

Besides farming activities, men and women in Ampreng Village also have opportunities to increase their income by joining temporary work involving restocking or replanting trees through reforestation in the protection forest, and re-greening in the village and near springs initiated by the government, churches, or private sectors in Ampreng village

Figure 4. Men working in the farm

Figure 5. Women working in farm

Table 6. Regreening and Reforestation Activities in Ampreng Village

Type of activity	Place	Initiatives by	Year	Women and men participation
A. Re-greening				
Trees	Private forest	Church	1980's	W = M
Coconut hybrid	Village	Government	n/a	W = M
Trees	*Tonkuya* spring	Government	1990's	W = M
B. Reforestation				
Trees	Protection Forest	Government through private sector (contractor)	1970's	W<M as labors
Cempaka and *Nantu* trees	Protection Forest	Government through Forest Office	2000	W = M as labors

Source: Ampreng Village Secretary

Table 6 shows the regreening and reforestation activities conducted by men and women in Ampreng village. It is obvious that in regreening activities, both genders are equally participating, while in reforestation, men dominate the work.

Moreover, to improve economic opportunities based on the local protection forest resources, the productive activities should be put under local agroforestry system development. In conjunction with this case, Swack (1990) argues for Community Economic Development (CED) proposing two concepts: 1) comparative advantage and 2) opportunity cost.

Comparative advantage refers to the relative efficiency of production, such as how a producer can produce several products more cheaply than its competitor. Opportunity costs refers to the cost of foregoing any economic activity that might otherwise have used up on the resources, such as a farmer who cannot grow bananas if he or she uses all of his or her land, capital, and labor to produce pineapples.

In light of Swack's perspective, there are some agroforestry products that can be explored in Ampreng Village. For example, the production of traditional beverages *saguer* and *cap tikus* (local alcoholic beverages) is made from sap of sugar palm (JICA 2001). *Saguer* is a fermentation which is distilled for *cap tikus.*

These two types of traditional beverages can be potentially further processed, with *saguer* being used for vinegar and *cap tikus* for medicine alcohol and ethanol. Medicine alcohol is produced to supply hospital needs and ethanol for cars. Also, the conversion of *cap tikus* to medicine alcohol will give a positive image to *cap tikus* products. Given wider market demands for this product at the National level, such products are worth developing.

Other local agroforestry developments can also be explored from seedling or nursery of local trees; organic farming; medicinal plants related to cancer and fever dengue, such as beetroots, pineapples, and guavas; local jam or salad from *pakoba* fruits; handicraft from bamboos; and home industries, like honeybee.

3. Community activities

Table 7 shows, in community or social activities, women and men in Ampreng Village are almost equally involved. There is a new phenomenon in a youth church organization where a woman has the position of chair of the organization. It indicates this young generation is likely to recognize women and give them more opportunities to take part in decision-making levels.

Table 7. Community Activities in Ampreng Village

Activities	**Women**	**Men**	**Information**
Church organization			
- Prayer group		√	M as a chair
- Woman church group	√		
- Youth church group	√	√	A girl as a chair
Social organization			
- Funeral association (*Rukun duka*)	√	√	W = M as chairs
- ROSCA (*Arisan*)	√	√	W > M as chairs
Village organization			
- Village youth group	√	√	A boy as a chair
- Village women group	√		

Note: ROSCA = Rotating Saving and Credit Association
Source: JICA, 2001 and Manginsela et al., 2002

On the basis of the above explanation, there are at least three strategies for the community to utilize the forest so that they can improve their economic status. First with regard to land tenure and livelihood strategies between households, it is necessary for the government to give user rights for the villagers so that they can utilize the forest legally and sustain the forest.

Also, women's capabilities in managing domestic and productive work in the absence of men who work outside the village should be recognized. As such, it is important because they can be prepared to be equal partners to their husband in managing forest resources, not merely as peripheral agents, so that, when they are involved in community-based sustainable forest management, they can be expected to be able to participate actively.

Second, the data of access to and control over forest resources of men and women within households revealed that there is an equal position in decision making to utilize the income from the forest. This position should be visible for forest development agencies in order to maintain their roles as the main providers of their households' basic needs. Such

recognition is likely to help secure the household economic status, so the level economic status can be maintained or improved.

In terms of division of labor, it is necessary to involve both gender especially women in developing the agroforestry system based on their skills. In doing so, it is likely that they can generate more income.

4.3 Gendered Organization

Rocheleau (1996) suggests exploring gendered organizations by tracing the reason underlying the emergence of the organization and their forms.

Based on the secondary data**,** particularly stakeholder information, it shows that there is no detail and complete information about the reasons for the emergence of each organization. Yet there are many forms of organizations related to the forest and little information related to gender. In Ampreng Village, the organizations related to the forest can be divided into five major groups based on their locations outside or inside Ampreng Village. They are Government, Church Organization, Non-Government Organization (NGO), Private Sector, and Academic organization. Each is explained below.

1. Outside Ampreng Village:
Government-related organizations dealing with protection forests in general consists of Forest Service Offices (North Sulawesi Province, Minahasa District, and South Minahasa sub-district Forest Management Unit), Water Resources Offices (North Sulawesi Province and Minahasa District), Land Rehabilitation and Soil Conservation Office, Agriculture Service Office (North Sulawesi Province and Minahasa District), Regional Development Planning Board, (North Sulawesi Province and Minahasa District), and Local Government (North Sulawesi Province, Minahasa District, West Langowan Sub-district).

Based on Act or *"Undang-undang"* (UU) Number 22/1999 and Act No.32/2000, it is stipulated that the responsibility of forest government is decentralized to regional government, especially to the District level (*Kabupaten*). Basically, almost all of decisions concerning protection forests are under District government authority which is supported by Provincial governments in the form of guidance.

The central government still holds decision making power in national planning of forest areas. In most cases, the central government only plays a role in providing criteria and indicators for forest management to ensure the sustainability. In case of rehabilitation and reclamation of production and protection forests, district governments hold authority to manage forests and provincial governments provide guidance. Forest management units are set up at provincial, district/municipality and local levels. The units take into account ecological, social, economic, and "community organization" aspects, including indigenous or local peoples and government administrative boundaries. The Minister may allow some units to exceed administrative boundaries depending on the nature of the forests.

Based on the regulation above, the government in-charge of managing forests in Minahasa area is Minahasa Forest Office District. The two important government stakeholders in relation to the Soputan Mountain Protection Forest is the District Office of the Forestry Services and South Minahasa sub-district Forest Management Unit responsible for conservation and forest management. This office is basically the implementation of the Province Forest Service Office and has a major role in the implementation of forest management program. Reforestation, as rehabilitation programs in forest state lands, and others duties are managed by this office based on the master plan and guidelines from the provincial office. This office provides the forestry management data and information, and monitoring and evaluation data and information regularly to the province office.

The sub-district Forest Management Unit in South Sub-district Minahasa is also responsible for the extension service, forest patrolling and general enforcement (Diagram 4). Minahasa District Forest Office Services are in general weak in conducting supervised implementation and providing available data and priority to extension service. Most extension workers do not have any real connections to the villages in which they must work. As a result, the work undertaken is not always successful because the extension service is rarely able to be on site. The main task of extension service and forest patrol is actually at the village level, but in general this office prefers to conduct forest patrol rather than the extension service. Also the limited number of the official staff compared with the wide area of the forest makes their work ineffective. The rarity of visits creates negativity in the community toward the forestry officers. Thus, it is considered that a forest management unit at the village level is non-existent.

In the past, several times re-forestation or re-planting activities were conducted by Minahasa District Forestry Office Service in the Soputan Mountain Protection Forest. Church organizations in the past, and still regularly, implement reforestation and conservation programs with the voluntary help from their church members.

Related to the Soputan Mountain Protection Forest, there are several types of religious groups, one of which is especially Man of Church Association of Minahasa Evangelical Church (*Gereja Masehi Injili Minahasa* - GMIM) in the Synod level. This group conducts re-greening activities planting types of timber trees. These activities relate to the concept of "*mapalus*," a local term that describes the willingness of the members of any group or villagers to work together to achieve common goals. The high social value placed on this tradition has evolved through the needs for social cohesion (JICA, 2001).

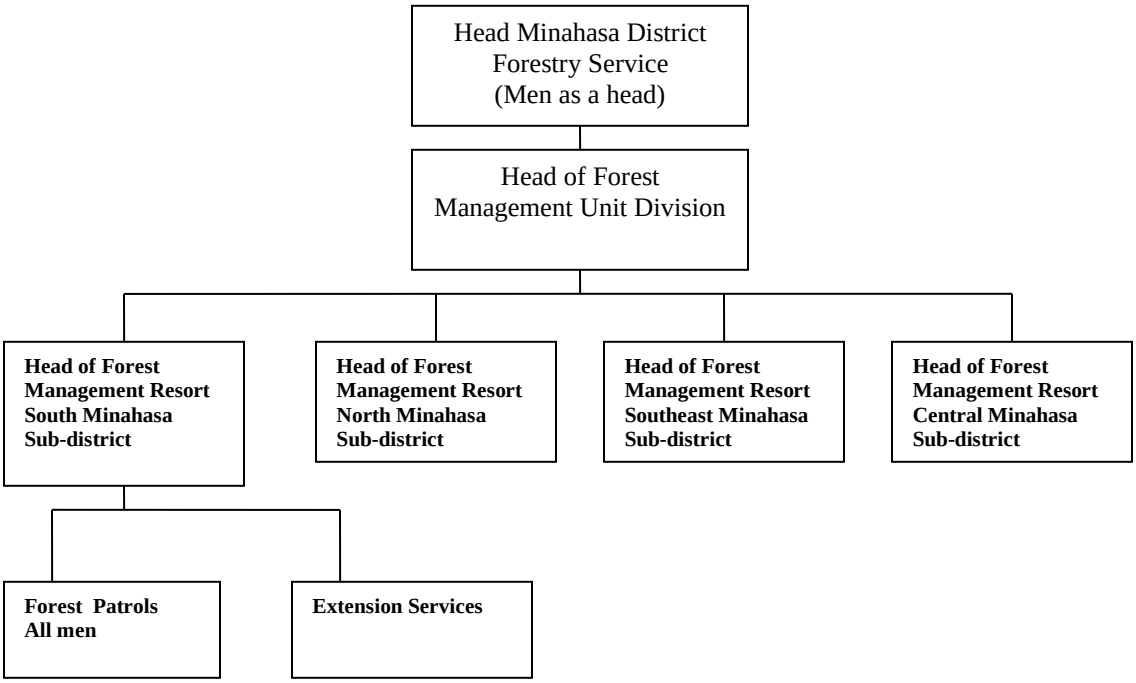
NGOs include local NGOs at the Provincial, District, and Sub-district levels, such as *Wanuata waya, Bina Swadaya, Manguni* and *Minahasa*. In Ampreng Village, up to this time, the NGOs have no activities reporting the Soputan Mountain Protection Forest, except religious groups from outside the village (JICA, 2001).

Academics consist of Sam Ratulangi University and Manado Public University. As academic institutions, the universities in Indonesia assign three major tasks to lecturers: lecturing, doing research, and conducting community services. There are many types of

research and community service activities. In Ampreng Village, the universities are involved mostly when they are doing research and also when their students participate in community services. Their activities are not focused on protection forests.

Private Sectors include private nurseries for seeds and seedling supply, and consultant and international support, such as the United States Agency for International Development (USAid), the Canadian International Development Agency (CIDA), and the Japan International Cooperation Agency (JICA). Private nurseries for seed and seedling supply are not sufficient in number, not have the amount of seed and seedling required. USAid and JICA have been involved in Ampreng Village to do research on the Protection Forest related to Tondano Lake.

Diagram 4. Organizational Structure Forest Management Units in South Minahasa Sub-district



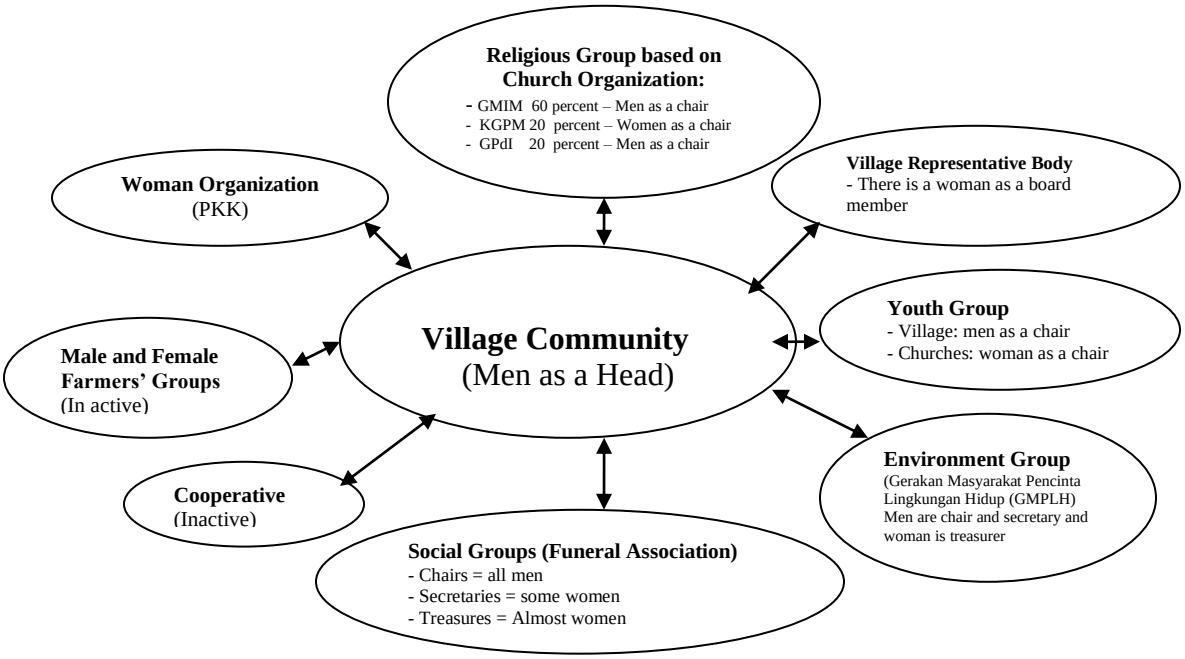
Source: Modification from JICA, 2001

2. Inside Ampreng Village

There are various organizations or groups inside Ampreng village. Ampreng Village community is very familiar with church, social and village organizations. In the board organization level, there are some women having the structural position allowing them to participate in the decision making process.

There are three Christian church organizations: Minahasa Evangelism Church (GMIM), Minahasa Protestant Church Unity (KGPM), and Indonesia Pentecost Church (GPdI). The decision making process, at the organization level, involves Parish or head of congregation positions, congregation board members, secretary, and treasurer. From three head congregations, it is found that one position is held by a woman from KGPM church while the other two are occupied by men.

Diagram 5. Community Groups in Ampreng Village



Source: Modification form JICA, 2001

Social organizations consist of funeral association and *arisan* or rotation and saving association (ROSCA). Funeral association relates to extended families association, church organizations, village, and hamlet organizations. The heads of funeral associations are dominated by men. However, some women have the positions as a secretary or a treasurer.

One household could at least have two memberships of these funeral associations, such as in families association and church organization.

The environment group was established in 1993 in the village with the head and the secretary being held by men while a treasurer by a woman. This organization is one of potential organizations to improve or rehabilitate the Soputan Mountain Protection Forest based on gender equity.

In Ampreng village, there are some organizations which only have names but are not operating actively. For example, one of them is the government cooperative organization. The main reason for this dormant activity is the mismanagement. Therefore, as Minerbi (2001) states following Waipi'o successful case, successful organizations in protection forest rehabilitation necessitate the implementation of community governance and capacity to create and support community-based management and community organizational capacity.

With these various existing organizations, it is of great importance to recognize and encourage more female participation in the organization. Their involvement is likely to develop some grounds for their participation in the Community-based Sustainable Forest Management Gendered Sensitive Project.

5. A MANAGEMENT PLAN FORMULATION OF A COMMUNITY-BASED SUSTAINABLE FOREST MANAGEMENT GENDER SENSITIVE PROJECT

This section formulates a management plan, based on Ampreng Village's conditions, to answer research question number 4.

Based on the findings in Chapter 4, user rights in the protected forest are necessary for Ampreng villagers, especially because of the agricultural encroachment of the landless and the near-landless. User rights provide these groups with the legality to cultivate in the forest while maintaining the forest's ecological health (Lessons learned from Guatemala; Gibson et al., 2002). Thus, I propose the Community-based Sustainable Forest Management Gender Sensitive (referred to as CBSFMGS) Project under the Community Forestry Program (CFP). The project provides the villagers with user rights through the FFG, which will receive funding, assistance, and facilitation from the central government through the Minahasa District Forest Services. This can be translated into planning and management of the forest in a sustainable way, while meeting their needs as well. The CBSFMGS Project will also address the issues of poverty, deforestation, and gender inequity. It will draw upon traditional knowledge and practices in the village as well as appropriate modern knowledge and practices from outside the village

The management plan for the CBSFMGS Project addresses the lack of information on local knowledge and use of forest resources with regard to gender by identifying and documenting local environmental knowledge of forest rehabilitation. The project also addresses illegal logging through the establishment of a policing system, which consists of forest patrols and FFGs (Lessons learned from Setulang, Kalimantan Timur case; Limberg, et al., 2006). To address poverty, the project implements an agro-forestry system to meet the basic needs of villagers (Lessons learned from Thailand; Suutari, 2007; and Bangladesh case; Sanzida Baten, 2005) by increasing household income, which in turn can support the children's education (Lessons learned from Bangladesh case; Sanzida Baten, 2005). To address the unsustainable farming practices, environmentally friendly farming activities are applied. This includes the reduction of chemical fertilizer and pesticide application (Learned from the Thailand case; Suutari, 2007).

This management project plan uses the enterprise strategy for conservation, also known as the eco-enterprise. This management project plan consults the BCN Enterprise Strategy Guide of Salafsky, et al. (1999), to evaluate whether the plan meets the suitable conditions to gain success. The results in some of the criteria fell in the "maybe if" area for the four factors. Therefore, according to Salafsky, et al. (1999), before formulating the management project plan, it is necessary to solve the problems regarding the four factors which fall in the "maybe if" area. Also, the project should have the lowest cost compared to other strategies. The implementation of an agro-forestry system not only addresses poverty but also deforestation as it did in the Kalimantan case in Indonesia (Cordes, 1999). Other sources of income come from the creation of nurseries of local or indigenous species which creates job opportunities (Learned from the African case;

Rocheleau, et al., 1996). To address gender inequity, the project also provides men and women with an equal opportunity to be members and serve as board members in the FFG. At the same time, women have access to financial and facilities assistance from the government to rehabilitate the forest (Lesson learned from India; Chaturvedi, 1998) and increase their income (Lesson learned from India; Chaturvedi, 1998).

A management plan formulation of a CbSFMGS Project based on the Measure of Success Framework Conceptual Model of Margoluis and Salafsky (1998) consists of the following:
1. Description of the Project Area
2. Details of the Project Activity
3. Conceptual Model of Problem and Intervention
4. Management Plan
5. Management Plan Timeline.

The detailed process of each stage is presented below:

5.1 Description of the Project Area

The Soputan Mountain Protection Forest is adjacent to Ampreng village. The total area of the protection forest is approximately 13,344 hectares. However, 21% or 2,803 hectares has been damaged due to slash and burn (12% or 1,650 hectares) and dry land agricultural activities (9% or 1,153 hectares) (JICA, 2001).

Given the isolated location of Ampreng village, the lack of infrastructure and no pro-poor policy or policy to aid the poor, poverty is a major problem. This problem and a lack of income cash have forced community members from Ampreng Village to go to the protection forest to cut trees, illegally damaging 130 hectares of forest and 30 hectares of farming area. They also do hunting that creates major threats to the Soputan Mountain Protection Forest, the highest point in the Tondano Lake watershed area. The community, including men and women of the Ampreng village is intensively involved in illegal farming activities inside the forests to grow crops, such as red beans, corns, and tomatoes. They also collect forest products, such as timber and non-timber products which they use to meet their family needs and earn cash income. In terms of gender involvement, the community hunting and illegal logging are done by men. However, in agriculture encroachment, both men and women are involved as managers and labors. The encroached area can be divided into three parts in terms of cultivation activities: *the lower part* is permanently used for tomato, maize, and beans cultivation; *the upper part* is temporarily used; and *the middle part* is in between these two (JICA 2001). As for the number of encroachers, there are men and women from five villages in Tondano Lake watershed: Ampreng, Tumaratas, Raringis, Noongan and Toure villages with the highest number being from Ampreng Village. As a result, the encroachment stimulates deforestation and forest degradation.

To prevent further deforestation and degradation, I propose the CbSFMGS Project. The project plan is under the umbrella of the CFP which aims to incorporate the local

community, both men and women equally, in the forest management, the rehabilitation of the protection forest, and the development of forest products that will increase the community income.

5.2 Details of the Project Activity

Under the CbSFMGS Project, the local communities living near the protection forest are granted a community forest concession through a Forest Farmer group (referred to as FFG) as a local formal organization. This program ensures that the local community, both men and women, surrounding the protected state forest will have concession rights to manage the forest based on their needs, capabilities, and knowledge.

The main source of funds, under the CFP, is the central government, the Minahasa District Forest Service Office, and other (Forest Ministry Decree No. P. 37/Menhut-II/2007). However, it is possible to cooperate with large international institutions, such as the Ford Foundation from the United State, the Japan International Cooperation Agency (JICA) from Japan, and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) from Germany. Other types of support are obtained from NGOs and the universities such as Sam Ratulangi University and Manado Public University. The plan's implementation will last for 20 years.

5.3 Conceptual Model of the Problem and the Intervention of the CbSFMGS Project based on Ampreng Village Conditions

The area consists of various forest plants and animals, some of which are endemic. The major threat to the forest biodiversity and functions is the destruction of the ecosystem through deforestation.

The conceptual model of the problem of the community in Ampreng Village living near the Soputan Mountain Protection Forest is based on the conceptual model of Margoluis and Salafsky (1998) combined with Marten's (2007) Eco-Tipping points' concept.

The conceptual model of the problem of this project according to Margoluis and Salafsky (1998) consists of a target condition, the major threat, and direct threats. *The target condition* of this project is to address the Soputan Mountain Protection Forest. The area consists of much biodiversity of plants and animals, some of which are endemic species. *The major threat* to plants and animals is the destruction of habitat through deforestation. Deforestation of the protection forest is caused by *a number of direct threats*, including illegal logging, followed by agricultural encroachment and community hunting. The community hunters go after rats and snakes for food and sale. Another threat to the protection forest is the collecting of non-timber forest products such as fuel wood. Agricultural encroachment has a high potential to increase due to a lack of farming land and the need for income to cover farming capital, health, education, and daily needs. A number of direct threats are results of poverty due to a lack of poor aid policies, such as expensive health care services and education. Women have important roles in domestic and economic activity, especially in farming activity. Also, they have significant roles in forestry activities such as re-greening and reforestation, and hold high positions in related

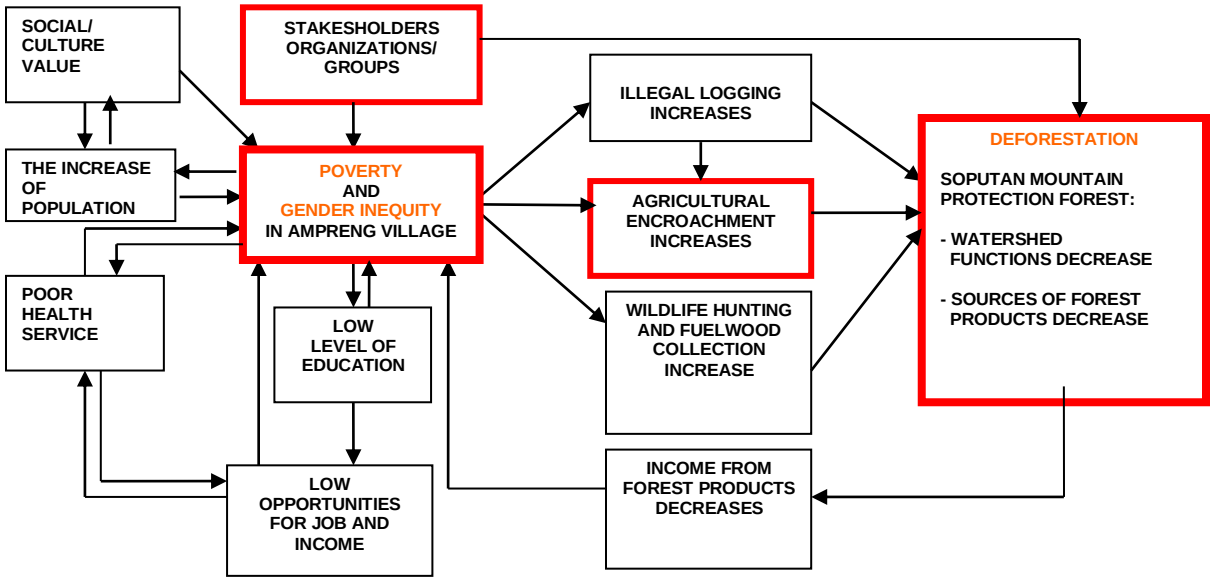
organizations such as chairs, secretaries and treasurers. However, their works are undervalue as their farming wages are lower than men's.

The EcoTipping points portion of the conceptual model comprises a vicious cycle which begins with a negative tipping point in Ampreng village (Diagram 6) due to poverty and gender inequity. Poverty in Ampreng Village has caused low education levels, shortage of jobs, decrease of land availability, poor access to health services, and is a result of the growth of the village population and certain social or cultural values underlying the community. It is often the case that serious illnesses force villagers to sell their land to get cash money for hospital costs. The increasing number of families or households leads to an increase in farming land demands. As for social or cultural values, parents usually want to hold a big party for their children's wedding day and also really want to give land to their children when they get married. As a result, when the parents' land has been lost or become smaller, their income decreases and they need cash. These situations force the men and women of the local community to exploit the Soputan Mountain Protection Forest. Men do illegal logging and hunting. Both men and women do agriculture encroachment and collection of fodder and fuel wood. These activities have degraded the forest through deforestation and as a result, the hydrological function has declined (Table 8, Diagram 7 and 8). The hydrological functions include storing and distributing water and preventing natural hazards. The degradation of the forest has caused other forest products, such as non-timber products, to decrease. In turn, this decrease in non-timber products, such as honey, vegetables, and fruits has caused the people surrounding the forest to become poorer, especially women, who depend more on forest products than men to meet their family basic needs. Moreover, the decline of watershed function has generated flooding, soil sliding, and other natural hazards.

One block of the new model, based on a combination of Margoluis and Salafsky's conceptual model and Marten's EcoTipping Points consists of the target group, Soputan Mountain Protection Forest, and the major threat, deforestation. The direct threats in the conceptual model, also considered as cause and effect chains in the EcoTipping Points concept, are: poverty, illegal logging, agricultural encroachment, forest animal hunting, and fuel wood collection, and stakeholders. Moreover, deforestation affects income from forest products. Other cause and effect chains in the EcoTipping Points or indirect threats in Margoluis and Salafsky's conceptual model are level of education, opportunities for job and income, health service, population growth, and certain social/culture values.

A conceptual model of development intervention, formed by the CbSFMGS Project, into the problem constructed as a virtuous cycle starts from a positive tipping point by the intervention of an agroforestry system under the CbSFMGS Project (Diagram 9), which can stimulate income generation. Income generation through direct sales of the product or through processing in home industry, in turn, help people, men and women, to get out of poverty. Implemented agroforestry, by emphasizing the planting of multipurpose trees and perennial permanent with high canopy trees in the Soputan Mountain Protection Forest can increase tree coverage to rehabilitate cleared land caused by illegal logging, and at the same time can fulfill the basic needs and cash demand of the community.

Diagram 6. Conceptual Model of Problem based on the Ampreng Village Conditions



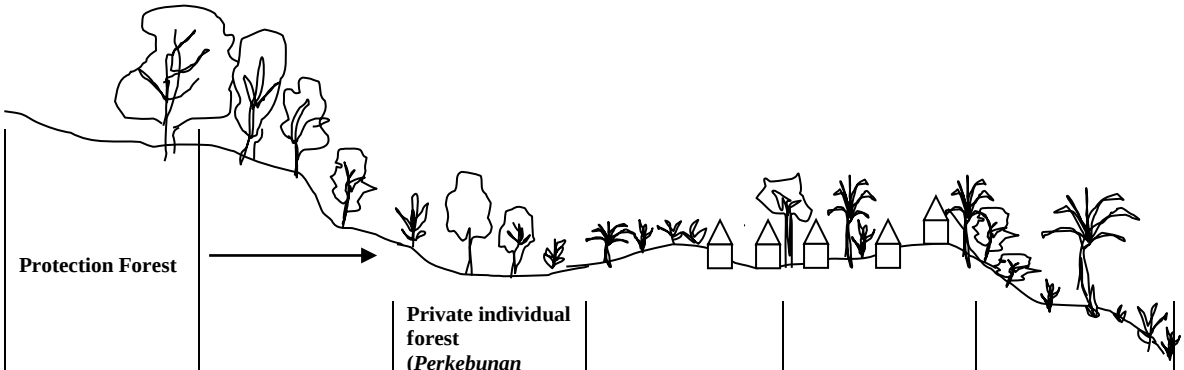
Constructed based on Margoluis and Salafsky Conceptual Model of Problem (1998) and Marten (2007) EcoTipping Points concept.

Table 8. Timeline of Community and Forest in Ampreng Village

1900 – 1943	as a part of farming land of Paslaten, Lowian, and Tumaratas Village people started to built settlement in this farming land
1944 – 1945	as a part of Raringis Village area
1946	as a part of Paslaten, Lowian, and Tumaratas Village
1947	established as a village: Ampreng village
1970's	trees started to decline in the forest, pines introduced settlement started to increase quality of water started to decrease replanting in forest and *Tongkoyo* spring; planting: of Nantu and Pines
1975	an organic fertilizer and pesticide introduced Planting of *Kaliandra* and Pines
1977	reforestation in the forest by government trough private sector (contractor); planting of Pines, Acacia, Kaliandra
1979	planting of Pines, Mahogani, Acacia, *Sengon*, and *Kaliandra* trees by government (Forestry Service) in Ampreng Village
1980's	fruit trees declined replanting in village and forest by church the use of inorganic fertilizer to increase farm yield the use of pesticide to prevent to decrease farm yield illegal logging increased
1985	replanting/reforestation in protection forest
1986	Soputan Mountain Eruption (eruption every 5 – 10 years) wild animal decreased
1989	replanting/*reboasasi* in forest, planting pines
1990's	fuelwood declined honey declined number of springs declined the use of anorganic (chemical) fertilizer for farming continued to increase the use of pesticide for farming continued to increase
1991	re-greening in farming area (*onderneming*) by Church Organization; Planting of *Mahogani*, Acacia, and Cinnamon
1995	replanting in spring area, village, and forest by government
2000's	replanting in village and forest flooding, soil erosion, and bridge damage occurred

Source: JICA Tondano Lake Study Team, 2001; and Manginsela, Wahongan, and Tulung, 2002

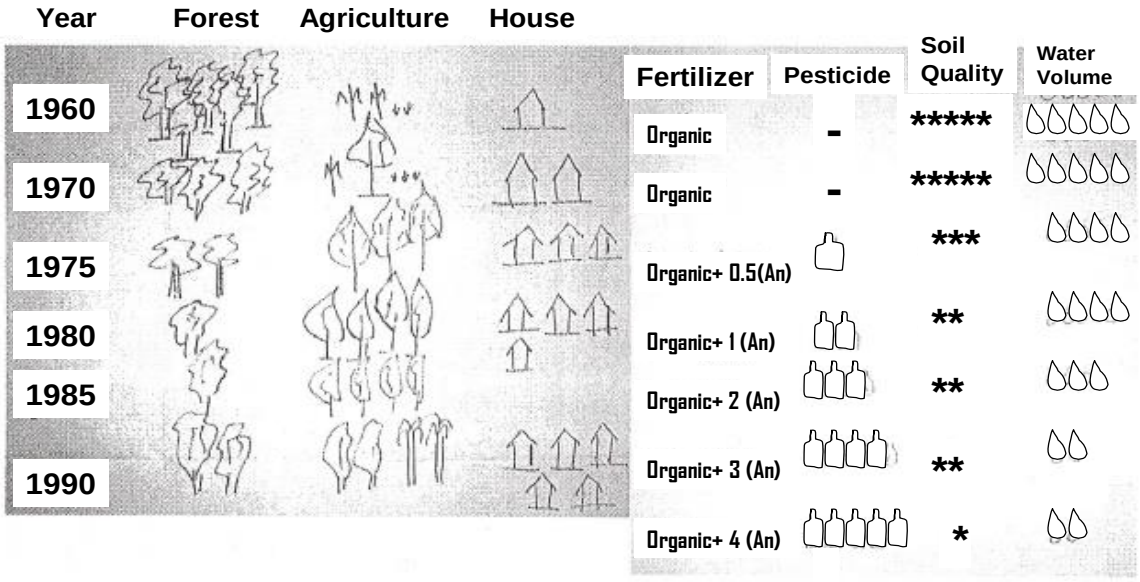
Diagram 7. Transect Village Walk in Ampreng Village, Sub-District Langowan Barat, Minahasa Indonesia



	Protection Forest		Private individual forest (*Perkebunan rakyat*)	Village	
Soil	Sand and Small stone	Sand and Soil	- Clay soil with sand - White soil/ Sulphur	Black soil with sand	Clay Soil
Water	Rain water	Rain water	Rain water	- Dwell about 20 meters	Spring and River
Types of Plant	*Beringin, Cempaka, Pinus, Mahoni, Kailandra*	*Cempaka Tayapu Walantakan Marintek*	- Red Wood - Corn - Tomatoes - Ground nut	Bamboo Coconut Banana Mangos Papayas Vegetables crop	- Read bean - Corn - Tomatoes - Rice - Ground nut - Coconut
Fertilizer	- Fertilizer (from cow, horse and pig) - Chemistry (anorganic) fertilizer	- Fertilizer (from cow, horse and pig) - Chemistry (anorganic) fertilizer	- Fertilizer (from cow, horse and pig) - Chemistry (anorganic) fertilizer	- Fertilizer (from cow, horse and pig) - Chemistry (anorganic) fertilizer	- Fertilizer (from cow, horse and pig) - Chemistry (anorganic) fertilizer
Production	- rattan - fuel wood (dried branch) - hunting wild pig	- fuel wood (dried branch) - bamboo - batako wood	- corn (loose) - ground nut - potatoes - tomatoes - red bean (loose and dried)	- pig meat - beef meat - duck egg - chicken - horse	- rice - read Bean - ground nut - coconut - corn (loose)
Problems	- the decline of the quality of spring water - illegal logging - water debit 15 lt per minutes	- a shift from private forest to industry - a lot of cutting trees	- heavy fertilizer - plants disease - damaged road to farming land - expensive fertilizer price - rat disease	- running out of water every dry season - animal husbandry disease (cow and horse) - cooperative being inactive - low participation of farmers in cooperative - water supply (PAM) from Noongan not working since 1994	- expensive heavy fertilizer (high cost of production - Pests of rats - the damage of chilly stem because of pests

Source: JICA, 2001 and key informant

Diagram 8. Trends Analysis for Ampreng Village

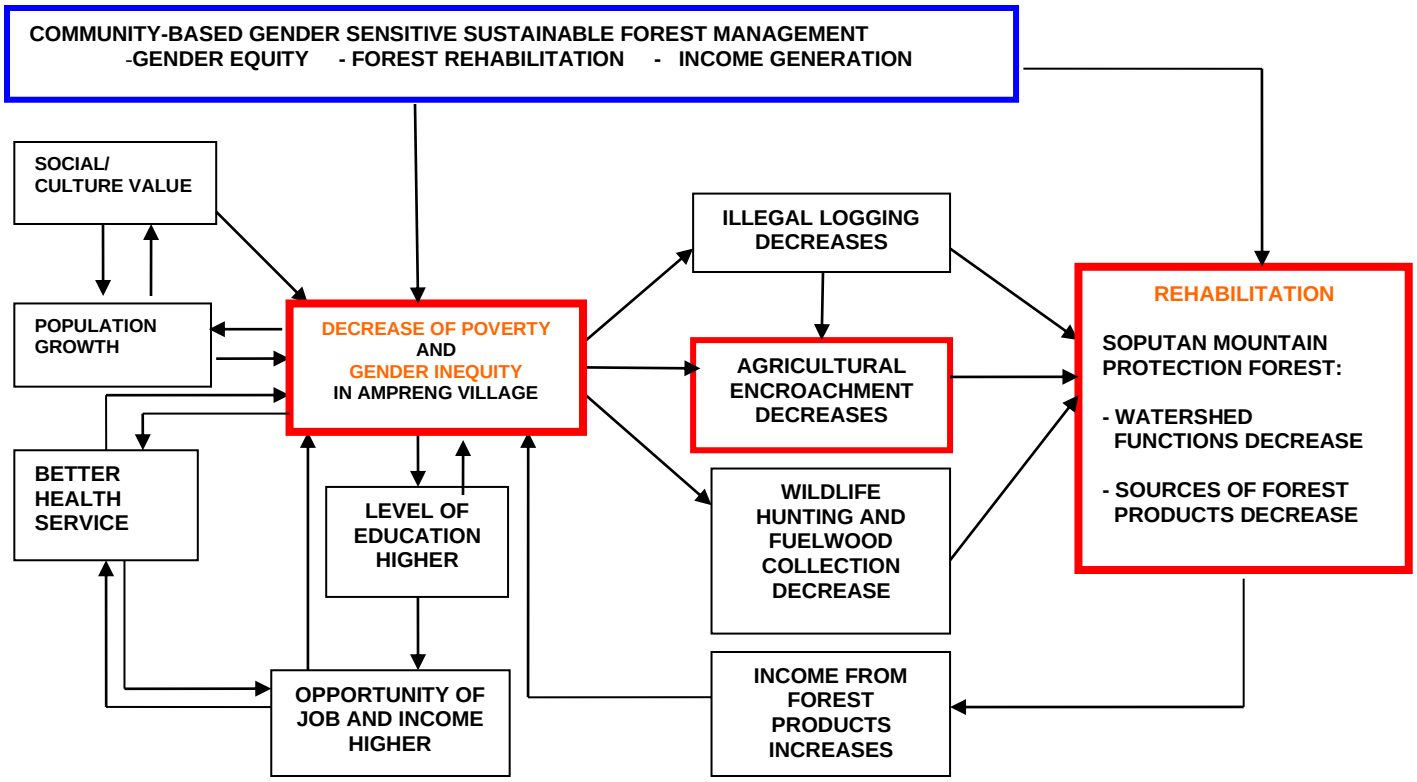


Source: JICA, 2001

Note: (An) = An Organic

Modification from JICA, 2001

Diagram 9. Conceptual model of problem and development intervention of Cb-SFMGS project based on Ampreng Village Condition



Constructed based on Margoluis and Salafsky Conceptual Model of Problem (1998) and Marten (2007) EcoTipping Points concept.

Meeting basic needs and cash demand allows the community to be able to improve their education and in turn provide opportunities to have better jobs and income. The system will reinforce itself in terms of environment recovery and improving the local community's quality of life.

5.4 The Management Plan: Mission, Goal, Objectives, and Activities

A good management plan should be based on an accurate conceptual model of the problem reflecting local conditions (Margoluis and Salafsky, 1998). A good management plan, based on a measure of success, can serve as a tool to provide good understanding of the factors that influence the target condition and to facilitate identification and ranking of the important threats that relate to the target condition.

A management plan consists of missions, goals, objectives, and activities (Margoluis and Salafsky, 1998). A mission is a statement of a long-term desired outcome and the general strategy for achieving it. A goal is a general statement of the desired state that a plan or project is working to achieve. The criteria of a good goal include being visionary, relatively general, brief, and measurable. The objectives are specific statements describing the desired outcomes of a project or plan. A good objective is impact oriented, measurable, time limited, specific, and practical. Activities are specific actions or tasks undertaken to reach the project's objectives. A good activity meets the following criteria: linked, focused, feasible and appropriate. A good management plan is parallel with its mission in helping all stakeholders focus their effort and can help select suitable institutions to work together.

In addition, a strong relationship between a management plan and a conceptual model determines a successful project. Also, a management plan requires precise and strong linkages between the goal and objectives, and between objectives and activities to make success more likely. A suitable management plan based on a conceptual model is shown below.

A Management Plan for Ampreng Village

Mission

FFG members, including both men and women, seek to rehabilitate the Soputan Mountain protection forest by cooperating with the government to develop long-term integrated conservation strategies and strive to maintain gender and social equity, open and transparent relationship, public accountability, law enforcement, and democratic relationships within and among each other.

Project goal: To rehabilitate the Soputan Mountain protection forest and to generate household income for men and women members of FFG.

Objective 1. Gender Equity through equal opportunity

By the end of the fifth year, all men and women of FFG will have the same opportunity to become members, board members, and to receive government assistance.

Activity 1. Increase capacity building of men and women of FFG
Activity 2. Increase management capability of men and women of FFG
Activity 3. Increase leadership capability of men and women of FFG

Objective 2. Forest Rehabilitation through the improvement of the agroforestry system based on gender knowledge and needs.

By the end of the second year, a suitable agroforestry system based on gender knowledge and practices documented on a study report will have been applied. Within five years, all of the FFG members as the participants of CbSFMGS Project should have applied the suitable agroforestry system based on gender knowledge to rehabilitate the protection forest

Activity 1. Identify and document local agroforestry system based on gendered knowledge and needs
Activity 2. Formulate a suitable plan of local agroforestry system based on gendered knowledge and needs
Activity 3. Implement a suitable plan of local agroforestry system based on gendered knowledge and needs

Objective 3. Income generation through agricultural products, handicraft and home industries

By the end of the of the project, the annual household income of the men and women of FFG will have increased by at least 50 percent based on sales of the protection forest products, organic and non-organic agricultural products, bamboo handicrafts, and brown sugar, local jam, and traditional beverage home industries, using the support funding from the government.

Activity 1. Survey market demands for farming organic, agricultural products, handicraft and home industries
Activity 2. Facilitate and support local savings and loans institutions for men and women
Activity 3. Improve existing skills and provide new skills for men and women of FFG related to organic agricultural products with high market demands and high returns
Activity 4. Improve existing skills and provide new skills for men and women of FFG related to non-organic agricultural products with high market demands and high returns
Activity 5. Improve existing skills and provide new skills for men and women of FFG related to bamboo handicrafts to improve quality and encourage creativity
Activity 6. Improve existing skills and provide new skills for men and women of FFG related to brown sugar home industries to improve quality
Activity 7. Improve existing skills and provide new skills for men and women of FFG related to local jam or salad of *pakoba* fruits to improve quality
Activity 8. Improve existing skills and provide new skills for men and women of FFG related to traditional beverages to improve the quality

5.5 Project Management Timeline

A timeline is necessary to show major activities and tasks involved. It also shows how much time the various activities need to accomplish tasks and the relationships among different activities (Margoluis and Salafsky, 1998). An alternative of the Ampreng Village timeline (Table 9) based on a management plan for a 20 year project is presented below:

Table 9. Timeline of Management Project for Ampreng Village

Monitoring task / Project Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Mission FFG members, men and women, seek to rehabilitate the Soputan Mountain protection forest by cooperating with the government to develop long-term integrated conservation strategies and strive to maintain gender and social equity, open and transparent relationship, public accountability, law enforcement, and democratic relationships within and among each other.																		
Goal : To rehabilitate the Soputan Mountain Protection Forest																		
Preparation	x																	
O 1. Gender Equity through equal opportunity																		
Act. 1. Increase capability building of men and women of FFG	x	x				x				x				x				
Act. 2. Increase management capability of men and women of FFG			x				x				x				x			
Act. 3. Increase leadership capability of men and women of FFG				x				x				x				x		
O 2. Forest Rehabilitation through improve agroforestry system based on gendered knowledge and needs																		
Act. 1. Identify and document local agroforestry system based on gender knowledge and needs	x	x									x							
Act. 2. Formulate a suitable plan of local agroforestry system based on gender knowledge and needs		x	x									x						
Act. 3. Implement a suitable plan of local agroforestry system based on gender knowledge and needs			x	x									x					
O 3. Generate income through agricultural product, handicraft and home industry																		
Act 1. Survey market demands for farming organic, agricultural products, handicraft and home industry	x										x							
Act 2. Facilitate and support local savings and loans institutions for men and women	x										x							
Act 3. Improve existing skills and provide new skills for men and women of FFG related to farming organic products with high market demands and high returns		x										x						
Act 4.Improve existing skills and provide new skills for men and women of FFG related to agriculture products with high market demands and high returns		x										x						
Act 5. Improve existing skills and provide new skills for men and women of FFG related to bamboo handicrafts to improve the quality and encourage the creativity			x										x					
Act 6. Improve existing skills and provide new skills for men and women of FFG related to brown sugar home industries to improve the quality				x										x				
Act 7. Improve existing skills and provide new skills for men and women of FFG related to local jam or salad of *pakoba* fruits to improve the quality					x										x			
Act 8. Improve existing skills and provide new skills for men and women of FFG related to traditional beverages to improve the quality					x										x			

6. EVALUATION PLAN OF COMMUNITY-BASED SUSTAINABLE FOREST MANAGEMENT GENDER SENSITIVE PROJECT

This section formulates an evaluation plan based on Ampreng Village situation, to answer research question number 5.

6.1 Project Overview

6.1.1 The problems addressed by the project

The purpose of this section is to present a summative evaluation design plan of the Community based Sustainable Forest Management Gender Sensitive (referred to as CBSFMGS) project in Ampreng Village, North Sulawesi, Indonesia. The CbSFMGS aims to address three major problems: 1) gender inequity in forest rehabilitation, 2) deforestation of the Soputan Mountain Protection Forest, and 3) poverty in Ampreng Village, North Sulawesi, Indonesia.

Based on the National Census conducted in 2000, the total population of Ampreng Village is 1,285, consisting of 680 males and 605 females, from a total of 393 families (Manginsela et al., 2002). The majority of the Ampreng Village labor forces (72%) are farmers. With regard to land ownership, 54.4% of the farmers do not own land. The village area is 113 ha and the population density is 1,137 per square kilometer. The average size of land per household is 0.5 ha and no landowner has more than 2 ha (Japan International Cooperation Agency or JICA, 2001).

In terms of the education levels, the education of the head of the family is as follows: Have not completed Elementary School is 55 %, Elementary School and Junior High School is 38 %, and Senior High School and above is 7 %. It is obvious that the level of education in the village is extremely low since more than a half of the heads of families never completed their elementary education.

Concerning the first problem, gender inequity, it seems apparent that in relation to rehabilitation addressing deforestation, women have not been fully recognized in their roles and participating (Ardayfio-Schandorf, 2007). This general view is also the case for women in Ampreng Village. Despite the fact that women are highly involved in utilizing the forest and have capabilities in forest management, this gender is often marginalized to voice their concerns and contribute their thoughts to the issue of deforestation. Their roles and participations tend to be confined as laborers utilizing forests to provide basic sustenance for the families. Such an inequity might lead to a narrower scope of solution of deforestation because by nature, women are likely to have different approaches, perspectives, and practices in utilizing and managing forests than men.

The research site of the project, Ampreng village, is located adjacent to the Soputan Mountain Protection Forest. The Soputan Mountain Protection Forest is the widest (approximately 13,3440 hectares) protection forest in North Sulawesi Province. The peak of the Mount Soputan is the highest point in the Tondano Lake watershed and is located about 40 kilometers from the mouth of the Tondano River at Manado. Therefore,

the Soputan Mountain Protection Forest and Ampreng Village are located on the upper of Tondano Lake watershed area. The position of the Soputan Mountain Protection Forest and Ampreng Village at the upstream of Tondano Lake Watershed have important roles because what happens in that area will give tremendous impacts on the area in the lowland, particularly Tondano Lake and Manado city.

Like other Mountain Forests in the world, the Soputan Mountain Protection Forest mainly serves three functions: protection, production, and welfare functions (But and Price. 1999). The protected function is to protect watersheds that supply fresh water, habitat wildlife, and to decreases this risk of natural hazards. As the production function, the forest becomes the source of timber and non-wood products, food for mountain people and fodder for their livestock. Also, the welfare or amenities function provides recreation, cultural value, and education.

As for the second problem, unfortunately with such essential functions, the forest experiences the highest deforestation (21 percent or 2,803 hectares) compared to the other nine protection forests in North Sulawesi. The deforestation impacts the upland of the watershed, that can further bring about flooding, erosion, decreased water source and quality, as well as decreased source of food, fuel wood, and others, crucial for the basic need of the community surrounding the forest.

Regarding the third problem, it is the case that the geographic isolation of Ampreng Village, lack of infrastructure, limited access to land, and the lack of a poor aid policy have contributed to the high level of poverty (40-60 percent) of families in the village and other villages surrounding the protection forest, especially after the Asian Financial Crisis in 1998. As a result, poverty, subsistence needs, and cash requirements for livelihood have forced people to do illegal logging and agricultural encroachment in the protection forest. The encroachers involve villagers from Ampreng, Tumaratas, Raringis, Noongan, and Toure, with the highest number from Ampreng Village.

To prevent further deforestation, I propose a Community-based Sustainable Forest Management Gender Sensitive or CbSFMGS Project to be conducted in Ampreng Village. The CbSFMGS Project enables local community, men and women to have user rights access to the Soputan Mountain Protection Forest. The CbSFMGS Project objectives are to promote gender equity to the local community, especially the agricultural encroachment families, so that men and women can be equally involved in the protection forest management, rehabilitate the protection forest, and improve the local community's family income.

6.1.2 The development of the project

The CbSFMGS Project primarily stems from concerns of serious deforestation in Soputan Mountain Protection Forest related to three aspects: 1) gender inequity, 2) deforestation and 3) poverty.

The project is developed through bottom up and top down approaches. Bottom up approach means that the project departs from the problem identifications of the deforestation found in Ampreng Village based on conceptual model of problem of Margoluis and Salafsky (1998) guideline and Marten (2007) EcoTipping Points model (Diagram 6 and 9). Top down approach means that the project is not independent, in that it is incorporated under the government initiated program, known as CFP.

The Community Forest program was first passed in 1995 by Ministerial Decree No. 622/1995 under the administration of the Directorate General of Reforestation and Land Rehabilitation (Lindayati, 2003). Based on the Minister of Forestry Act in 1995, 1998, 2001 and 2007, the CFP fundamentally intends to improve local community welfare while enhancing the hydrological cycle of protection forest functions. Due to the decentralization in 1999, a revised decree was passed (Ministerial Decree Number 31/2001) in 2001, allowing district regents to issue the right user for the communities to manage state forests.

Under the CbSFMGS Project, the local communities living near the protection forest are granted a community forest concession through the FFG as a local formal organization. The concession is valid for a period up to a maximum of 35 years. This program ensures local people surrounding the protected state forest have concession rights to manage the forest based on their needs, capabilities, and knowledge.

6.1.3 The Project operation

At the implementation level, the CbSFMGS Project involves the participation of men and women as members and board members of FFG, the local formal organization responsible for forest rehabilitation. This group will execute the CbSFMGS Project.

The CbSFMGS Project is conducted in conjunction with the capacity-building of FFG as the local formal organization embodying the cooperative organization. Technical and management assistance will be provided by the government using services of Non Government Organizations (NGOs) and universities, aside from those of the government extension agents.

As members of FFG, each member will have a minimum of one hectare with a minimum number of permanent trees with high canopy or crown requirement 400 per hectare combined with other middle and low canopy trees with a total of 1,050 to 1,300 trees normally. The cost of plantation, maintenance, farming input, and tillage cost in the first year will be provided by the Forest Department and/or other sources, such as private sectors or international institutions.

The following are the operational steps of the project, under Community Forestry Program (Ministry Forestry of Republic of Indonesia Decree Number P. 37/Menhut-II/2007, Chapter 8-16, 23, 25, 27-31, 35). First, the farmers in Ampreng Village establish FFG, a local, formal organization. Second, FFG applies to Minahasa District Forest Service (referred to as MDFS) for Community-based sustainable forest management gender sensitive. Third, the MDFS selects, approves the application, and gives the land user rights. Fourth, FFG distributes the land among the members and MDFS provides assistance and funding. Fifth, FFG formulates the implementation and evaluation plan. Finally, FFG implements and evaluates their plan.

6.1.4 Source of funding

The main source of funding for the CbSFMGS Project under the CFP is from the central government, Minahasa District Forest Service (MDFS), and others (Ministry Forestry of Republic of Indonesia Decree Number P. 37/Menhut-II/2007, Chapter 37). The government as the main source of funding can cooperate with large international institutions, such as the Ford Foundation or USAid from the United States, Japan International Cooperation Agency (JICA) from Japan, and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) from Germany. Other types of support can be obtained from Non Government Organizations (NGOs) and Universities. The planning implementation lasts at least for 20 years; therefore, the period of summative evaluation will be at least 20 years to consider the trees age to be mature and the farmer can get the trees products, such as timber or fruits.

6.2 The Key Assumptions Project Based

6.2.1 The key assumptions

In this project, gender equity is conceptualized as equal opportunities for men and women to apply their knowledge about forests and there utilization, and rehabilitation. Also, it refers to equal opportunities in responsibility for forest rehabilitation and benefits from the forest. Such a conceptualization is of great importance to propose in this project because women and men play different roles in dealing with and managing environment, including forest. They also have different needs in forest utilization. Moreover, at the essence of forest rehabilitation, it seems apparent that women are the party being severely affected by forest deforestation, but they also can be potential agents of forest rehabilitation. To realize and achieve this gender equity, the project proposes that men and women become members and board members of the local forest organization or FFG. By joining this organization, women can have a chance to move from laborers to managers or from workers to producers, elevating the women's status in forestry.

Based on the above grounds, the key assumptions underlying this project are to promote gender equity, rehabilitate forest, and generate income. It means that the CbSFMGS Project increases gender equal opportunities to rehabilitate the protection forest and generate income from forest utilization.

6.2.2 The key implementation tasks

The key implementation tasks and Program Theory of the program are presented below:

Program theory and/or implementation logic

Minahasa District Forest Service office is in charge of making rules about how access is managed by men and women.

Key Implementation Activities		**Assumption of Program**
The farmers establish their Forest Farmers Group (FFG) as a formal organization	→	The farmers establish a formal FFG organization
The FFG proposes CbSFMGS Project under CFP to the Minahasa District Forest Service.	→	The Minahasa district forest service office receives and approves the FFG proposal
The Minahasa District Forest Service office gives the FFG concession rights	→	The FFG receives the concession rights from the Minahasa District Forest Service
The FFG distributes the land among the members of the group	→	The land is distributed among the members of the FFG
The Minahasa District Forest Service provides the farmers with assistance and funding for the FFG members	→	The FFG members receive assistance from the Minahasa District Forest Service
The FFG formulates the management and evaluation design plan	→	The management and evaluation design plan are formulated by the FFG
The FFG implements the plan	→	The plan is implemented by the FFG
The FFG evaluates the effectiveness of their plan implementation	→	The effectiveness of their plan implementation is evaluated by the FFG
The CbSFMGS Project demonstrates the effectiveness	→	The effectiveness is measured from the reduction in - Gender inequity - Forest deforestation - Poverty

6.2.3 The target audience of the evaluation

The target audience of the evaluation is the government as the source of funding, assistance, and the provider of the concession rights for the Soputan Mountain Protection Forest. Also, the target audience is the participants of the Community-based Sustainable Forest Management Gender Sensitive Project in Ampreng Village.

6.3 The Evaluative Questions, Indicators and Analysis

6.3.1 Evaluative questions

This evaluation design aims to answer the three evaluative questions:

1. To what extent has the CbSFMGS Project encouraged women equity to rehabilitate and benefit from the forest as members and board members in FFG?
2. To what extent has the CbSFMGS Project resulted in successful forest rehabilitation?
3. To what extent has the CbSFMGS Project resulted in successful income generation from the forest?

6.3.2 Indicators of evaluative questions

Based on these sub-ordinate evaluative questions, the following indicators are formulated. For gender participation, the indicators are the number and the positions of men and women as the member and board members of FFG:

1) How many men and women are members and board members in FFG in the beginning of the project and at the end of the project?
2) How many men and women have the positions as the head, secretary, and treasurer in FFG in the beginning and at the end of the project?

As for the forest rehabilitation, the indicator is the number of perennial permanent trees with high canopy:

1) How many perennial permanent trees with high canopy per hectare have grown in the project area before the CbSFMGS Project?
2) How many perennial permanent trees with high canopy per hectare have grown in the project area after the CbSFMGS Project?

For the income generation, the indicator is the percentage of household income derived from forest sources of the members of FFG:

1) What is the percentage of annual household income derived from forest sources of the members of FFG before their involvement in the project?
2) What is the percentage of annual household income derived from forest sources of the members of FFG after their involvement in the project?

6.3.3 Evaluation design: the data collection and analysis

The data collection for evaluative question number 1 use List Question A. (Attachment), for evaluative question number 2 use List Question B (Attachment), and for evaluative question number 3 use List Question C (Attachment).

The analyses are applied to the three evaluative questions. Regarding the first question, the analysis concerns the calculation of the number of men and women participation as members and board members of FFG as well as their positions in FFG. The calculation will be shown by using the percentage (Outcome Table 1 and 2).

As for the second question, rehabilitation, the analysis is conducted by calculating the average number of perennial permanent trees with high canopy per hectare in SMPF before and after the CbSFMGS Project based on each gender (men and women) (Outcome Table 3 to 6). Following this, t-test is used to reveal whether the difference of the average number of perennial trees with high canopy per hectare in SMPF before and after the CbSFMGS Project from each gender (men and women) is significantly increasing. Another t-test is performed to examine whether the increase of the number of trees between gender (men and women) is significantly different.

The third analysis deals with the income generation. The analysis involves the calculation of percentage of the household income derived from protection forest source of the FFG members before and after the CbSFMGS Project from each gender (men and women). Following this step, based on Weiss (1998), I will convert the total annual household income to the current value using the average inflation rate range from the year before the project started until the exact year of the completion of the annual family income data collection (Outcome Table 7 to 9).

Based on the results of the conversion, the analysis performs t-test to examine whether the increase is significant. Then, a t-test is used again to examine whether the difference of the average of the total annual household income before and after the CbSFMGS Project between gender (men and women) is significant.

Furthermore, the average total annual household income after the project will be compared to the poverty line and the regional and national income per capita in the exact year of the completion of the data collection of the annual family income.

The number of FFG members as samples will be determined based on a statistical consideration to maintain the internal validity of the evaluation. Moreover, the outside effects will be carefully taken into account to enhance the internal validity of the evaluation. The outside effects are like the source of trees that FFG members might receive from other projects, such as replanting and reforestation programs.

7. CONCLUSION AND RECOMMENDATION

7.1 Conclusions

The main problem underlying the proposal of the Community-based Sustainable Forest Management Gender Sensitive (CbSFMGS) Project is the deforestation brought about by the agricultural encroachment in the Soputan Mountain protection forest near Ampreng village in the province of North Sulawesi. As a consequence, given the other vicious cycles of problems, like low education and inadequate pro-poor policy, poverty also seems to be the major problem in this area.

The CbSFMGS Project provides potential solutions to the deforestation problem by taking into account three crucial factors: 1) gendered knowledge, 2) gendered rights and responsibilities, and 3) gender organizations in Ampreng village. The incorporation of these context-sensitive factors optimizes the program because the local community is given opportunities to be actively involved, heightening their sense of ownership to the forest. Besides the rehabilitation, the program focuses on the forest utilization to increase income through the agroforestry system. In other words, the program not only restores the forest but also enhances the community's quality of life.

Concerning the gendered knowledge, there are differences and similarities between men and women in Ampreng Village. They both possess and practice local knowledge of forest resources usage, conservation rules, and soil conservation techniques. However, only the men are familiar with hunting techniques and the conservation rules. Both men and women possess and practice local environmental knowledge regarding the usage and protection of plants, mainly trees, and water. However, information about tree usage is not disaggregated by gender, and the men and women who possess and practice local environmental knowledge are on the decline. Local knowledge and practices could help design environmentally sustainable and economically rewarding farming systems for the village. It can also help men and women within local community's to select appropriate trees for both subsistence and cash needs, avoid misuse or overexploitation of forest resources, and provide a basis for rules regarding access to the forest and its resources.

As for the gendered rights and responsibilities, there are differences and similarities between how men and women utilize forest resources to meet their basic needs and cash demands. Men cut trees illegally, trap rats, collect medicinal plants, and process traditional beverages and brown sugar. Both men and women trespass the protection forest to cultivate cash crops. Not only men and women, but also the young, gather fuel wood and water. Forest resources are not utilized in a sustainable manner due to overexploitation and chemical use in agricultural activity inside the forest. There is tremendous deforestation due to excessive tree cutting. The soil is damaged and polluted by the overuse of chemical fertilizers and pesticides in farming cash crops. Other forest products, such as rats and fuel wood have declined as a result of deforestation and as a result, some men are looking for jobs outside the village. Sustainable forest use would eliminate overexploitation of forest resources and employ environmentally friendly farming techniques. Agro-forestry – a combination of crops, trees, and/or animal husbandry – play a key role, providing basic needs and cash along with environmental

services such as biodiversity maintenance, carbon storage, natural fertilizer, recreation, eco-tourism resources, a healthy watershed, reliable water supply, and reduction of natural hazards such as floods and landslides.

Regarding the gendered organizations, women have an equal opportunity with men in decision making and management at the household level. However, the same does not occur at the community level. The women have their own organizations and have an equal opportunity with men in terms of being board members in social organizations but women have fewer opportunities than men at the village level, the church, and environmental organizations in terms of becoming board members. Women can contribute to decision making by having a voice and right to select trees to plant for food, fuelwood, and medicinal use connected to their responsibilities with the family.

Based on the findings, user rights in the protection forest are necessary for Ampreng villagers. User rights can provide the agricultural encroachment of the landless and the near-landless with the legality to cultivate in the forest while maintaining the forest's ecological health. Thus, I proposed the Community-based Sustainable Forest Management Gender Sensitive Project under the Community Forestry (CbSFMGS) Project.

The project will provide the villagers, through Forest Farmer Group (FFG), with user rights and the chance to receive funding, assistance, and facilitation from the central government through the Minahasa District Forest Services. The project will address the issues of poverty, deforestation, and gender inequity. It will draw upon both local knowledge and practices in the village and appropriate modern knowledge and practices from outside the village. To address poverty and deforestation, the project will implement an agroforestry system to meet the basic needs of villagers by increasing household income and to increase land cover by increasing the number of perennial permanent trees. Other ways that the suitable management project increases household income are the farming of products with high return and the establishment of environmentally friendly home industries or eco-enterprises. To address gender inequity, the project also provides men and women with an equal opportunity to be members and serve as board members in the FFG. Also, women have equal opportunity as men to have both financial and facilities assistance from the government in order to rehabilitate the forest and increase their income.

To ensure the success of the program, the evaluation program is also designed based on three key issues: 1) gender equity in relation to forest rehabilitation and income generation from forest products, 2) forest rehabilitation, and 3) income generation from forest products. Forest rehabilitation concerns the number of perennial permanent trees with a high canopy and income generation, which is annual household income derived from forest-related activities. The gender equity focus on four measurements: the percentage of women members, percentage of women board members, number of permanent perennial trees with high canopy, and annual household income derived from the forest.

Finally, it is necessary to emphasize that successful forest programs need to include both genders equally. This should be based on the local's community underlying values, knowledge, and skills. Putting it succinctly, despite the importance of governmental support and funding, the involvement of the local community elements should not be overlooked.

7.2 Recommendations

This study found that there is a need for further research about gender and forest, focusing on perception, knowledge, and practices related to forest change. Further research findings contribute to improved community forestry development policy. The theoretical framework of further research is based mainly on gender theory, social system theory and forest system theory. The theory helps to understand how local community's perception and knowledge is used to make decisions regarding forest use. The local perception and knowledge are affected by political, socio-economic, and environmental factors. Fieldwork methods include open-ended interviews and observation of the community and forest.

The CbSFMGS Project under CFP is recommended urgently for land rehabilitation and livelihood for encroachers. Since the Soputan Mountain Protection Forest is currently illegally encroached by the village people for agricultural activity, it is necessary to take urgent actions to avoid its further expansion, recover forest function, and prevent further natural hazards.

References

Ardayfio-Schandorf, Elizabeth. 2007. Gender Mainstreaming In Forestry In Africa: Ghana. Retrieved on November 25, 2007from ftp://ftp.fao.org/docrep/fao/010/k0745e/k0745e00.pdf

Barton 2000a. The Neighborhood as Ecosystem. in Sustainable Communities: The Potential for Eco-neighborhoods. Earthscan Publication Ltd. London.

Barton, 2000b. Conflicting Perception of Neighborhood. in Sustainable Communities: The Potential for Eco-neighborhoods. Earthscan Publication Ltd. London.

But, Nathalie and Martin F. Price. 1999. Mountain People, Forests, and Trees: Strategies for Balancing Local Management and Outside Interests. Synthesis of an Electronic Conference, April 12 - May 14. Retrieved on November 18, 2007 from http://www.mountainforum.org/rs/econfreports/MountainPeopleForestsAndTrees.

Chaturvedi, Rashmi. 1998. Gender-based planning in India: An assessment of "women-oriented strategies". Ph.D. dissertation, Purdue University, United States – Indiana. Retrieved January 31, 2008, from ProQuest Digital Dissertations database. (Publication No. AAT 9900168).

Chikahisa, T, H. Anzai, Y. Hishinuma and K. Kudo. 2005. Modeling and evaluating the effect of forest fire control on the CO2 cycle in Siberia, Energy Volume 30, Issues 11-12, International Symposium on CO2 Fixation and Efficient Utilization of Energy (CandE 2002) and the International World Energy System Conference (WESC- 2002), August-September 2005, Pages 2261-2274. Retrieved on July 6, 2007 from http://www.sciencedirect.com/science/article/B6V2S-4DKGYC3-3/2/5aabefedf29581db237d1fc085bad987)

Clarke W. C and R. R. Thaman 1993**.** Agroforestry in the Pacific Islands: Systems for Sustainability. Tokyo: United Nations University Press. Retrieved 9 November 2006 from http://www.unu.edu/unupress/unupbooks/80824e/80824eOO.htm

Cordes, Bernd. 1999. Doing Business in Borneo. *Lessons from the Field,* Issue BCN-2. Biodiversity Support Program, Washington, D.C., USA. Retrieved on February 2, 2008 from http://www.worldwildlife.org/bsp/publications/bcn/lessons/lessons2.html#Preface

FAO and UN. 1989. Community forestry rapid appraisal of tree and land tenure. Community Forestry Note 5. Prepared by John W. Bruce.

FAO. 1997. Women's participation in national forest programmes. Retrieved on November 2007 from http://www.fao.org/docrep/W6206E/w6206e00.htm#Contents

Fortmann, Louise. 1996. Gendered knowledge: Rights and space in two Zimbabwe villages: Reflection on methods and finding. in Rocheleau, D., B. Thomas-Slayter and E. Wangari. Eds. 1996. Feminist Political Ecology: Global Perspectives and Local Experiences. Routledge. London.

Forest Watch Indonesia, Global Forest Watch, World Resource Institute. 2002. The State of the Forest: Indonesia.

Limberg, G., Ramses Iwan, Eva Wollenberg, and Moira Moeliono. 2006. Peluang dan tantangan untuk mengembangkan Hutan Kemasyarakatan: Pengalaman dari Malinau. CIFOR Governance Brief 15b. 6p Retrieved on September 5, 2008 from ttp://www.cifor.cgiar.org/publications/pdf_files/govbrief/GovBrief0619.pdf

Japan International Cooperation Agency (JICA). 2001. The study on Critical Land and Protection Forest Rehabilitation at Tondano Watershed in the Republic Indonesia. JICA and Directorate General of Land Rehabilitation and Social Forestry, Ministry of Forestry, the Republic of Indonesia. Nippon Koei Co. Ltd and Kokuasi Kogyo Co.Ltd.

Kantor Menteri Negara Pemberdayaan Perempuan dan United Nations Population Fund (UNFPA). 2000. Buku Fakta: Isu Jender dalam Pembangunan di Indonesia.

Kartika, Sofi. 2002. Dapur, Ruang bagi Perempuan dalam Jurnal Perempuan No 21 Perempuan dan Ekologi. Yayasan Jurnal Perempuan, Jakarta.

Lindayati, Rita. 2000. Community Forestry Policies in Selected Southeast Asian Countries. ENRM Working Paper Number 6. Retrieved on 23 April 2005 from http://www.idrc.ca/uploads/user-S/111711295116Lindayati.pdf

Lindayati, Rita. 2003. Ideas and Policy Change: Indonesia's Locally-Based Forest Management Policy. Dissertation in York University, Toronto, Ontario, Canada.

Manginsela, Elsje P., A. E. Wahongan, and M. Tuturoong. 2002. Women's Roles in Conservation of Soputan Mountain Protection Forest: A Gender Analysis Case Study. Women's Studies Center. Sam Ratulangi University, Manado.

Margoluis, Richard, and Nick Salafsky. 1998. Measures of Success: Designing, Managing, and Monitoring Conservation and Development Projects. Island Press, Washington, D.C.

Marten, Gerry. 2007. About EcoTipping Points. Retrieved on April 23, 2007 from http://www.ecotippingpoints.org/aboutetps.html

Minahasa Statistic Office, 2002. Minahasa dalam Angka (Minahasa in Number). Tondano, Minahasa, North Sulawesi, Indonesia.

Minister of Forestry. 1995. Forestry Ministerial Decree No. 622/Kpts-II/1995. Republic of Indonesia. Jakarta.

Minister of Forestry and Estate. 1998. Forestry and Estate Ministerial Decree No. 677/Kpts-II/1998. Republic of Indonesia. Jakarta.

Minister of Forestry. 2001. Forestry Ministerial Decree No. 31/Kpts-II/2001. Republic of Indonesia. Jakarta.

Minister of Forestry. 2007. Forestry Ministerial Decree P. 37/Menhut-II/2007. Republic of Indonesia. Jakarta.

Minerbi, Luciano. 1999. "Indigenous Management Models and the Protection of the Ahupua'a" in Ibrahim Aoude' guest ed. Social Process in Hawaii. pp. 208-225.

Minerbi, Luciano. 2001. "Modern Watershed Planning and Traditional Ahupua'a Management in Waipi'o, Hawaii. Paper presented at the Seventh National Watershed Conference May 20-23, 2001, Richmond VA

Moser, Caroline. O.N. Gender planning and development : theory, practice, and training London ; New York : Routledge, 1993.

Nanang, Martinus. and Makoto Inoue. 2000. Local Forest Management in Indonesia: A Contradiction between National Forest Policy and Reality. International Review for Environmental Strategies. Vol. 1, No. 1, pp 175- 191, 2000. Retrieved on 6 July, 2005 from http://www.iges.or.jp/en/pub/ires/pdf/vl1_n1/a7.pdf

North Sulawesi Statistic Office, 2002. Number of North Sulawesi (Sulawesi dalam Angka). Manado, Indonesia.

Rocheleau, D., B. Thomas-Slayter and E. Wangari. Eds. 1996. Feminist Political Ecology: Global Perspectives and Local Experiences. Routledge. London.

Rocheleau, Dianne E. 2007. Political ecology in the key of policy: From chains of explanation to webs of relation, Geoforum, In Press, Corrected Proof, Available online 23 May. (http://www.sciencedirect.com/science/article/B6V68-4NT2539-1/2/4c97a308b9361c75e9a44207058f5407)

Saunders, Kriemild. 2002. Feminist Post-Development Though: Rethinking modernity, postcolonism & representation. Zed Books. London and New York.

Salafsky, Nick., Bernd Cordes, John Parks, and Cheryl Hochman. 1999. Evaluating Linkages between Business, the Environment, and Local Communities. Biodiversity Conservation Network. Retrieved on February 2, 2008 from http://www.worldwildlife.org/bsp/publications/bcn/analytical/analytical.pdf

Sanzida Baten, Cassia. 2005. Participatory forestry in Bangladesh: Agroforestry projects, policy and poverty alleviation. M.Sc.F. dissertation, University of Toronto (Canada), Canada. Retrieved January 31, 2008, from ProQuest Digital Dissertations database. (Publication No. AAT MR07291).

Schroeder, Richard A. 1999. Shady Practices Agroforestry and Gender Politics in the Gambia. Berkeley, Los Angeles, Oxford. University of California Press.

Suutari, Amanda. 2007. Ecosystem Restoration with Agroforestry and Community Forests In Nakhon Sawan, Thailand. Editorial contributions: Andrew Mittelman, Gerry Marten, Regina Gregory. Retrieved on April 23, 2007 from http://ecotippingpoints.org/ETP-Stories/indepth/thailandforest.html

Swack, Michael. January 16-17, 1990. "Economics and People: A Case for Community Economic Development". Conference on Community Development. Dominica. Unpublished Paper.

Weiss, Carol H. 1998. Evaluation: Methods for Studying Programs and Policies. Prentice Hall.

World Rainforest Movement (WRM). 2002. Philippines: Lessons on gender from community based forest management WRM's bulletin Nº 58, May, retrieved on May 24, 2007 from http://www.wrm.org.uy/bulletin/58/Philippines.html

World Rainforest Movement. 2004. Community Forests: Equity, Use and Conservation. retrieved on December 3, 2006 from www.wrn.org.uy

Yong, Kate. 1993. Planning development with women: making a world of difference. St. Martin's Press. New York.

Newspaper:

Komentar News, 6 August 2002. Fokus: Hutan Minahasa paling banyak rusak (Focus: Minahasa Forest is the most damage). Page 5.

Komentar 5 Mei 2007. Dishut tak Punya Data Kerusakan Hutan. Retrieved from on 27 September 2007 from http://www.hariankomentar.com/

Komentar, 06 Juni 2007. Pusat kucur Rp 7 miliar Bupati Janji Hijaukan Minahasa. Retrieved on 8 October 2007 from http://www.hariankomentar.com/

Komentar, 14 December 2006. Dishut Akui Pengawasan Hutan Minim. Retrieved from on 27 September 2007 from http://www.hariankomentar.com/

Kompas 25 Januari 2007. Pengrusakan Hutan di Indonesia Terjadi di Mana-mana. Laporan Wartawan Kompas: Yurnaldi. Retrieved on 25 Januari 2007 from http://www.kompas.com/kompas-cetak/

Kompas, Minggu, 09 September 2007. Pemimpin APEC Kurangi Efek Rumah Kaca Bush Beri 20 Juta Dollar AS untuk Pengelolaan Hutan Indonesia. By Suryopratomo. Retrieved on 09 September 2007 from http://www.kompas.com/kompas-cetak/

Kompas 25 September 2007. Hutan dan Pemanasan Global. Transtoto Handadhari Retrieved on 25 September 2007 from http://www.kompas.com/kompas-cetak/

Kompas, Jumat, 28 September 2007. Dephut Minta Warga Sekitar Ikut Jaga Hutan: Kegiatan Perkebunan di Lahan PLG Dihentikan Sementara. Retrieved from on 28 September 2007 from http://www.kompas.com/kompas-cetak/

Suara Pembaruan Daily, 8 October 2007 Masyarakat Harus Menanam Pohon di Lahan Kritis. Retrieved on 9 October 2007 from http://www.suarapembaruan.com/

Attachment

List of Questions and Outcome Tables for Project Evaluation Plan

A. List of Questions to answer evaluative question number 1
The data can be collected from FFG documentation or key informant

Gender participation at the beginning of the project
How many women and men are the members of the group?
How many women and men are the members of the board?
What positions do women and men have in the FFG (Head, Secretary, and Treasure)?

Gender participation at the end of the CbSFMGS:
How many women and men are the members of the group?
How many women and men are the members of the board?
What positions do women and men have in the FFG (Head, Secretary, and Treasure)?

B. List of Questions to answer evaluative questions number 2 and 3
The Family survey of men and women as FFG members and as CbSFMGS Project participants before and after the project

Name of respondent _____
Gender _____

Respondent profile:
What is your main occupation?
What is the number of your family members (Adult male, Adult female, Children, Total)?
What is their respective age (Age structure)?

Before the project

1. What is your status before participating in this project:
   Landless ( ) go to number 5
   Have land ( ) go to number 2

2. Do you have any land inside the protection forest before participating in the project?
   Yes – go to number 3
   No – go to number 5

3. How much land do you have inside the protection forest?
   Go to number 4

Number of trees

4. How many trees do you have in your land inside the protection forest last year before joining the project? Specify according to the age and the name of trees?

Name	Number of trees	Age of trees
1.		
2.		
3.		

Go to number 6

Household Income

5. What is the total monthly income of your family from all sources (both in cash and in non-cash) last year before joining the project? (From April to March)

Sources	Income in cash and in non-cash
1. From Protection Forest	
2. From Non Protection Forest	

Go to number 11

6. Did you get **agricultural products** (such as tomatoes, leaf onion) from the land inside the protection forest last year?
   If yes, what was the output last year (from April to March)?
   (Output is the quantity of the product converted to IDR (Indonesia Rupiah)
   what were the inputs last year?
   (Input is the cost to buy seed, fertilizer, insecticide, et last year?

7. Did you get **fruits** (such as mangoes and avocado) from the land inside the protection forest last year?
   If yes, what was the output last year (from April to March)?
   (Output is the quantity of the products converted to IDR (Indonesia Rupiah)
   what were the inputs last year ?
   (Input is the cost to buy seed, fertilizer, insecticide, etc last year)

8. Did you get **forest product** (such as timber) from the land inside the protection forest last year?
   If yes, what was the output last year (from April to March)?
   Output is the quantity of the products converted to IDR (Indonesia Rupiah)
   what were the inputs last year?
   Input is the cost to buy seed, fertilizer, insecticide, etc last year

9. Do you have any land outside the protection forest?
   Yes – go to number 10
   No – go to number 12

10. If yes, how much land do you have outside the protection forest?

11. From the land outside the protection forest last year did you get:
    - agricultural products,
    - fruits,
    - forest products, and
    - livestock

    What were the inputs for agricultural product, fruits, forest product, livestock last year?
    What were the outputs from agricultural products, fruits, forest products, livestock per last year?

12. Do you have other sources for your income?
    Yes – go to number 13
    No – go to number 14

13. If yes, what is your the total income from other sources?

After the project

Number of trees

14. How much forestland do you receive by participating in the CbSFMGS Project in the protection forest?

15. How many trees do you have in your land in the protection forest last year according to the age and the name of trees?

Name	Number of trees	Age of trees
1.		
2.		
3.		

Household Income

The questions for number 15 to number 21 are the same as number 6 to 12

22. Do you have other sources for your income? If yes, what is the total income?

C. Outcome Tables

1. Outcome Tables for the answer of Evaluative Question Number 1: Gender Equity

Table 1. Gender Participation as members and board members

	the beginning of the CbSFMGS Project		**the end of the CbSFMGS Project**		**Change (Increase or decrease)**
	Number	Percentage	Number	Percentage	
Members of the Group					
- Men					
- Women					
Total					
Members of the Board					
- Men					
- Women					
Total					

Table 2. Gender position (men and women) in the board

Positions in the Board	the beginning of the CbSFMGS Project		the end of the CbSFMGS Project	
	Men	Women	Men	Women
Chair				
Secretary				
Treasurer				

2. Outcome Tables for the answers of the Evaluative Question Number 1 and 2: Gender Equity and Forest Rehabilitation

Table 3. Perennial permanent trees with high canopy of FFG members in the SMPF before the CbSFMGS Project

Name of members	Gender	Name of perennial permanent trees with high canopy in SM protection forestland with number											
		1	2	3	4	5	6	7	8	9	10	Others	Total
		Candle nut	Cinnamon	Mango									
1	Men												
2	Men												
3	Men												
4	Men												
5	Men												
…	Men												
n	Men												
1	Women												
2	Women												
3	Women												
4	Women												
5	Women												
…	Women												
n	Women												

Table 4. Perennial permanent trees with high canopy of FFG members in the SMPF after the CbSFMGS Project

Name of members	Gender	Name of perennial permanent trees with high canopy in SM protection forestland with number											
		1	2	3	4	5	6	7	8	9	10	Others	Total
		Candle nut	Cinnamon	Mango									
1	Men												
2	Men												
3	Men												
4	Men												
5	Men												
…	Men												
n	Men												
1	Women												
2	Women												
3	Women												
4	Women												
5	Women												
…	Women												
n	Women												

Table 5. Mean of the number of perennial permanent trees with high canopy

	Before	**After**	**Types of Test**
Men's mean number of trees			Differences of Means Test. Using t-test
Women's mean number of trees			Differences of Means Test. Using t-test
Total means number to trees (Men and Women)			Differences of Means Test. Using t-test

Table 6. The increase of mean of the number of perennial permanent trees with high canopy

	Increasing		**Differences of Means Test. Using t-test**
	Men	**Women**	
Average number of trees			

3. Outcome Table for the answer of the Evaluative Question Number 1 and 3: Gender Equity and Household Income

Table 7. Total Annual Household Income of FFG members before CbSFMGS Project

Name of members		Vegetables	Fruits	Forest trees	Fuel Wood	Traditional Beverages (*Saguer* and *Cap Tikus*)	Brown Sugar	Wild Animal	Others	Total income from protection forest land	Total income from non-protection forest land	Total Income
1	Men											
2	Men											
3	Men											
4	Men											
5	Men											
…	Men											
n	Men											
1	Women											
2	Women											
3	Women											
4	Women											
5	Women											
….	Women											
n	Women											

Table 8. Total Annual Household Income of FFG members after CbSFMGS Project

Name of Participants		Vegetables	Fruits	Forest Trees	Fuel Wood	Traditional Beverages	Brown Sugar	Forest Animal	Others	Total income from protection forest land	Total income from non-protection forest land	Total Income
1	Men											
2	Men											
3	Men											
4	Men											
5	Men											
…	Men											
n	Men											
1	Women											
2	Women											
3	Women											
4	Women											
5	Women											
…	Women											
n	Women											

Table 9. Total Annual Household Income Before and After the Project

ID	Annual Household Income Before the project		Current Value of Annual Income Before the project		Annual Household Income After the project		Gender
	Forest	Non-forest	Forest	Non-forest	Forest	Non-forest	
1							Men
2							Men
3							Men
4							Men
5							Men
…							Men
n							Men
1							Women
2							Women
3							Women
4							Women
5							Women
.							Women
n							Women
Men Total							-
Men Mean							-
Women Total							-
Women Mean							-

Note: *) Use average of inflation for at least 20 years to calculate current value

Table 10. Mean of the annual household income

	Current Value of Annual Income **Before the project**	**After**	**Types of Test**
Men's mean - From Forest - From non-Forest			Differences of Means Test. Using t-test
Women's mean - From Forest - From non-Forest			Differences of Means Test. Using t-test
Total means (Men and Women) - From Forest - From non-Forest			Differences of Means Test. Using t-test

Table 11. The increase of mean of the annual household income

	Increasing		**Differences of Means Test. Using t-test**
	Men	**Women**	
Average annual household income - From Forest - From non-Forest			